

THE EFFECT OF SOCIAL MEDIA USAGE, BIG
FIVE PERSONALITY TRAITS, FRUGALITY,
AND IMPULSE BUYING BEHAVIOUR ON
FOOD WASTE: MODERATING ROLE
OF GENERATIONAL COHORTS

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UNIVERSITI KEBANGSAAN MALAYSIA

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MODERATING ROLE OF GENERATIONAL COHORTS

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UNIVERSITI KEBANGSAAN MALAYSIA

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HATI TERHADAP PEMBAZIRAN MAKANAN: PERANAN PENYEDERHANA
KOHORT GENERASI

AISHATH LAHATH

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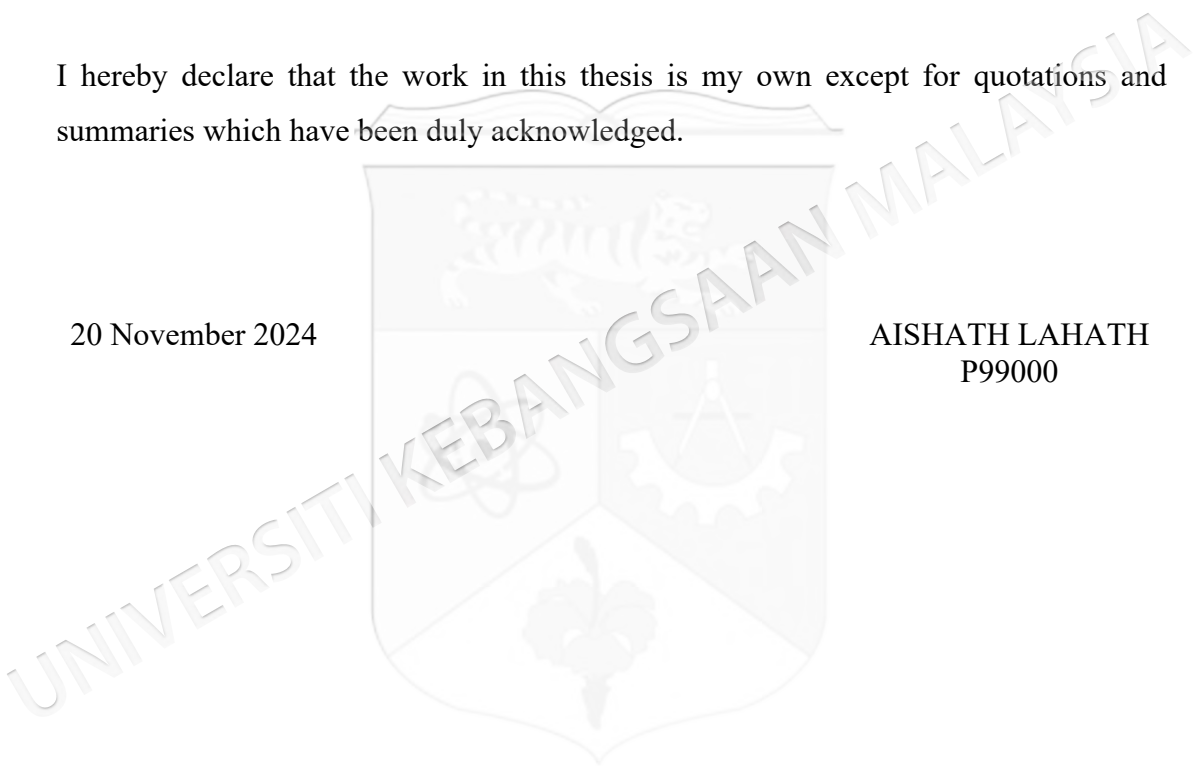
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DECLARATION

I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

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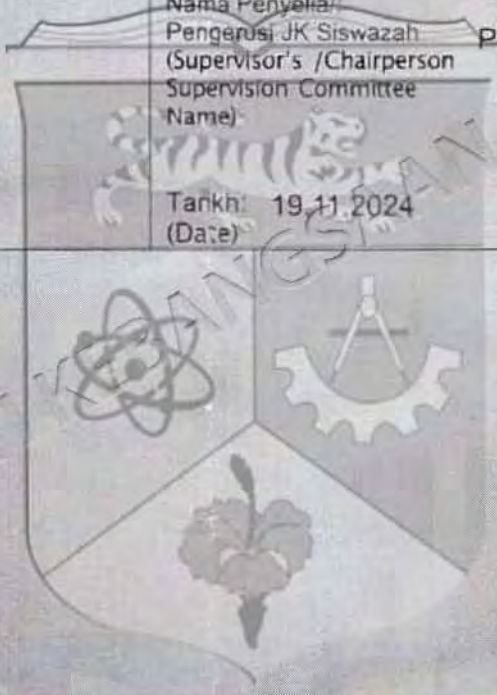
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ABSTRAK

Setiap tahun, satu pertiga makanan yang dihasilkan di dunia dibazirkan, dan ini menjadi cabaran besar terhadap pembangunan mampan. Pandemik COVID-19 telah memberi impak signifikan terhadap isu ini, termasuk di Malaysia, di mana jumlah pembaziran makanan yang dilaporkan bersamaan dengan jumlah untuk memberi makan kepada 3 juta orang setiap hari. Tindakan menangani krisis ini penting agar dapat memenuhi Matlamat Pembangunan Mampan (SDG) Pertubuhan Bangsa-bangsa Bersatu (UN) untuk mengurangkan pembaziran makanan per kapita sebanyak separuh menjelang 2030. Pandemik COVID-19 telah mengubah tingkah laku pengguna, dengan meningkatkan belian gerak hati didorong oleh perasaan risau dan ketidaktentuan, menyebabkan penyimpanan stok dan pembaziran makanan. Penggunaan media sosial meledak, mungkin mempengaruhi keputusan penggunaan, manakala personaliti dan sikap berjimat membentuk tingkah laku yang mempengaruhi pembaziran makanan. Kajian ini menyelidik kesan penggunaan media sosial, Lima Sifat Utama Personaliti, dan sikap berjimat terhadap terhadap pembaziran makanan, serta tingkah laku belian gerak hati sebagai pengantara, dan mengkaji peranan penyederhana Generasi X, Y dan Z terhadap pengaruh media sosial ke atas tingkah laku belian gerak hati. Satu model baharu dibangunkan dan diuji berpandukan tiga teori iaitu model Rangsangan-Organisma-Gerak Balas (S-O-R) yang dikonsepsikan semula, Model Lima Faktor (FFM) dan teori kohort generasi. Model S-O-R mengkaji bagaimana rangsangan membawa kepada respons menerusi proses dalaman, manakala FFM mengkategorikan Lima Sifat Utama Personaliti. Teori kohort generasi mengumpulkan individu dalam kelompok generasi. Data diperoleh daripada 387 orang pengguna Malaysia menerusi borang kaji selidik kuantitatif dalam talian. Dapatan mendedahkan penggunaan media sosial, neurotisisme, keterbukaan dan sikap berjimat dapat meramal tingkah laku belian gerak hati. Neurotisisme, kehematan, kebersetujuan, sikap berjimat dan tingkah laku belian gerak hati mempengaruhi pembaziran makanan dengan signifikan. Tingkah laku belian gerak hati menjadi perantara hubungan antara penggunaan media sosial, neurotisisme, dan sikap berjimat terhadap pembaziran makanan. Tambahan lagi, terdapat kesan penyederhana Generasi X, Y dan Z pada penggunaan media sosial terhadap tingkah laku belian gerak hati. Dapatan ini memberikan maklumat bernilai kepada pemasar, pembuat dasar, dan kumpulan sivik dengan membantu dalam pembuatan keputusan bagi mengurangkan pembaziran makanan dan melaraskan dengan komitmen Malaysia untuk mencapai SDG dalam penggunaan mampan, meskipun berhadapan peristiwa yang tidak pernah berlaku seperti pandemik COVID-19.

ABSTRACT

Every year, one-third of the world's produced food is wasted, posing a major challenge to sustainable development. The COVID-19 pandemic has significantly impacted this issue, including in Malaysia, where reported food waste is equivalent to feeding 3 million people daily. Addressing this crisis is crucial to meet the United Nations' Sustainable Development Goal (SDG) of halving global per-capita food waste by 2030. The pandemic reshaped consumer behaviour, amplifying impulse buying driven by fear and uncertainty, leading to stockpiling and food waste. Social media usage surged, potentially influencing consumption decisions, while personality traits and frugality shaped behaviours affecting food waste generation. This study examines the effects of social media usage, the Big Five personality traits, and frugality on food waste, with impulse buying behaviour as a mediator, and investigates Generations X, Y, and Z's moderating role on social media's influence on impulse buying behaviour. Guided by the reconceptualised Stimulus-Organism-Response (S-O-R) model, Five-Factor Model (FFM), and generational cohort theory, a novel model was developed and tested. The S-O-R model examines how stimuli lead to responses via internal processes, while the FFM categorises the Big Five personality traits. Generational cohort theory involves grouping individuals into generations. Data were gathered from 387 Malaysian consumers via an online quantitative survey. Findings revealed social media usage, neuroticism, openness, and frugality predict impulse buying behaviour. Neuroticism, conscientiousness, agreeableness, frugality, and impulse buying behaviour significantly influenced food waste. Impulse buying behaviour mediated the relationships between social media usage, neuroticism, and frugality on food waste. Additionally, Generation X, Y, and Z moderated the effect of social media usage on impulse buying behaviour. These findings provide valuable insights for marketers, policymakers, and civic groups, aiding informed decision-making to reduce food waste and align with Malaysia's commitment to achieving the SDG on sustainable consumption, despite unprecedented events like the COVID-19 pandemic.

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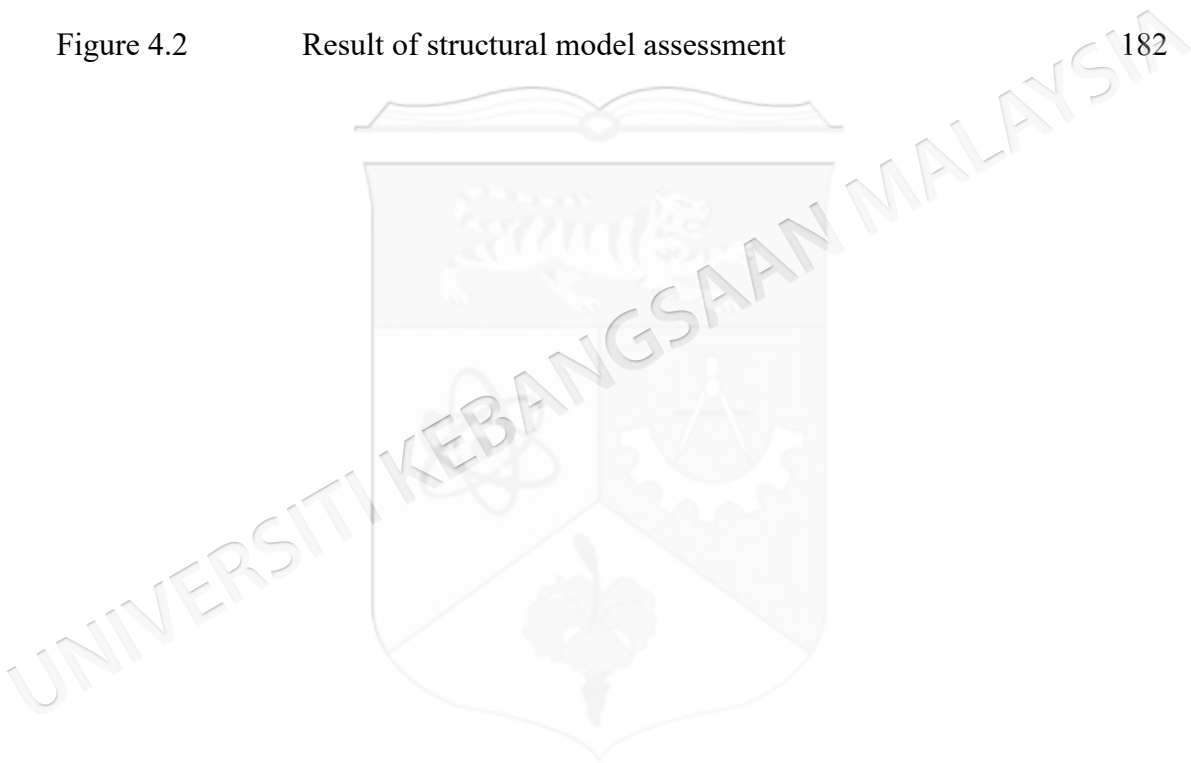
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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BFI	Big Five Inventory
BOGOF	Buy One, Get One Free
CB-SEM	Covariance-Based Structural Equation Modeling
EC	European Commission
FAO	Food and Agriculture Organization
FFM	Five-Factor Model
HTMT	Heterotrait-Monotrait
LM	Linear Regression Model
MCO	Movement Control Order
PLS	Partial Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modeling
RMSE	Root Mean Squared Error
SDG	Sustainable Development Goal
SEM	Structural Equation Modeling
S-O-R	Stimulus-Organism-Response
SPSS	Statistical Package for Social Sciences
SWCorp	Solid Waste and Public Cleansing Management Corporation
UN	United Nations
VIF	Variance Inflation Factor
WRI	World Resources Institute

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

This chapter provides an overview of the research. Following the introduction in section 1.1, section 1.2 presents the background to the research. Section 1.3 details the problem statement, whereas section 1.4 highlights the research questions. The research objectives and contributions of the research are specified in sections 1.5 and 1.6, respectively. Finally, section 1.7 outlines the definitions of the research constructs, followed by the organisation of the research in section 1.8.

1.2 BACKGROUND TO THE RESEARCH

The COVID-19 global pandemic profoundly impacted individual lives, prompting people to live, purchase, and think in new ways. This unprecedented event has brought about increased anxiety and uncertainty, particularly regarding health and livelihoods (Dong & Bouey 2020). With various lockdown measures implemented to contain the spread of the virus, people have had to adapt to drastic lifestyle changes (Pappalardo et al. 2020).

The pervasive anxiety stemming from uncertainties surrounding the pandemic, coupled with the spread of the disease, has led to widespread panic among the population (Hossain et al. 2020). Limited access to essential goods, including food, due to disrupted supply chains has exacerbated this panic, prompting individuals to engage in impulse buying behaviour out of fear of scarcity (Nielsen 2020). Consequently, this surge in panic-driven purchases has contributed to heightened levels of food waste, as

excessive buying often results in unused or spoiled food items (Australian Associated Press 2020; Rabobank 2020).

The environment created by the pandemic exacerbated the longstanding food waste issue before the global health crisis (Berjan et al. 2022). According to the Food and Agriculture Organization (FAO) of the United Nations (UN), almost one-third of the world's produced food for human consumption is wasted (Gustavsson et al. 2011). This alarming level of food waste has aroused the interest of various researchers to understand the role of consumer behaviour that leads to food waste (Graham-Rowe et al. 2014; Leal Filho & Kovaleva 2015; Stefan et al. 2013). During the pandemic, impulse buying out of panic and the hoarding of large quantities of food were identified as drivers of food waste (Aldaco et al. 2020; Australian Associated Press 2020; Leal Filho et al. 2021).

A key factor amplifying impulse buying behaviour during the pandemic has been the increased use of social media platforms (Gazali 2020). With more time spent indoors and limited social interactions, individuals have turned to social media for information, entertainment, and connection (Fernandes et al. 2020). However, the overwhelming health-related news and concerns about limited supplies on these platforms have fuelled panic buying behaviours, like impulse buying (Naeem 2020). To reduce exposure to potential virus transmission, people engaged in excessive shopping, leading to increased food waste and less frequent visits to grocery stores (Berjan et al. 2022). Besides, information disseminated on social media has influenced consumer eating habits, particularly to adopt a healthier lifestyle amidst health risks during the pandemic (Hernandez et al. 2022). However, without proper storage or cooking knowledge, such changes in purchasing and consumption patterns led to reported levels of food waste during the movement restriction measures (Jribi et al. 2020).

Moreover, individual differences in personality traits, such as those outlined in the Big Five model (neuroticism, conscientiousness, agreeableness, extraversion, and openness), have influenced consumer responses to the pandemic (Di Crosta et al. 2021). For instance, individuals high in neuroticism may be more prone to anxiety and impulsive behaviours in response to stressful situations, such as a global pandemic

(Gazali 2020; Kohút et al. 2021). In contrast, those high in conscientiousness may exhibit more cautious and deliberate decision-making, mitigating the likelihood of impulse buys or stockpiling that can reduce wastage (Dammeyer 2020).

Furthermore, the economic ramifications of the pandemic have significantly impacted individuals' livelihoods, with many facing job losses or financial strain (Blomqvist et al. 2023). In response, individuals may adopt a more frugal lifestyle, prioritising essential expenses and seeking ways to stretch their resources to survive challenging times (Rayburn et al. 2021). Consequently, this shift towards frugality could lead to more mindful purchasing and resource utilisation, potentially curbing unnecessary expenditures and reducing waste (Aschemann-Witzel et al. 2022).

The pandemic has affected individuals across all age groups, including Generation X, Y, and Z, although in varying ways (Ceccato et al. 2021). Each generation's social media usage habits and responses to the pandemic may influence their engagement with consumer behaviours such as impulse buying differently (Snyder 2020; Zafar et al. 2021a). Younger adults, particularly Generation Z, tend to be more heavily engaged with social media than older generations (Taha et al. 2021). This increased engagement often leads to greater exposure to and consumption of online information, which can more significantly influence their behaviour during the pandemic (Nwachukwu et al. 2020). While younger adults may consume more social media content, older adults might be more selective in their information sources, potentially leading to different impacts on their buying behaviours (Jílková & Králová 2021). These generational differences in information consumption and processing can result in varied consumer responses to crises like the COVID-19 pandemic.

The combination of factors such as social media usage, the Big Five personality traits, frugality, and generational influences shapes consumer behaviour during the COVID-19 pandemic. This complex environment has significant implications for impulse buying and, consequently, food waste, a critical issue that has been exacerbated by the crisis.

1.3 PROBLEM STATEMENT

In recent years, the global community has become increasingly aware of the critical challenges posed by food waste (WFP 2022). This issue, which intersects with resource management, environmental sustainability, and food security, has garnered significant attention from scholars, policymakers, and practitioners alike (Cattaneo et al. 2021; Reynolds et al. 2019). Even before the COVID-19 pandemic brought many societal issues into sharper focus, the scale of food waste worldwide had reached alarming proportions (Gustavsson et al. 2011). According to a report by the Food and Agriculture Organization (FAO 2013), an estimated 1.3 billion tonnes of food—equivalent to one-third of the world's total food production—are wasted annually. This staggering figure not only represents a profound loss of resources but also exacerbates food security challenges, potentially hindering progress towards achieving the United Nations (UN)'s Sustainable Development Goal (SDG) of halving global per-capita food waste by 2030 (Aschemann-Witzel et al. 2016; UN 2015a).

Emerging economies like Malaysia are witnessing an intensification of this problem due to rapid urbanisation, economic growth, and demographic shifts (Aschemann-Witzel et al. 2018; Xue et al. 2017; van Grunsven & Benson 2020). During the pandemic, high levels of food waste were reported in Malaysia, with over 4,000 tonnes of edible food wasted daily, equivalent to providing three meals a day for three million people (Dermawan 2022). This alarming level of waste underscores the urgent need for action, particularly considering the UN's SDGs (Reynolds et al. 2019). As a UN member state, Malaysia is committed to SDG 12.3, which aims to halve per capita global food waste at the retail and consumer levels by 2030 (UN 2015a). Achieving this goal requires concerted efforts from all nations to significantly reduce food waste (Cattaneo et al. 2021). To address this critical issue and contribute to Malaysia's efforts in meeting SDG 12.3, this study aims to examine consumer food waste behaviour in Malaysia. The traditional belief that food waste primarily occurs at the production and post-harvest stages in developing countries such as Malaysia is challenged by recent findings suggesting significant consumer-level wastage (Dorward 2012; Kummu et al. 2012; Zainal 2021). This revelation calls for a paradigm shift in addressing food waste

in Malaysia, urging a closer examination of consumer behaviour within the country, particularly considering the significant changes brought about by the pandemic.

Despite substantial growth in consumer food waste research, significant gaps persist in understanding the complex factors influencing food waste at the consumption level (Wakefield & Axon 2020). The limited knowledge underscores the need for further research into the drivers and root causes of consumer food waste behaviour (Schanes et al. 2018). Failure to address these research gaps will hinder the development of effective measures, potentially impeding progress towards achieving global food security and environmental sustainability goals.

The COVID-19 pandemic has fostered an environment conducive to consumers engaging in impulse buying behaviour, potentially leading to increased food waste generation (Australian Associated Press 2020). Marketing practices, such as 'Buy One, Get One Free' (BOGOF) offers, are criticised for promoting excessive purchases, ultimately contributing to food waste (Welch et al. 2018). While many studies have examined food waste from a sociological perspective, focusing on social norms and cultural practices, there is a growing need to investigate individual behaviours, such as impulse buying, and their impact on food waste (Närvänen et al. 2018; Porpino 2016; Stancu & Lähteenmäki 2022). However, despite the recognised influence of impulse buying on food waste, there is a lack of quantitative research examining this relationship using validated measurement scales. This gap hinders accurate assessment of the effect of impulse buying on food waste, impeding the development of effective consumer-level interventions (Reynolds et al. 2019).

The COVID-19 pandemic accelerated the growth of social media usage, amplifying its influence on consumer behaviour and impulse buying tendencies (Naeem 2020). With movement restrictions, individuals increasingly turned to online shopping, including social commerce—the use of social media for shopping (Rashid et al. 2022). The spread of information and misinformation through social media during the crisis may have motivated consumers to engage in panic buying, leading to excessive impulse purchases and subsequent food waste (Australian Associated Press 2020; Dong & Bouey 2020). While social media research often focuses on online shopping influences,

its impact on potentially unsustainable consumer behaviours like overconsumption and impulse buying has received comparatively less attention (Djafarova & Bowes 2021; Gupta & Vohra 2019; Zafar et al. 2021b). Additionally, social media's impact on consumer behaviour regarding sustainable food consumption is relatively under-explored (Simeone & Scarpato 2020).

The COVID-19 pandemic has heightened the need to understand how individual differences in Big Five personality traits influence consumer behaviour, particularly in shaping responses to the crisis (Di Crosta et al. 2021). Traits such as Extraversion, as well as altered food consumption habits, have been notably associated with the pandemic's impact on decision-making processes (Kohút et al. 2021; Wang & Hao 2020). Research has connected the Big Five personality traits to impulse buying (Farid & Ali 2018; Leong et al. 2017; Shahjehan & Qureshi 2019) and environmental behaviours like waste management (Brick & Lewis 2016; Poškus & Žukauskienė 2017; Swami et al. 2011). However, results are mixed—especially concerning traits such as neuroticism (Fenton-O'Creevy & Furnham 2020; Rehman & Manjur 2018).

The pandemic has also led to the depletion of economic resources, with many resorting to a more frugal lifestyle (Rayburn et al. 2021). While frugality is about careful and controlled spending, there is also another facet where the frugal demonstrates strong deal-seeking tendencies (Kapitan et al. 2021). Despite frugality's far-reaching implications on consumption behaviours, such as impulse buying and food waste, the complex relationships between these factors require further investigation (Awais et al. 2020; Raippalinna 2022; Shoham et al. 2017).

While past studies have established the roles of social media usage, the Big Five personality traits, and frugality as predictors of impulse buying behaviour, and identified impulse buying as an antecedent to food waste, there is a notable gap in the literature. Current research lacks exploration of impulse buying behaviour as a mediator in food waste studies. Examining this mediating role is crucial. It could offer a more comprehensive understanding of how various factors influence food waste, potentially leading to more targeted and effective strategies for reducing food waste.

In addition, the global pandemic has increased reliance on social media for product discovery and purchase decisions. While existing research has detailed the varying levels of social media engagement among Generations X, Y, and Z (Viens 2019; Kusá & Záziková 2016; Taha et al. 2021; Zhang et al. 2017), it has not thoroughly examined how this engagement influences food consumption behaviours like impulse buying across generations (Dabija et al. 2018; Jílková & Králová 2021). Understanding these generational differences in the relationship between social media usage and impulse buying is crucial, as it may indirectly contribute to variations in food waste patterns through its impact on purchasing behaviour.

While the Theory of Planned Behaviour (Ajzen 1991) has been foundational in exploring food waste behaviours, it often falls short of bridging the 'attitude-behaviour' gap. This gap highlights the discrepancy between attitude or intentions and actual behaviours in food waste studies (Graham-Rowe et al. 2015; Stancu et al. 2016; Visschers et al. 2016). In response to this issue, this study proposes the use of the Stimulus-Organism-Response (S-O-R) model (Jacoby 2002; Mehrabian & Russell 1974), which has seen minimal application in food waste research (Talwar et al. 2021). Grounded in environmental psychology, the S-O-R model offers a comprehensive framework that considers environmental and psychological variables to determine behavioural responses, potentially providing new insights into the complex dynamics of food waste behaviour (Zhang et al. 2022).

To address these interconnected challenges in understanding and mitigating food waste, this study aims to develop and validate a conceptual model exploring the relationships between food waste and its antecedents in the Malaysian context during the pandemic. By focusing on actual food waste behaviour rather than intentions, this research seeks to address the attitude-behaviour gap often encountered in food waste studies. This study endeavours to contribute towards Malaysia's efforts in reducing food waste in alignment with the objectives set forth by SDG 12.3. By examining the relationships among social media usage, the Big Five personality traits, frugality, impulse buying behaviour, and Generations X, Y, and Z, this study aims to provide more actionable insights into consumer food waste patterns. These insights are crucial

for developing effective intervention strategies to combat food waste, a critical issue with significant environmental, economic, and social implications.

By elucidating the factors influencing food waste behaviour in Malaysia, this research aims to inform the development of targeted policies and interventions, thereby supporting the country's progress towards the food waste reduction goals outlined in the SDGs. Addressing this issue is crucial for achieving two important UN SDGs: SDG 12, which includes halving global per-capita food waste by 2030, and SDG 2, which aims to achieve Zero Hunger by 2030 (UN 2015a; WFP 2022). Reducing food waste directly contributes to these goals by improving food security and resource efficiency.

1.4 RESEARCH QUESTIONS

The problems discussed in the previous section pose several important research questions worthy of closer examination. To address these issues, the following research questions were formed.

RQ 1: What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, and frugality on impulse buying behaviour?

RQ 2: What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, frugality and impulse buying behaviour on food waste?

RQ 3: Does impulse buying behaviour mediate the relationship between social media usage and food waste; neuroticism and food waste; conscientiousness and food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste?

RQ 4: Does consumer Generation X, Y, and Z moderate the relationship between social media usage and impulse buying behaviour?

1.5 RESEARCH OBJECTIVES

The overall objective of this research is to examine the various factors that contribute to consumer food waste in Malaysia during the COVID-19 pandemic, with a particular

focus on social media usage, Generation X, Y, and Z, the Big Five personality traits (neuroticism, conscientiousness, agreeableness, extraversion, and openness), frugality, and impulse buying behaviour. Specifically, this study aims to achieve the following objectives.

1. To examine the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, and frugality on impulse buying behaviour.
2. To investigate the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, frugality and impulse buying behaviour on food waste.
3. To test the mediating role of impulse buying behaviour in the relationship between social media usage and food waste; neuroticism and food waste; conscientiousness and food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste.
4. To examine the moderating effect of Generation X, Y, and Z in the relationship between social media usage and impulse buying behaviour.

1.6 CONTRIBUTION OF THE RESEARCH

This research contributes to the field by integrating various consumer-related characteristics and behaviours towards food waste. Its theoretical and practical significance are manifold.

First, it provides empirical evidence on the determinants of food waste behaviour during the unprecedented COVID-19 pandemic, during which consumer behaviour was significantly altered. The pandemic introduced new dynamics, including impulse buying driven by panic, increased media consumption, shifts in economic circumstances potentially leading to frugality, and the influence of personality and generational differences. Understanding these factors comprehensively may aid in developing effective food waste intervention strategies. While previous studies have explored food waste through various lenses, including sociological perspectives such as social norms and cultural practices, this study addresses a critical gap by investigating

individual behaviours and cognitive aspects. These include impulse buying behaviour, social media usage, Big Five personality traits, and frugality with food waste (Kutlu 2022; Närvänen et al. 2018; Porpino 2016; Stancu & Lähtenmäki 2022). The findings are expected to provide more precise insights into how these factors contribute to food waste, offering a robust foundation for developing targeted strategies to mitigate this issue.

Second, this study integrates three relevant and essential theories, namely the S-O-R model, the Five-Factor Model (FFM), and the generational cohort theory, to develop a comprehensive model examining the key factors influencing food waste behaviour. The integration of these theories aims to provide a more holistic and contemporary analysis of consumer food waste behaviour.

In contrast to most past studies (e.g., Graham-Rowe et al. 2015; Stancu et al. 2016; Visschers et al. 2016) that have applied the Theory of Planned Behaviour, a socio-psychological framework to investigate food waste, this study seeks to contribute to a more robust and contemporary theoretical knowledge on food waste by employing an environment psychology framework, the S-O-R model. Originally proposed by Mehrabian and Russell (1974) and later reconceptualised by Jacoby (2002), the S-O-R model offers a conceptual approach to grasp both an environmental variable (i.e., social media usage) and psychological variables (i.e., personality traits and frugality) leading to behavioural responses (i.e., impulse buying and food waste behaviours). It aims to broaden the perspective on food waste by moving beyond the focus on planned behaviour variables like attitude and intention, potentially addressing the 'attitude-behaviour' gap often associated with the Theory of Planned Behaviour. Several scholars have demonstrated the effectiveness of the S-O-R model in explaining food waste behaviour, providing a strong rationale for its further application in this field (Talwar et al. 2021; Talwar et al. 2022).

Consumer food waste can be significantly influenced by individual characteristics, such as personality, which has been less frequently discussed in the literature (Abdelradi 2018; de Hooge et al. 2017). This study integrates the Big Five personality factors from the FFM with the S-O-R model to examine impulse buying and

food waste. This approach contrasts with previous research that has tested these models separately within impulse buying and food waste contexts, offering a more comprehensive framework. By applying the FFM and considering all Big Five factors, which many studies fail to explore fully (Abdelradi 2018; Fenton-O’Creevy & Furnham 2020), this study aims to provide valuable insights into the impact of these personality traits on food impulse buying and food waste. This is particularly relevant during the pandemic, a period in which personality traits have been shown to influence food consumption behaviours (Di Crosta et al. 2021).

In addition, this study aims to contribute to the knowledge base by applying Jacoby’s (2002) reconceptualised S-O-R model in conjunction with the FFM to food waste research. This updated framework seeks to determine the association of social media usage, the Big Five personality traits, and frugality (as Stimuli and Organism) with impulse buying behaviour and food waste (as Responses). This integrated approach addresses the ‘attitude-behaviour’ gap discussed earlier and offers a more comprehensive and contemporary analysis of consumer food waste behaviour by combining the reconceptualised S-O-R model with the FFM. Furthermore, this study aims to contribute by examining impulse buying behaviour as a potential mediator within the S-O-R framework in food waste. Impulse buying behaviour is analysed as a mediating variable and as the initial response behaviour before leading to the final response, food waste, in the S-O-R model. This approach creates a dynamic loop within the S-O-R framework, where responses can become new stimuli, offering a more nuanced understanding of the continuous cycle of consumer behaviour. This perspective has received little attention in the existing food waste literature (Talwar et al. 2021).

Drawing from generational cohort theory, this study examines Generation X, Y, and Z as moderators in the relationship between social media usage and impulse buying behaviour, particularly in the context of the COVID-19 pandemic. This approach not only provides fresh insights into consumer behaviour literature but also serves as an extension to the S-O-R model, given that such moderating effects have not been commonly implemented in studies exploring food waste-related behaviours using this framework (Talwar et al. 2022; Zhang et al. 2022). By facilitating comprehensive

comparisons among these generations, this research enhances understanding of how different age cohorts have responded to social media and engaged in food consumption behaviours, particularly impulse buying—an area where generational differences have been relatively under-explored (Dabija et al. 2018; Jílková & Králová 2021). This study will provide valuable insights into each generation's distinct behavioural patterns and preferences, contributing to a more nuanced understanding of consumer dynamics in the context of social media and food impulse buying during the pandemic. Ultimately, this approach deepens scholarly understanding and contributes to the theoretical notion of generational cohort theory within the framework of the S-O-R model and food consumption behaviour.

Third, this research addresses a methodological gap in the current literature by employing validated measurement scales to examine the effect of impulse buying behaviour and social media usage on food waste (Porpino 2016; Principato et al. 2021; Sainsbury's 2016). By incorporating these validated measures, this study aims to offer a more empirically sound assessment of the relationships between food waste, impulse buying behaviour, and social media usage. This approach enhances the rigour of statistical analyses, addressing a limitation in previous quantitative studies that did not use such validated instruments. Applying these scales offers the potential for more precise measurement within the sampled group, allowing for a direct scholarly examination of how impulse buying behaviour and social media usage impact consumer food waste. The resulting quantitative assessment can inform evidence-based policymaking, consumer education campaigns, and industry best practices, potentially contributing to reducing food waste at the consumer level.

In addition, this study contributes to the existing literature by investigating impulse buying behaviour and social media usage as general constructs, without limiting the examination to specific shopping environments, social media platforms, or food categories. This broader approach provides a more comprehensive understanding of how these factors might relate to food waste, extending beyond the contexts of impulse buying and social media use explored in previous studies (Koay et al. 2021; Tariq et al. 2019a; Zafar et al. 2021c).

By examining impulse buying behaviour as a general construct, without specifying online or offline settings, this research takes a holistic approach that complements existing studies focused on digital environments (e.g., Kimiagari & Malafe 2021), physical stores (e.g., Sharadkumar 2016), and comparisons between the two (e.g., Aragoncillo & Orús 2018). This approach allows exploring impulse buying behaviour regardless of the specific shopping environment, potentially uncovering insights applicable to various purchasing contexts. Similarly, the study of social media usage without platform-specific constraints or confinement to food types builds upon previous research that focused on specific platforms (e.g., Shahpasandi et al. 2020) or food categories (e.g., Tariq et al. 2020). This comprehensive perspective acknowledges the multifaceted nature of contemporary consumer experiences, offering a broader understanding of social media's influence on impulse buying behaviour and food waste.

Fourth, integrating frugality into the study model illuminates consumption decisions during economic downturns, such as those experienced during the COVID-19 pandemic, an area with room for further exploration (Sarmiento et al. 2020). By examining the relationships between frugality, impulse buying behaviour, and food waste, this study contributes to understanding frugality's role in sustainable consumption, an emerging area of interest (Raippalinna 2022). This research contributes to the field by exploring frugality's influence on food waste at a behavioural level, complementing previous studies that have primarily examined this relationship through attitudinal measures or waste reduction communications (Kansal et al. 2022; Kutlu 2022; Raghunathan & Chandrasekaran 2021; Stancu & Lähteenmäki 2022). This research empirically investigates frugality's impact on food waste among Malaysian consumers under pandemic conditions, extending the examination of frugal behaviour beyond specific industries like hospitality that have been previously studied in the Malaysian context (Sadom et al. 2022a; Sadom et al. 2022b, 2022c). Given that frugality is influenced by cultural factors (Kansal et al. 2022; Raippalinna 2022), exploring it within the context of Malaysia offers new insights into the intersection of economic thriftiness and sustainable food consumption practices during a global health crisis.

Fifth, this research will contribute to the existing literature on food waste in Malaysia, Asia, and developing countries (Aktas et al. 2018; Fami et al. 2019; Abdelradi 2018). The extent and patterns of food waste have evolved alongside economic growth and shifting consumer behaviour (Aschemann-Witzel et al. 2018; Thi et al. 2015; van Grunsven & Benson 2020). As an emerging economy generating significant food waste (Bloomberg 2018; Zainal 2021), Malaysia will benefit from this study's insights into consumer behaviour and food waste characteristics. This research will provide valuable information to address this pressing issue in Malaysia.

While a significant portion of food waste research in Malaysia has focused either on households (Amirudin & Gim 2019; Jereme et al. 2018; Zainal & Hassan 2019) or specific sectors like hospitality and education (Jalil et al. 2019; Jamaludin et al. 2020; Kasavan et al. 2019; Papargyropoulou et al. 2019), this study provides a more comprehensive understanding by examining food waste behaviour both at home and outside the home among Malaysian consumers. This broader approach expands upon the typical focus on household food waste seen in much of the global literature (Principato et al. 2021), offering a more holistic view of food waste behaviours in the Malaysian context. Moreover, this study offers knowledge on the impact of pandemic-induced behavioural changes on food consumption and waste dynamics that remain under-explored in Malaysia (Arumugam et al. 2021; Brohan et al. 2021; Ismail et al. 2020; Zakarya et al. 2022). By quantitatively investigating food impulse buying, food waste, and their antecedents in the Malaysian context during the pandemic, this study contributes significantly to the growing body of research in this field.

Lastly, this study offers significant practical implications for government authorities, policymakers, civic groups, and food marketers. By providing insights into consumer behaviour patterns and psychological factors influencing food waste generation, the findings can guide the development of targeted interventions, educational initiatives, and responsible marketing strategies. The study serves as a valuable resource for evidence-based management and policymaking, potentially enhancing the quality and effectiveness of policies, regulations, and technological innovations aimed at reducing consumer food waste. These insights can inform the design of community-based initiatives to promote sustainable consumption patterns.

Such actions are crucial in addressing Malaysia's substantial food waste problem and contribute to the country's commitment to the UN's SDG of halving global per-capita food waste by 2030 (UN 2015a).

Overall, this study is among the first to empirically examine food waste in Malaysia during the COVID-19 pandemic, incorporating social media usage, Big Five personality traits, frugality, impulse buying behaviour as a mediator, and Generation X, Y, and Z as a moderator within a single framework. The findings will provide valuable insights into how pandemic-induced changes in consumer characteristics and behaviour affect food waste. Table 1.1 summarises the contributions of this study.

Table 1.1 Contributions of this study

Area of contribution	Replication	Extension
Conceptual	Clarifies the concept of social media usage, personality traits, frugality, impulse buying behaviour, Generation X, Y, and Z, and food waste.	Extends the concept of impulse buying behaviour as a mediator in terms of food consumption, with food waste as the dependent variable. Extends the concept of Generation X, Y, and Z as a moderator in the relationship between social media usage and impulse buying behaviour.
Methodological	Verifies the validity and reliability of the scales to measure the related constructs.	Employs validated measurement scales to examine the effect of social media usage on food waste; and impulse buying behaviour on food waste.
Empirical	Validates the interactions between key constructs: social media usage and impulse buying behaviour; Big Five personality traits and impulse buying behaviour; frugality and impulse buying behaviour; specific Big Five personality traits (e.g., conscientiousness) and food waste; frugality and food waste; and the moderating role of Generation X, Y, and Z in consumer behaviour research.	Examines the effect of all Big Five personality traits on food impulse buying behaviour; social media usage on food waste (using validated scales at a scholarly level); all Big Five personality traits on food waste; impulse buying behaviour on food waste (using validated scales); frugality on food waste (on a behavioural level); the mediating role of impulse buying behaviour in food waste research; and the moderating effect of Generation X, Y, and Z in the relationship between social media usage and food impulse buying behaviour.
Contextual	Consumer food behaviours.	Food impulse buying and waste in Malaysia during COVID-19.

to be continued...

...continuation

Theoretical	Applies the S-O-R model to explain impulse buying and food waste behaviour, while the FFM is used to study personality traits. Additionally, generational cohort theory is utilised to explore generational cohorts as a moderator.	<p>The S-O-R model integrates the direct effects (Social media usage and impulse buying behaviour; Big Five personality traits and impulse buying behaviour; frugality and impulse buying behaviour; social media usage and food waste; Big Five personality traits and food waste; frugality and food waste; impulse buying behaviour and food waste).</p> <p>Integrates the FFM (to draw the Big Five personality traits) with the S-O-R model to examine both impulse buying and food waste.</p> <p>The S-O-R model provides the theoretical foundation for considering impulse buying behaviour as a mediator.</p> <p>The generational cohort theory provides the theoretical basis for testing Generation X, Y, and Z as a moderator in the relationship between social media usage and impulse buying behaviour, while also extending the S-O-R model.</p>
Managerial	Provides evidence on consumers' impulse buying and food waste behaviours.	Provides actionable insights into how multiple factors – specifically social media usage, personality traits, and frugality – shape impulse buying and food waste behaviours. These insights extend current understanding, enabling marketers, policymakers, and sustainability advocates to develop more targeted and effective strategies for responsible marketing, promoting sustainable consumption habits, managing impulse buying, and reducing food waste.

1.7 DEFINITIONS OF CONSTRUCTS

Table 1.2 shows the definitions of constructs investigated in this study.

Table 1.2 Definitions of study constructs

Term	Source	Definition
Food waste	Thyberg and Tonjes (2016)	Food which was originally produced for human consumption but then was discarded or was not consumed by humans. Includes food that spoiled prior to disposal and food that was still edible when thrown away.
Social media usage	Lai and Turban (2008)	Sharing opinions and experiences by posting content and interacting with others on social media platforms.
Impulse buying behaviour	Rook (1987)	A sudden, compelling, and hedonically complex purchase behaviour characterised by a powerful and persistent urge to buy immediately, which may stimulate emotional conflict and occurs with diminished regard for its consequences.
Generation X	Dimock (2019)	Consumers born from 1965 to 1980.
Generation Y		Consumers born from 1981 to 1996.
Generation Z		Consumers born from 1997 onwards, with no chronological endpoint set.
Neuroticism	Costa and McCrae (1992); Goldberg (1993)	The tendency to experience negative emotions, such as anxiety, depression, and vulnerability.
Conscientiousness		The tendency to show self-discipline, act dutifully, and aim for achievement.
Agreeableness		The tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others.
Extraversion		The tendency to seek stimulation in the company of others and to express positive emotions.
Openness		The tendency to be open to new aesthetic, cultural, or intellectual experiences.
Frugality	Lastovicka et al. (1999)	A consumer lifestyle orientation characterised by disciplined acquisition and resourceful use of goods to achieve longer-term goals.

Source: Costa and McCrae (1992), Dimock (2019), Goldberg (1993), Lai and Turban (2008), Lastovicka et al. (1999); Rook (1987), and Thyberg and Tonjes (2016)

1.8 ORGANISATION OF RESEARCH

This research is divided into five chapters. Chapter 1 introduces the research topic, examines related issues, and provides an overview of the research. Chapter 2 critically reviews the relevant literature on food waste and its associated factors, including the underpinning theories. The literature review informed the selection of key research

constructs and contributed to the development of the theoretical framework. Based on the reviewed literature, research hypotheses were formulated and presented in this chapter. Chapter 3 details the research methodology employed for hypothesis testing, followed by Chapter 4, which presents and interprets the empirical results of the statistical analysis. Finally, Chapter 5 explains the main research findings, highlights the implications and limitations of the study, provides recommendations for future research, and draws conclusions.

1.9 SUMMARY

This chapter introduces the basic research idea by explaining the issues related to the research topic of food waste. Specifically, the problems in the existing literature pertaining to the topic under investigation necessitate this research to be carried out. This is followed by the specification of the research questions that address the problem, research objectives, intended contributions, construct definitions, and the organisation of this research. The next chapter presents a critical review of the relevant literature and provides a thorough elaboration of the underpinning theories, theoretical framework, and hypotheses to be tested in this research.

CHAPTER II

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter begins with an overview of food waste under section 2.2, followed by a more in-depth literature analysis of the construct. Similarly, based on a critical review of the literature, explanations of other constructs under investigation, i.e., impulse buying behaviour, social media usage, the Big Five personality traits, frugality and Generation X, Y, and Z, are provided in sections 2.3, 2.4, 2.5, 2.6 and 2.7, respectively. Section 2.8 emphasises the gaps that exist in the current literature, while section 2.9 focuses on the underpinning theories that guide this research. Next, section 2.10 presents the theoretical framework from which the hypothesised relationships to be tested are developed in section 2.11. Finally, a summary concludes this chapter in section 2.12.

2.2 FOOD WASTE

2.2.1 Overview of Food Waste

Food waste draws global interest and attention as it is a growing concern that needs to be tackled to ensure food sustainability and security (FAO 2019; UN 2015b). The estimated amount of food waste globally, which equals a third of world-produced food for human consumption, is shocking (Gustavsson et al. 2011). The extent of food waste consumers generate varies among countries or regions, as indicated in Table 2.1. Measures to combat food waste by governments and international organisations have continuously been in place to prevent or curb the damage and future risks associated with it; in line with the proceedings, the UN has targeted to halve per capita global food

waste by 2030 under its SDGs (UN 2015a) while EC aimed to reduce food waste by half by 2020 (EC 2011).

Table 2.1 Estimated amounts of consumer food waste

Country/Region	Year	Estimate	Source
Malaysia	2019	5.475 million tonnes	KRI (2019)
United Kingdom	2015	7.3 million tonnes	WRAP (2017)
New Zealand	2015	122,547 tonnes (1,402 households)	WasteMINZ (2015)
European Union	2012	47 million tonnes	FUSIONS (2016)
Australia	2009	2.675 million tonnes	EPHC (2010)

Source: EPHC (2010), KRI (2019), FUSIONS (2016), WasteMINZ (2015) and WRAP (2017)

Food waste—food thrown away in edible condition—is common and alarming among medium- and high-income countries (Gustavsson et al. 2011) mainly because people can afford to waste (Wakefield & Axon 2020). This makes consumers one of the largest driving forces in food waste (Bravi et al. 2019). In 2011, the FAO estimated that 280 million tonnes of food were wasted by consumers, which constitutes one-fifth of global food waste, 80% of which occurs in Europe, North America and Oceania, and Industrialised Asia (WRAP 2017). While the remaining four-fifths of food waste occurs in other stages of the food supply chain, such as production, post-harvest handling and storage, processing and distribution, consumers have been identified as the largest single contributor to food waste along the food supply chain (Campbell & Feldpausch 2022; Graham-Rowe et al. 2015). This underscores the critical need for research focused on consumer behaviour and interventions to address this significant aspect of the food waste problem (Jribi et al. 2020; Wakefield & Axon 2020).

When food goes wasted, all the resources used from production to transportation in the upper stream of the food supply chain go in vain, further causing harmful environmental effects that could have been averted otherwise (Economou et al. 2024; Gustavsson et al. 2011). The 1.3 billion tonnes of food wasted annually generates a carbon footprint of 3.3 billion tonnes of Carbon dioxide equivalent greenhouse gases, making food waste the third largest greenhouse gas emitter after the United States and China (FAO 2013). Food waste is responsible for 8% of greenhouse gas emissions per year and costs the global economy USD 940 billion annually (UN News Centre 2016). In the United Kingdom alone, the economic cost of household food waste in 2015 was

staggering, accounting for £ 14.9 billion, which is about USD 19.6 billion (Gillick & Quedstedt 2018), while in New Zealand, they amounted to USD 589 million (WasteMinz 2015). Consumer food waste contributes to environmental degradation and economic consequences (Filimonau et al. 2020). It has social implications, given the ethical concerns associated with wasting food in a world where millions suffer from hunger and food insecurity (WFP 2022).

Food waste has been studied based on quantitative (e.g., Stancu et al. 2016), qualitative (e.g., Evans 2011a), and mixed-method approaches (Aschemann-Witzel et al. 2017; Aschemann-Witzel et al. 2019; Papargyropoulou et al. 2019). Measuring food waste is done using three main types: extrapolation of existing waste databases (Beretta et al. 2013; Bräutigam et al. 2014), self-reporting methods, and direct measurement or physical waste surveys (Quedstedt et al. 2013; Schott & Andersson 2015). Self-reporting methods include questionnaires (Ponis et al. 2017; Stefan et al. 2013), food waste diary (Koivupuro et al. 2012; Williams et al. 2012), visual tools like shapes to estimate wasted amounts (Martindale 2014) and interviews (Aschemann-Witzel et al. 2015; Parfitt et al. 2010).

According to Møller et al. (2014), interviews can study food waste practices closely; however, they are subject to small sample sizes and may not be representative. Likewise, food waste diaries are more appropriate to examine small sample sizes since the method is time-consuming and costly to record waste each time it is produced (Møller et al. 2014; Xue et al. 2017). The survey questionnaires, on the other hand, as Visschers et al. (2016) highlight, are less time-consuming, invasive, and inexpensive, making them more suitable for studying large sample sizes (Møller et al. 2014). However, the reliability of this method may be compromised as respondents may not be able to recall accurate amounts of waste produced (Visschers et al. 2016; Xue et al. 2017).

Research has typically characterised food waste using a range of factors, including socio-demographic (e.g., education, gender, age, and income), psychographic (e.g., values, attitude and lifestyle choices), and behavioural (e.g., habits and routines) aspects (Schanes et al. 2018). These factors encompass a broad spectrum of consumer

activities, from meal planning and grocery shopping to in-store behaviours, such as making unplanned purchases or being influenced by discounts, as well as food storage, preparation, and consumption practices at home (Principato et al. 2021). Habitual behaviours, notably excessive impulse buying, have been consistently linked to increased food waste (Mondéjar-Jiménez et al. 2016; Porpino et al. 2015; Stancu & Lähteenmäki 2022). In 2020, the focus of food waste studies shifted towards the impacts of the COVID-19 pandemic, aiming to understand changes in consumer behaviours associated with food waste during this period (Allahyari et al. 2022; Pappalardo et al. 2020). The pandemic underscores how unexpected events can lead to shifts in consumer behaviours, such as increased impulse buying due to panic, contributing to higher food waste – a pattern noted in recent studies (Aldaco et al. 2020; Berjan et al. 2022). This highlights the importance of ongoing research into the drivers of consumer behaviour, especially during crises, to inform and refine public policies aimed at reducing food waste (Cattaneo et al. 2021).

2.2.2 Defining Food Waste and Related Issues

Assessing and quantifying food waste has become a challenge due to the numerous ways the term has been defined (Buzby & Hyman 2012; Thyberg & Tonjes 2016) as no common definition exists universally (Lebersorger & Schneider 2011), resulting in inconsistencies when calculating food waste (Bräutigam et al. 2014). The definition of food waste in several studies is provided in Table 2.2. Furthermore, the term food waste has been used to refer to food waste and food loss (Parfitt et al. 2010), the latter being defined as the reduction of quantity and quality of food that makes it unsuitable to be consumed by humans (Grolleaud 2002). Again, these questions the validity of the food waste estimates reported (Parfitt et al. 2010; Bräutigam et al. 2014). Food loss is generally focused on post-harvest losses. It occurs at the earlier stages of the food supply chain, i.e., production, postharvest, and processing (Alamar et al. 2018). In contrast, food waste occurs at the downstream or consumption and retail stages of the food supply chain (Aktas et al. 2018).

Recently, researchers have highlighted the complexity of food waste definitions and emphasised the importance of achieving a clear understanding for effective

management. Teigiserova et al. (2020) discuss how varying definitions of food waste among stakeholders, including researchers, food manufacturers, and multi-stakeholders, pose challenges for consistent measurement and management practices. In response to these challenges, the UN announced the Food Loss and Waste Accounting and Reporting Standard, aiming to provide a global framework for measuring and reporting food waste (UN News Centre 2016). While the standard does not establish a universal definition for food waste, it offers a common set of terms for reporting entities, facilitating easier data comparison over time and across different sectors (Food Loss and Waste Protocol 2019).



Table 2.2 Definitions of food waste

Author	Year	Definition
FAO	1981	Food waste is the food intended for human consumption but discarded, lost, degraded, or consumed by pests at any point in the food chain.
FUSIONS	2014	Food waste is any food together with its inedible parts, removed from the food supply chain either to be recovered or disposed. These include composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or those discarded to sea.
World Resources Institute (WRI)	2016	Food loss and waste is the disposal of both edible and inedible parts of food from the food supply chain.
Papargyropoulou et al.	2016	Food waste was defined by categorising them into three groups: (i) Avoidable food waste – All of the food or much of it was in edible condition when it was discarded. (ii) Unavoidable food waste – Parts of food that is not edible like, apples cores, chicken bones and banana skin. (iii) Possibly avoidable food – Food eaten by some and not by others such as bread crusts.
Thyberg and Jones	2016	Food which was originally produced for human consumption but then was discarded or was not consumed by humans. Includes food that spoiled prior to disposal and food that was still edible when thrown away.
Bellemare et al.	2017	Define food waste focusing on food that is wasted, emphasising the total value of the food that could have been consumed but instead was discarded or left unused.
Hartikainen et al.	2018	The flows of primary products that were meant to be eaten by humans, but never entered the next step in the food supply chain (e.g. slaughter, retail, processing), and instead were used for other purposes (e.g. feed) or sent for waste treatment. Non-edible parts (not intended for human consumption) of wasted food, e.g. peels and bones, are not included in the definition.
United States Environmental Protection Agency	2021	Food not ultimately consumed by humans that is discarded or recycled, such as plate waste (i.e., food that has been served but not eaten), spoiled food, or peels and rinds considered inedible.

Source: Bellemare et al. (2017), FAO (1981), FUSIONS (2014), Hartikainen et al. (2018), Papargyropoulou et al. (2016), Thyberg and Jones (2016), United States Environmental Protection Agency (2021) and WRI (2016)

Despite the various definitions and concerns surrounding food waste measurement, this study adopts the definition of food waste proposed by Thyberg and Tonjes (2016), detailed in Table 2.2 and as previously stated in Chapter 1. In this

definition, food waste is food initially produced for human consumption but discarded or not consumed by humans. This includes food that spoiled prior to disposal and food that was still edible when thrown away. Unlike other definitions (FAO 1981; FUSIONS 2014; Hartikainen et al. 2018; WRI 2016) that encompass various stages of the food supply chain, Thyberg and Tonjes's (2016) definition is more focused on consumer-level food waste generated both at home and away from home, which better aligns with the scope of this study. While the United States Environmental Protection Agency's (2021) and Bellemare et al.'s (2017) definitions address consumer food waste, they either consider the total value of discarded food or involve recycled food or inedible food such as peels. Similarly, Papargyropoulou et al. (2016) include inedible food parts in their food waste categories.

2.2.3 Food Waste in Malaysia

Rapid economic growth in Malaysia has inadvertently exacerbated the issue of food waste, primarily at the consumer stage (van Grunsven & Benson 2020; Zainal 2021). Household waste significantly contributes to this issue, as figures from the Solid Waste and Public Cleansing Management Corporation (SWCorp) indicate that domestic food waste makes up nearly half of the total waste produced (Bernama 2020). Additionally, other data highlights that Malaysian households produce the highest proportion of food waste, accounting for 38%, while wet markets contribute 24%, followed by restaurants at 23%, and hotels at 7% (Anon. 2019). According to SWCorp's Deputy Chief Executive Officer (Technical), Dr Mohd Pauze Mohamad Taha, overbuying is one of the major causes of food waste, and combating waste requires planning purchases according to the quantity needed for each household (Anon. 2019).

In addition, pre-pandemic data suggests significant levels of food waste in Malaysia, with reports indicating that the amount wasted daily could feed millions (Aris 2019). There are indications that food waste issues persisted and may have been exacerbated during the pandemic (Dermawan 2022). The onset of COVID-19 and subsequent Movement Control Order (MCO) instigated notable shifts in consumer behaviour, including panic-induced impulse buying, potentially inflating food waste statistics (Berjan et al. 2022; Gazali 2020; Zainal 2021). Interestingly, there was a slight

dip in food waste after the first month of MCO, likely due to mandatory business closures and the shutdown of public dining spaces (Arumugam et al. 2021; Ismail et al. 2020). However, this trend was short-lived as food waste volumes began climbing in the following months. This rise was potentially driven by shifts in consumption patterns and increased use of online food delivery services (Arumugam et al. 2021; Brohan et al. 2021).

Like other Muslim countries that observe Ramadan and experience increased food waste during the festive occasion, such as Egypt (Abdelradi 2018) and Qatar (Aktas et al. 2018), Malaysia is no exception. Statistics from SWCorp indicate that during Ramadan, approximately 4,005 tonnes of food suitable for human consumption are thrown away daily, with this number expected to increase by as much as 20% during each festive occasion (Hassandarvish 2019). This amounts to 120,000 tonnes of food waste for the month, which could produce 343 million packs of Nasi Lemak Ayam (Hassandarvish 2019).

Empirical studies on food waste in Malaysia have emerged in recent years, yet they remain relatively limited. Much of the existing research concentrates on a specific sector (such as hospitality or education) or household context (Amirudin & Gim 2019; Kasavan et al. 2019; Zulkifli et al. 2019). Some studies have explored attitudes and intentions rather than actual food waste behaviours (Chun T'ing et al. 2021; Jamaludin et al. 2020). Although recent pandemic-related research has quantified food waste during movement restrictions (Arumugam et al. 2021; Brohan et al. 2021), there remains a clear need for a deeper analysis of the behavioural changes impacting waste generation.

2.2.4 Causes of Food Waste

Food waste emerges from a complex network of interconnected factors (Principato et al. 2021; Schanes et al. 2018). Consumers are identified as the primary contributors to food waste along the supply chain (Campbell & Feldpausch 2022; Graham-Rowe et al. 2015). In developing countries like Malaysia (van Grunsven & Benson 2020; Xue et al. 2017), the surge in food waste is linked to the rapid expansion of the middle class

(Zaobao 2020), increased income levels (DOSM 2020b), and population growth (DOSM 2020a). These economic and demographic shifts lead to evolving consumption patterns (Thi et al. 2015), which challenge the prevailing assumption that food losses in developing nations predominantly occur at the production and post-harvest levels due to limited resources (Aschemann-Witzel et al. 2018; Dorward 2012; Kummu et al. 2012). Contrary to this, it is seen in countries such as South Africa that household food waste can exceed commonly reported figures (Nahman et al. 2012), indicating significant waste at the consumer level even in emerging economies.

Food waste generation is intricately linked to consumer food-related activities, including meal planning, shopping habits, storage, food preparation, consumption, and disposal practices (Principato et al. 2021). The literature review reveals several key themes: consumer behaviour, demographic influences, economic drivers, and policy shortcomings. These broad categories break down into specific behaviours like planning, shopping, storing, cooking, and eating, as well as the social impacts on consumer habits. Demographically, age and gender provide essential insights, while economically, the nuances of market dynamics and product affordability are crucial factors.

a. Consumer behaviour (meal planning)

Poor planning regarding meals and failure to make shopping lists cause consumers to overbuy and waste food (Gunders & Bloom 2017). Planning meals and knowing information about food items stored at home before purchasing is essential to avoid underestimating items and limiting food waste (Chandon & Wansink 2006). Using shopping lists reduces consumer food waste (Farr-Wharton et al. 2014) as food purchases become more planned rather than based on impulse (Buckley et al. 2007). Besides, communication with other household members prevents them from buying items exceeding the required quantity (Farr-Wharton et al. 2014). A planned shopping routine mitigates unplanned purchases that are regarded as an antecedent of consumer food waste (Stefan et al. 2013).

On the contrary, while past research shows meal planning is associated with lower reports of food waste (Jörissen et al. 2015; Quedsted et al. 2013; Stefan et al. 2013), some studies have not found a significant relationship between them (Stancu et al. 2016; Visschers et al. 2016). This contradictory finding might be attributed to varying economic factors among the study populations. For instance, in wealthier urban areas (potentially the 89% urban sample in Stancu et al. 2016), the economic cost of wasting food might be less concerning (Qi & Roe 2016). Conversely, in a more economically diverse sample (such as the 45% urban sample in Stefan et al. 2013), the economic implications of food waste could be more pronounced, thus more directly influencing waste behaviours (Secondi et al. 2015).

b. Consumer behaviour (food shopping)

Past studies indicate that food shopping behaviour strongly affects food waste (Falasconi et al. 2019; Fanelli & Florio 2016; Jörissen et al. 2015). If consumers purchase large quantities of food items, especially perishable ones like vegetables, bread, and milk, for a week or more, the likelihood of spoilage is greater (Jörissen et al. 2015).

The type of store where food is purchased, i.e., small shops or mini markets, is associated with decreased levels of food waste (Fanelli 2019). This is supported by Jörissen et al. (2015), who found that food waste is highest when consumers make purchases from supermarkets, reduced when purchases are made from small shops, and is lowest when consumers grow their own food. This difference could be attributed to fewer promotional offers typically found in small shops than in supermarkets; fewer promotions may lead to reduced impulse buying, contributing to lower food waste levels (Bellini et al. 2017; Fanelli 2019). Furthermore, consumers tend to waste less food when they grow it, as they understand the time and energy required to produce it (Ganglbauer et al. 2013).

The relationship between shopping frequency and food waste is complex and sometimes contradictory. Some empirical evidence suggests that frequent shopping drives household food waste as consumers are at a higher risk of spontaneous or impulse

shopping, which outweighs any gains made by better day-to-day management of food purchases and consumption (Brook Lyndhurst 2007). However, other studies indicate that higher food shopping frequencies are associated with less food waste, as frequent shopping allows consumers to better match their daily needs (Quested et al. 2013; Williams et al. 2012). Shopping frequency is not very relevant for thrifty or frugal consumers as they are closely associated with food waste reduction (Sosna et al. 2019). They economise and avoid over-purchasing food since the food at home is used before buying more food, which helps them keep food costs and waste to a minimum (Graham-Rowe et al. 2014; Stancu et al. 2016).

Unusual circumstances can also affect shopping behaviour and food waste. For instance, during the COVID-19 pandemic, less frequent shopping trips were made to minimise exposure to the virus, leading to stockpiling, excessive impulse buys, and increased food waste (Aldaco et al. 2020; Berjan et al. 2022). The pandemic also accelerated the shift towards online grocery shopping and food delivery services. According to Marusak et al. (2021), online food purchases and home deliveries increased significantly during the pandemic. While this reduced physical exposure, it also led to increased impulse buying (Islam et al. 2021). Leal Filho et al. (2021) observed that panic-induced impulse buying and food stockpiling contributed to increased household food waste generation.

c. Consumer behaviour (food storage)

Poor or long storage time partly due to overbuying results in contamination of leftovers or food items that have exceeded expiration dates, contributing to how food can go wasted (Williams et al. 2012). According to Farr-Wharton et al. (2014), it is not uncommon for consumers to store food randomly rather than using a systematic approach (e.g., based on frequency or orderly stacking of food differentiating newer and older food) that results in food expiring before being relocated. Systematic storage is often hampered by the shortage of space in fridges and a lack of knowledge on where to best locate food items (Schanes et al. 2018). Food storage habits like failing to store according to the storage guidance on the packaging are among the main determinants of household food waste (Brook Lyndhurst 2011). The recommended temperature in

the fridge is vital to ensure food longevity, and failure to do so can accelerate food spoilage (Marklinder & Eriksson 2015; Terpstra et al. 2005).

Besides, prolonged food storage affects food quality, potentially making it unsafe for consumption and hence becoming disposed of (Aschemann-Witzel et al. 2019; Thyberg & Tonjes 2016). Overstocking food (Porpino et al. 2015) or managing food storage carelessly and storing food under suboptimal conditions that lead to a loss in food quality can consequently drive food waste (Koivupuro et al. 2012).

d. Consumer behaviour (cooking)

Cooking practices, like excessive cooking or that cause dislike of taste due to personal preferences have been reported to have higher food waste (Aschemann-Witzel et al. 2015; Falasconi et al. 2019; Fanelli 2019; Graham-Rowe et al. 2014; Porpino et al. 2015; Silvennoinen et al. 2014). Individual preferences related to one's personality, such as pickiness in food selection or throwing out undesired food, drive food waste (Aschemann-Witzel et al. 2015). Over-preparation of food can be counteracted by consuming leftovers and reducing food waste (Stefan et al. 2013). Nevertheless, consumer lifestyles of eating outside cause leftovers from the previous day to be left in the fridge to be uneaten and eventually wasted (Bravi et al. 2019). To avoid excess food preparation, which is a key factor in generating food waste, cooking adequate portions is important (Secondi et al. 2015). However, cooking precise portions becomes challenging when it is difficult to predict whether children will eat at home or outside (Cappellini & Parsons 2012; Ganglbauer et al. 2013; Porpino et al. 2015).

e. Consumer behaviour (eating)

Eating practices significantly affect motivations for food waste (Cappellini & Parsons 2012; Evans 2012; Parizeau et al. 2015; Terpstra et al. 2005). However, this aspect has not been extensively investigated. The unpredictability of appetite, which often leads to waste, is common among children (Cappellini & Parsons 2012) and adults (Ganglbauer et al. 2013). A dislike for eating the same meal or leftovers is another indicator of food waste (Fanelli 2019). Additionally, consumer personality influences food waste

behaviour, affecting food preferences, particularly for suboptimal food products in supermarkets or at home (de Hooge et al. 2017). More convenient or time-saving options, such as eating out at restaurants, often decided spontaneously, also contribute to food waste, as they result in leftovers or wasted purchased food (Parizeau et al. 2015).

f. Consumer behaviour (social influence)

Food, being regarded as a tool to enhance the social relationships, diminishes its value as a necessity. Consumers in an act of hospitality tend to over-order, which leads to excess food uneaten and, in turn, wasted (Wang et al. 2017). As part of the social influence, to look impressive on social media, users of social networking sites post aesthetic food pictures (Atanasova 2016). The purchase of ingredients to prepare gourmet dishes, which people are not familiar with and eventually ends up being wasted, turns out to be only worth a snapshot of the plate shared on social media or enhancement of social relationships (Sainsbury's 2016). Moreover, consumers experience an inner conflict between finishing the food on the plates to minimise waste and avoiding too much consumption to maintain better health and stay slim (Hoek et al. 2017).

While Sainsbury's (2016) corporate study, which is not peer-reviewed, suggests social media contributes to food waste generation, academic research has explored a broader range of factors influencing food waste behaviour, including social aspects such as social norms and cultural influences (Aktas et al. 2018; Porpino 2016; Simões et al. 2022). The effect of social interactions, particularly through social media platforms, on food waste behaviour has been relatively unexplored (Demir & Bertan 2023; Närvänen et al. 2018). Given the pervasiveness of social media and its demonstrated impact on consumer behaviour (Dixon 2022; Oh et al. 2014), it is crucial to critically examine how social media usage may contribute to or mitigate food waste behaviour. This inquiry is pertinent for addressing whether consumers' engagement with social media correlates with increased food waste (Porpino 2016). However, much of the existing body of work has considered social media as a tool for promoting food waste reduction initiatives without examining the direct effect of social media usage on individual food waste behaviour (Närvänen et al. 2018; Sutinen & Närvänen 2022).

g. Demographic influences (age)

Demographic characteristics like age are indicators of household food waste generation (Quested et al. 2013). Past studies show the older the consumers are, the less they waste food (Aschemann-Witzel et al. 2018; de Hooge et al. 2017; Secondi et al. 2015; Stancu et al. 2016). According to Quested et al. (2013), consumers over 65 frequently waste less food as they are more aware of the ill effects of food waste and the frugal attitude related to their food consumption behaviours (Qi & Roe 2016). On the other hand, Cecere et al. (2014) reported a positive correlation between consumers' age and food waste.

h. Demographic influences (gender)

Regarding gender, evidence suggests men are more likely to waste food (Aschemann-Witzel et al. 2018), while women tend to generate less food waste (Secondi et al. 2015). This difference may be attributed to women having higher cooking skills than men (Hartmann et al. 2013). Nonetheless, it has also been reported that women waste more, especially when they take up the role of food shopping in the household (Silvennoinen et al. 2014).

i. Economic drivers (market dynamics)

While several studies (Graham-Rowe et al. 2014; Kimiagari & Malafe 2021; Mondéjar-Jiménez et al. 2016; Porpino et al. 2015) suggest that reduced price and promotional offers like BOGOF make consumers more susceptible to impulse buying and subsequent food waste, Falasconi et al. (2019) and Fanelli (2019), provide a contrary perspective indicating that people who are drawn to discounted products waste less food. One reason for this might be the higher regard people place on food since they cannot afford to waste money on food purchases (Koivupuro et al. 2012; Wakefield & Axon 2020). Moreover, this is consistent with past research, indicating price has no relationship with excessive purchases (Aschemann-Witzel et al. 2017).

Additionally, larger package sizes were reported to promote food waste (Ganglbauer et al. 2013; Koivupuro et al. 2012; Williams et al. 2012). Consumers often buy too big packages when smaller sizes are unavailable or smaller packages cost more (Koivupuro et al. 2012). Williams et al. (2012) estimated that packaging accounted for around 20-25% of household food waste generated due to packages being too big for the consumer or challenging to empty.

j. Economic drivers (affordability)

Employment status is a predictive factor for food waste generation, although the relationship with income is unclear. Employed individuals tend to waste more food (Cecere et al. 2014) than those who are not working (Secondi et al. 2015). Increased employment among mothers can lead to children consuming ready-made food that often comes with too large portions, resulting in food waste (Priefer et al. 2016). Although employment income may explain the relationship between employment and food waste (Monier et al. 2011), Qi and Roe (2016) suggest that time constraints associated with employment might be a more direct factor influencing food waste than income itself. They note that employed individuals commonly express having less time to worry about food waste. This time scarcity, rather than income levels, might be the critical driver of food waste behaviours among employed individuals. Indeed, some studies have found no significant relationship between income and food waste (Koivupuro et al. 2012; Williams et al. 2012), suggesting that the relationship between employment, income, and food waste is more complex than a simple linear correlation.

k. Policy shortcomings

To effectively reduce food waste, legislation relevant to marketers is necessary to prevent tactics such as promotions that can lead to excessive impulse buys and subsequent food waste (Cattaneo et al. 2021). Similarly, retailers should be encouraged to change store layouts to prevent impulse buying by altering how food products are displayed; however, as Stancu and Lähteenmäki (2022) noted, implementing regulations targeting food retailers has become challenging. Existing regulations

primarily focus on date labels to ensure food safety rather than directly addressing food waste reduction (Eriksson et al. 2020).

Moreover, interventions to prevent consumer food waste often rely on self-reported measurement methods, which can introduce bias and question the reliability of the measured food waste (Leverenz et al. 2021). Policies that fail to include mechanisms to track food waste production accurately undermine the effective assessment of food waste interventions and hinder strategy adjustments (Parizeau 2020). While awareness campaigns are a popular initiative for reducing food waste, Reynolds et al. (2019) argue that most interventions only achieve a 5-20 percent reduction in food waste. Despite criticisms of their effectiveness, these initiatives can be improved by educating consumers on food provisioning methods, such as shopping lists or meal planning (Neubig et al. 2020). Food waste reduction interventions often suffer from duration and sample size limitations, which may compromise their ability to demonstrate long-term effectiveness (Reynolds et al. 2019). Additionally, Reynolds et al. (2019) reveal that about a third of the food waste intervention studies lacked a theoretical framework or disciplinary orientation, limiting their applicability and scalability.

The methodological and theoretical gaps, compounded by policy failures that inadequately guide interventions and the lack of robust legislation to curb harmful marketing practices, present significant challenges to achieving SDG 12.3's aim of halving global food waste by 2030 (Cattaneo et al. 2021).

In brief, the literature highlights several factors contributing to consumer food waste, including behaviours, habits, values, personality, and levels of awareness (Abdelradi 2018; Principato et al. 2021). Critical aspects identified are inadequate meal planning and varied food purchasing behaviours, such as impulse buying (e.g., Stancu & Lähteenmäki 2022) and making thrifty or frugal choices (e.g., Sosna et al. 2019). Social influences (e.g., Aktas et al. 2018) and personality factors affecting eating and consumption patterns (e.g., de Hooge et al. 2017) also play significant roles. The review underscores impulse buying as a crucial driver of food waste (Aldaco et al. 2020; Parfitt et al. 2010; Porpino et al. 2015), emphasising the need to address these behaviours to mitigate waste effectively.

2.3 IMPULSE BUYING BEHAVIOUR

2.3.1 Definitions of Impulse Buying Behaviour

Previous research viewed impulse buying as purchases made without prior planning (Clover 1950; West 1951) and used the terms 'impulse buying' and 'unplanned purchases' interchangeably (Stern 1962). The significance of impulse buying was emphasised by linking it to a substantial proportion of sales (Clover 1950). These studies did not consider the effect of consumer traits but the purchase itself (Piron 1991), and it was later that researchers started focusing on consumers' impulsiveness by examining their behavioural aspects (Muruganantham & Bhakat 2013). The most seminal work in defining impulse buying was by Rook (1987), whereby impulse buying is regarded as a powerful and persistent urge to buy something immediately (Amos et al. 2014; Rook 1987; Rook & Fisher 1995; Rook & Hoch 1985).

Several researchers (Kollat & Willet 1969; Rook 1987; Stern 1962) argued that viewing impulse buying solely in terms of unplanned purchases may be overly simplistic. While all impulse buys are unplanned, not all unplanned purchases are necessarily impulsive (Koski 2004). Unplanned purchases may not always be associated with a powerful desire to buy something immediately, characteristic of impulse buying, but can occur due to mere forgetfulness of a required product (Amos et al. 2014).

The concept of impulse buying was further extended by researchers Applebaum (1951), Kollat and Willett (1969), and Stern (1962), such that exposure to a stimulus causes impulse buys. Over the years, the definitions of impulse buying continued to evolve. Applebaum (1951) defined impulse buying as an unplanned purchase that takes place after being exposed to a sales promotion stimulus. In his definition, the stimulus was limited to a sales promotion. According to Rook (1987), impulse buying is an unintended and non-reflective reaction resulting from a stimulus in the store, and during such a purchase, the consumers experience a sudden intense desire.

Similarly, Beatty and Ferrel (1998) defined impulse buying as an unplanned, non-reflective purchase driven by a desire to quickly acquire a product or fulfil a sudden need. Importantly, their definition excluded purchasing out-of-stock products and items that reminded shoppers of pre-existing needs. Likewise, researchers (Bayley & Nancarrow 1998; Block & Morwitz 1999; Kacen & Lee 2002) agree that impulse buying results from a powerful, hedonic urge, after which there is little or no deliberate consideration of the purchase. Based on several definitions, authors such as Mittal et al. (2016) concluded that impulse buying behaviour is about purchases made hedonically inside a store that do not include reminder purchases. Integrating the various definitions over the years, impulse buying behaviour is understood as spontaneous purchases made without prior intention, executed with minimal deliberation, often triggered by a stimulus that ignites a sudden and intense desire to buy (Redine et al. 2022).

The discussion above summarises and elaborates on key developments in the definition of impulse buying, drawing primarily from the chronological list of definitions presented in Table 2.3 and supplemented with additional relevant research.

Table 2.3 Definitions of impulse buying in chronological order

Authors	Year	Definition of Impulse Buying
Clover	1950	Unplanned act of buying without too much consideration
Stern	1962	Sudden urge to buy
Kollat and Willet	1967	Consumers buy things without the involvement of planning
D'Antoni and Shenson	1973	Rapid decision making or on the spot decision making
Bellenger et al.	1978	Consumers have not buying intention before purchasing the product
Weinberg and Gottwald	1982	Emotions are attached regarding impulse buying activity and it carries less control of cognition
Hoch and Loewenstein	1991	An inconsistent buying which will not be completed if the person is not passionate.
Rook, Rook and Fisher	1987, 1995	Unplanned act of buying backed by sudden urge to buy something
Beatty and Ferrell	1998	A powerful and persistent urge to buy something immediately
Kacen and Lee	2002	A subjective bias leads to the possession of something
Adelaar et al. Crawford and Melewar	2003, 2003	An unplanned purchasing within the store. Store environment is a major contributor to this unplanned buying decision
Zhou and Wang	2004	When a consumer feels a sudden desire to buy something. This desire is persistent and consumer wants to buy immediately.
Vohs and Faber	2007	A buying choice which is not consistent and is made by sudden urge that is initiated by emotions
Xiao and Nicholson	2013	An unplanned and sudden act of buying due to external stimuli that leads to the feeling of regret or happiness
Mittal et al.	2016	An act of purchase when a consumer experiences a sudden, often powerful, and persistent urge to buy something immediately, wherein there is no prior need or intent to buy either the specific brand or even the product category before entering the store
Chen et al.	2019	Happens, 'when a consumer experiences a sudden, often powerful and persistent urge to buy something immediately'.
Redine et al.	2022	Unplanned and unintended purchase made rapidly, on the spot, without much reflection, preceded by exposure to a stimulus and a sudden and powerful buying urge.

Source: Adapted from Abbas and Bashir (2015)

2.3.2 Chronological Study of Impulse Buying Behaviour

The study of impulse buying began in the 1950s when Clover first examined the impulse buying mix and noted that certain product categories are more prone to impulse purchases. Throughout the 1960s and 1970s, researchers like Stern, Kollat, and Willett explored various factors influencing impulse buying, including product characteristics, consumer demographics, and in-store stimuli.

In the 1980s and early 1990s, research on impulse buying shifted towards understanding its emotional and cognitive aspects. Weinberg and Gottwald (1982) emphasised that impulse buyers experience greater positive emotions during shopping. Rook introduced the concept of consumer impulsiveness as a lifestyle trait linked to materialism and sensation-seeking. Researchers like Piron (1991) and Rook and Gardner (1993) expanded the conceptual framework of impulse buying, highlighting its unplanned nature and the role of immediate gratification.

The late 1990s and early 2000s saw further refinement of the impulse buying concept and its influencing factors. Beatty and Ferrell (1998) conceptualised impulse buying as a sudden and immediate purchase without pre-shopping intentions, solidifying the understanding of its spontaneous nature. Hausman (2000) built upon earlier emotional research, proposing that the shopping experience itself could encourage emotions leading to impulse buying. The scope of research broadened to include cultural factors, with Kacen and Lee (2002) finding that people with independent self-concepts engage more in impulse buying.

From the mid-2000s onwards, researchers began to examine more specific aspects of impulse buying. Park et al. (2006) studied the fashion and hedonic aspects, while Peck and Childers (2006) investigated the role of touch in impulse purchases. Researchers like Mattila and Wirtz (2008) explored the impact of store environment and social factors on impulse buying.

In recent years, the focus has shifted towards online impulse buying and the influence of social media. Turkyilmaz et al. (2015) found that website quality and personality traits influence online impulse buying. Aragoncillo and Orus (2018) discovered that social networks, especially Facebook and Instagram, significantly impact impulse buying. This shift in research focus from traditional retail to online contexts suggests potential generational differences in impulse buying behaviour. James et al. (2019) identified variations in how different generational cohorts perceive factors influencing impulse buying behaviour online. Further research by Djafarova and Bowes (2021) examined Generation Z specifically, finding that advertisements, opinion

leaders, and user-generated content on Instagram evoke positive emotions, leading to impulse purchases in this cohort.

While Turkeyilmaz et al. (2015) found that personality traits impact online impulse buying, this connection between personality and impulse purchases has been a growing area of interest. Earlier, Muruganatham and Bhakat (2013) highlighted the need to explore the effect of personality traits on impulse buying, identifying an important area for future research. In subsequent years, researchers began to address this gap. For instance, Farid and Ali (2018) examined the relationship between the Big Five personality factors and impulse buying behaviour. More recently, Miao et al. (2020) contributed to this line of inquiry by studying how the Big Five personality traits, cultural factors, and store stimuli influence impulse buying behaviour.

The COVID-19 pandemic has heightened research interest in impulse buying behaviour, which intensified significantly due to negative emotions associated with the global health crisis (Ahmed et al. 2020; Wang et al. 2021). Studies such as Naeem (2020) and Anas et al. (2022) observed that fear and concerns about resource availability influenced such buying patterns. Notably, Naeem (2020) found that increased social media usage during this period facilitated the spread of information and misinformation, contributing to panic and impulse buying. Furthermore, the resultant economic constraints generated interest among researchers in studying frugality's impact on such behaviour (Rayburn et al. 2021).

The study of impulse buying has evolved significantly since the 1950s, progressing from initial examinations of product categories prone to impulse purchases (Clover 1950) to more complex investigations of psychological, social, and environmental factors (Aragoncillo & Orus 2018; Turkeyilmaz et al. 2015). Researchers have explored how various personality traits, including the Big Five factors, influence impulse buying behaviour (Farid & Ali 2018; Miao et al. 2020). Recent research has focused on online impulse buying, the influence of social media, and generational differences (Djafarova & Bowes 2021; James et al. 2019). The COVID-19 pandemic has further shaped the field, with studies exploring how fear, resource availability, and increased social media usage during movement restrictions have affected impulse

buying behaviour (Anas et al. 2022; Naeem 2020). Additionally, scholars have begun to examine the relationship between frugality and impulse purchases in the context of economic constraints resulting from the pandemic (Rayburn et al. 2021). A chronological study of impulse buying is illustrated in Table 2.4.

Table 2.4 Chronological study of impulse buying

Author	Year	Contribution
Clover	1950	First to study impulse buying mix and pointed out that some product categories are more sold on impulse.
Stern	1962	Defined impulse buying behaviour by classifying as planned, unplanned, or impulse, also suggested that some product-related factors that might predict impulse buying.
Kollat and Willett	1967	Argued that consumer's characteristics and demographics influence the impulse purchases.
Weinberg and Gottwald	1982	Emphasised that Impulse buyers show greater emotions such as amusement, enthusiasm, joy and delight when compared to planned buyers.
Rook and Hoch	1985	Argued that impulsive shoppers tend to enjoy shopping more and the impulses is result of consumer's sensation and perception driven by the environmental stimulus.
Rook	1987	Introduced the concept of consumer impulsion as a lifestyle trait, which can be linked to materialism, sensation seeking and recreational aspects of shopping.
Iyer	1989	Described impulse buying as a special case of unplanned buying
Abratt and Goodey	1990	Suggested that in-store stimuli such as POP posters can increase impulse buying behaviour.
Han et al.	1991	Introduced the concept of fashion-oriented impulse for buying the new fashion products
Piron	1991	Defined impulse purchase based on four criteria-Impulse purchases are unplanned, decided 'on the spot', stem from reaction to a stimulus and involve either a cognitive reaction, or an emotional reaction, or both.
Hoch and Loewenstein	1991	Observed that it is people and not the product that experiences the urge to consume on impulse. Suggested that buying may beget more buying by loss of self-control.
Rook and Gardner	1993	Defined impulse buying as an unplanned purchase that is characterised by relatively rapid decision-making, and a subjective bias in favour of immediate possession. 'Customers' mood states may result in impulse purchase behaviour.
Rook and Fisher	1995	Introduced impulsiveness as a personality trait and defined as consumer's tendency to buy spontaneously, non-reflectively, immediately, and kinetically.
Dittmar et al.	1995	Found that gender influences the impulse buying and purchase of a product impulsively could be motivated by the self-concept.
Beatty and Ferrell	1998	Formulated the definition of Impulse buying as a sudden and immediate purchase with no pre-shopping intentions either to buy the specific product category or to fulfil a specific buying task.
Wood	1998	Stated that a socio-economic factor of individuals such as low levels of household income indulges into impulse buying.

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Bayley and Nancarrow	1998	Suggested that impulse buying behaviour is a complex buying process and the rapid decision process during shopping, prevents deliberate consideration of alternative information and choices.
Hausman	2000	Proposed that shopping experience may encourage emotions such as feeling uplifted or energized. Consumers shop not only to buy but to satisfy their different needs.
Youn and Faber	2000	Suggested that both positive and negative feeling states of consumer are potential motivators for impulse buying.
Kacen and Lee	2002	Described that cultural forces could impact impulse purchasing of individuals. People having independent self-concept engage more in impulse buying.
Zhou and Wong	2003	Found that retail store environment such as POP could affect the impulse buying
Jones et al.	2003	Empirically tested that product-specific impulse buying is affected significantly by product involvement and it is an important factor supporting impulse buying tendencies.
Luo	2005	Found that the presence of peers increases the urge to purchase, and that the presence of family members decreases it.
Verplanken et al.	2005	Proposed that negative rather than positive affect is a driving force behind chronic impulse buying. The impulse buying could further result in curing negative state of mind.
Park et al.	2006	Studied the fashion and hedonic aspects of impulse buying. Hedonic consumption has an indirect effect on fashion-oriented impulse buying. Fashion oriented people are pleasure and enjoyment seeking.
Peck and Childers	2006	Found that touch increases impulse purchasing as the distance between product and consumer decreases (proximity). Suggested that point-of-purchase signs, displays, and packaging encouraging product touch may increase impulse purchasing.
Kaur and Singh	2007	Studied the impulse buying aspects of Indian youths and found that shopping enjoyment and the sensory stimulants influences impulse buying.
Mattila and Wirtz	2008	Found that store environmental stimuli such as social factors (perceived employee friendliness) positively affect impulse buying behaviour.
Silvera et al.	2008	Studied the impact of emotions and inferred that impulse buying is influenced by the 'affect' or emotions of the consumer.
Dawson and Kim	2009	Studied the affective-cognitive aspects and found significant relationship between a person's affective and cognitive state and their online impulse-buying behaviour.
Harmancioglu et al.	2009	First to study impulse buying of new products and suggested in case of new product: product knowledge, consumer excitement and consumer esteem – drive impulse buying behaviour.
Yu and Bastin	2010	Hedonic shopping value of an individual lead to impulse purchases and are inextricably related to each other.
Sharma et al.	2010	Studied the variety seeking behaviour of impulse buying. They found the variety seeking individuals are more prone to impulse purchases.
Chang et al.	2011	Observed that the positive emotional responses of consumer to the retail environment result in impulsive purchases.
Chih et al.	2012	Studied the role of hedonic consumption needs in driving online buying impulsiveness.

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Xiao and Nicholson	2013		Provided a comprehensive understanding of impulse buying as a process and outcome.
Muruganantham and Bhakat	2013		Provided a detailed account of impulse buying behaviour based on literature and highlighted the need to explore the impact of interactive stimuli and personality traits on impulse buying.
Amos et al.	2014		Studied primarily the impact of dispositional, situational, and sociodemographic variables as main effects of impulse buying.
Turkyilmaz et al.	2015		Found website quality and personality traits influence online impulse buying.
Chan et al.	2017		Identified and classified factors that influence online impulse buying using Stimulus-Organism-Response (S-O-R) model. Found a negative relationship between
Farid & Ali	2018		Studied Big Five factors with impulse buying behaviour.
Aragoncillo and Orus	2018		Found social networks especially, Facebook and Instagram to have major impact on impulse buying.
James et al.	2019		Found differences in perceptions of the importance of factors relating to online impulse buying behaviour across generational cohorts.
Iyer et al.	2020		Provided a comprehensive understanding on main, moderating, and mediating effects of impulse buying.
Abdelsalam et al.	2020		Classified predictors of online impulse buying behaviour is social commerce and developed a causal-chain framework.
Miao et al.	2020		Studied personality traits (Big Five), culture and store stimuli on impulse buying behaviour.
Ahmed et al.	2020		Studied antecedents of impulse buying behaviour during the COVID-19.
Naeem	2020		Found social media to increase impulse buying during the COVID-19 pandemic.
Djafarova and Bowes	2021		Found advertisements, opinion leaders and user-generated content on Instagram to evoke positive emotions and subsequent impulse purchase in Generation Z females.
Rayburn et al.	2021		Found COVID-19 pandemic's effect on frugality led to reduced impulse buys.
Wang et al.	2021		Studied the impact of COVID-19 on consumers' impulse buying.
Anas et al.	2022		Observed that fear and resource availability are the most significant factors affecting consumer's impulse buying behaviour during a pandemic like COVID-19.

Source: Adapted from Muruganantham and Bhakat (2013)

2.3.3 Antecedents of Impulse Buying Behaviour

Research on impulse buying has identified various antecedents that contribute to this behaviour. These include consumer-related factors, demographic factors, product-related factors, and store-related factors (Abdelsalam et al. 2020; Iyer et al. 2020; Muruganantham & Bhakat 2013). Additionally, the rise of digital platforms has introduced new antecedents specific to online environments (Redine et al. 2022). Consumer-related factors include personality traits, emotions, and consumer resources.

Scholars have employed the Five-Factor Model (FFM) to study personality traits and have associated neuroticism, extraversion, openness, and low conscientiousness with impulse buying behaviour (Fenton-O’Creevy & Furnham 2020; Miao et al. 2020; Olsen et al. 2016). While both positive and negative emotions motivate impulse buying (Vohs & Baumeister 2013), research suggests that positive affect drives impulse buying more than negative affect (Amos et al. 2014; Beatty & Ferrell 1998; Flight et al. 2012). Factors linked to resources, like financial constraints resulting from crises, can reduce impulse buys (Rayburn et al. 2021). On the other hand, consumers with a bigger shopping budget can engage in more impulse buying behaviour (Chang et al. 2014).

Demographic characteristics, particularly age and gender, influence impulse buying behaviour (Tifferet & Herstein 2012; Yang et al. 2008). Younger consumers, such as Generation Z, have caught the attention of researchers; older consumers are less impulsive buyers compared to their younger counterparts (Djafarova & Bowes 2021; Zafar et al. 2021a). Moreover, women allocate more time to shopping activities and are more prone to impulse buying than men (Atulkar & Kesari 2018; Kempf et al. 2006).

In addition, product categories have been associated with impulse buying behaviour (Iyer et al. 2020). O’Brien (2018) reports that, on average, consumers spend USD 5,400 every year on impulse buying, which includes food, clothing, and household products. Also, a survey conducted by OnePoll in 2018 shows that food tops the list of purchase items, as 71% of US consumers admit that food and groceries are the most popular unplanned products they buy (Garcia 2018). During COVID-19, there was a spike in impulse buying out of panic for food essentials (Australian Associated Press 2020), and there were also reports of increased consumption of specific food items like chocolate (Scacchi et al. 2021). While low price is another factor associated with impulse buying (Kimiagari & Malafe 2021), sales promotions involving reduced prices and bundle offers are effective marketing stimuli to trigger impulse buying behaviour (Miao et al. 2020; Zafar et al. 2021a).

Store-related factors, including the store environment, layout, employee friendliness, and crowding, have been found to influence impulse buying (Badgaiyan & Verma 2015; Mattila & Wirtz 2008; Mohan et al. 2013). In online shopping

environments, website quality has been found to impact impulse buying behaviour (Kimiagari & Malafe 2021; Turkyilmaza et al. 2015). Particularly, shopping websites stimulate consumers emotionally, making browsing enjoyable (Parboteeah et al. 2009). A website's visual and emotional appeal can stimulate consumers' impulse buying behaviour (Lim & Kim 2022; Turkyilmaza et al. 2015).

2.3.4 The Digital Transformation of Impulse Buying: E-commerce, Social Commerce, and Mobile Commerce

Digital technologies have expanded the scope of impulse buying research beyond traditional retail settings to encompass e-commerce, social commerce, and mobile commerce (Abdelsalam et al. 2020; Ampadu et al. 2022; Djafarova & Bowes 2021). This expansion is evidenced by the significant growth in online retail sales, with global e-commerce sales exceeding US\$ 4.28 trillion in 2020 (Chevalier 2021). Notably, approximately 40% of purchases in this sector are based on impulse buying (Stern 2021). Social networks have been demonstrated to play a significant role in shaping consumer shopping processes and encouraging impulse buying (Pellegrino et al. 2022). The interactive landscape of social commerce is characterised by psychological elements and phenomena such as parasocial interactions and social comparison that stimulate impulse purchases (Vazquez et al. 2020). This phenomenon is reflected in the rapid growth of social commerce, with sales in the United States surging by 34.8% in 2021, reaching \$36.09 billion (Lipsman 2021). Moreover, the expansion of mobile commerce has further promoted impulse buying behaviour, as illustrated by smartphones accounting for 65% of all retail website visits in 2019 (Coppola 2021; Rao & Ko 2021).

2.3.5 Impact of COVID-19 on Impulse Buying Behaviour

The COVID-19 outbreak has markedly hastened consumers' transition towards digital platforms, potentially reshaping impulse buying patterns. An examination of the pandemic's immediate effects on consumption habits by Sheth (2020) revealed several key changes, including stockpiling behaviour, rapid adoption of digital technologies, and a substantial increase in online shopping and delivery services. This evolving

landscape has created novel conditions for impulse buying as consumers navigate unfamiliar shopping environments. The health crisis has sparked a notable uptick in consumers' readiness to procure groceries online, possibly paving the way for increased spontaneous purchases in the digital realm (Hao et al. 2020; Marusak et al. 2021). This shift towards online shopping has significant implications for impulse buying behaviour (Islam et al. 2021). Research has shown that the quality and features of e-commerce platforms, such as website design, user experience, and atmospheric cues, can enhance consumers' tendency to make unplanned purchases (Chopdar & Balakrishnan 2022; Turkyilmaza et al. 2015). Additionally, the interactive nature of social commerce platforms, characterised by features such as reviews, ratings, social proof elements, and personalised recommendations, is particularly conducive to impulse buying (Redine et al. 2022; Vrontas 2023; Zafar et al. 2021b).

Furthermore, the rise of mobile commerce has contributed to the potential for impulse buying, with smartphones accounting for a significant portion of retail website visits (Coppola 2021). This trend, combined with the increased time spent on social media platforms during lockdowns, may have amplified the influence of social networks on consumer shopping processes and impulse buying behaviour (Renming & Kian 2021).

2.3.6 Theories of Impulse Buying

Several theories have been used to explain impulse buying behaviour, with the S-O-R framework being the most widely applied. The S-O-R framework has been extensively used in numerous studies (e.g., Adelaar et al. 2003; Ampadu et al. 2022; Chang 2017; Djafarova & Bowes 2021; Floh & Madlberger 2013; Hashmi et al. 2020; Leong et al. 2018; Parboteeah et al. 2009; Zafar et al. 2021a). This framework helps researchers understand how environmental stimuli influence consumers' internal states, which in turn affect their behavioural responses, including impulse buying.

The second most prominent theory in impulse buying research is the Big Five Model, also known as the Five-Factor Personality Model. This model has been applied in several key studies (e.g., Badgaiyan & Verma 2014; Leong et al. 2017; Miao et al.

2020; Olsen et al. 2016; Thompson & Prendergast 2015; Verplanken & Herabadi 2001) to examine how personality traits influence impulse buying.

Other theories that have contributed to the understanding of impulse buying include the Theory of Reasoned Action (Lim et al. 2017; Luo 2005), which was later improved to form the Theory of Planned Behaviour (Khilji 2016; Shim & Altmann 2016). The Technology Acceptance Model has also been applied in the context of online impulse buying (Kim & Eastin 2011; Zhang et al. 2007). Additionally, researchers have utilised Flow Theory (Koufaris 2002; Wu & Ye 2013) to explain the immersive experiences that may lead to impulse purchases, particularly in online environments. The Latent State Trait Theory (Chen et al. 2016) has also provided insights into the interplay between situational factors and personality traits in impulse buying behaviour.

The diverse theoretical approaches employed in impulse buying research underscore the multifaceted nature of this phenomenon and the various factors – environmental, personal, and situational – that contribute to impulse buying behaviour. Recent studies (e.g., Kimiagari & Malafe 2021; Qu et al. 2023; Zafar et al. 2021b) continue to apply and integrate these theories, demonstrating ongoing scholarly efforts to develop a comprehensive understanding of impulse buying across various contexts, including traditional retail and e-commerce environments.

2.4 SOCIAL MEDIA AND ITS USAGE

Defining social media remains challenging due to its evolving nature and diverse functionalities (Aichner et al. 2021). Recent conceptualisations emphasise social media as user-driven platforms facilitating content diffusion, dialogue creation, and broad communication across personal, professional, and societal levels (Kapoor et al. 2018). These internet-based applications, built on Web 2.0 foundations, enable user-generated content creation and exchange (Kaplan & Haenlein 2010; Obar & Wildman 2015). Social media services typically feature user-specific profiles and facilitate online social networks (Obar & Wildman 2015). They represent a shift from traditional broadcast models to interactive, user-centric communication channels, offering scalable sociality and persistent, asynchronous communication (Carr & Hayes 2015). As social media

continues to evolve, researchers may need to refine these definitions to capture new functionalities and societal impacts (Aichner et al. 2021). Table 2.5 lists ways social media has been defined.

Table 2.5 Definitions of social media

Source	Definition
Kaplan and Haenlein (2010: 61)	'group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content'.
Murthy (2012: 3)	'mainly conceived of as a medium wherein "ordinary" people in ordinary social networks (as opposed to professional journalists) can create user-generated "news"'.
Bharati et al. (2014: 3)	'a technology that is not focused on transactions but on collaboration and communication across groups both inside and outside the firm'.
Filo et al. (2014: 2)	'new media technologies facilitating interactivity and cocreation that allow for the development and sharing of user generated content among and between organizations (e.g. teams, government agencies and media groups) and individuals (e.g. customers, athletes and journalists)'.
Lundmark et al. (2016: 1409)	'a unique form of communication, integrates multiple sources of legitimacy, and as a result presents a unique and important context through which to study the topic. Indeed, "social media" are a means for the dissemination of both internally and externally generated information pertaining to firms, industries, and society in general'.
Kapoor et al. (2018: 536)	'made up of various user-driven platforms that facilitate diffusion of compelling content, dialogue creation, and communication to a broader audience. It is essentially a digital space created by the people and for the people, and provides an environment that is conducive for interactions and networking to occur at different levels (for instance, personal, professional, business, marketing, political, and societal)'.
Aichner et al. (2021: 216)	'Social media are Internet-based, disentrained, and persistent channels of masspersonal communication facilitating perceptions of interactions among users, deriving value primarily from user-generated content'.

Source: Aichner et al. (2021), Bharati et al. (2014), Filo et al. (2014), Kaplan and Haenlein (2010), Kapoor et al. (2018), Lundmark et al. (2016) and Murthy (2012)

2.4.1 Extensiveness of Social Media Usage

Social media's emergence and extensive usage have become among the most impactful information technology phenomena (Kane et al. 2014). The growth of social media has been exponential over the years, with platforms like Facebook surpassing 2 billion users globally (Li et al. 2020). This trend has continued, with recent data showing that by 2023, the number of social media users worldwide has exceeded 4.7 billion (Kemp

2023). The remarkable expansion in social media usage underscores social networking sites' increasing relevance and importance (Yadav & Rahman 2017).

The social media platform Facebook, with over 2 billion users, is the most prominent social networking site (Chaffey 2019). It is followed by YouTube with close to 2 billion users and Instagram with 1 billion users worldwide (Ortiz-Ospina 2019). The most popular social media platforms include YouTube, WhatsApp, Instagram, Twitter, and Snapchat, apart from Facebook, which dominates the industry (Ahmed 2019). In 2020, around 3.9 billion individuals engaged in social media activities (Dixon 2023). By 2023, this figure experienced a significant increase, surpassing the 5 billion mark by an additional 266 million compared to 2022 (Kepios 2024). Despite this growth, the most popular platforms have remained relatively constant, with Facebook, YouTube, WhatsApp, and Instagram leading global active users (Shewale 2024). TikTok has emerged as one of the fastest-growing platforms, with over a billion active users as of 2023 (Kepios 2024). These activities encompass a wide range of actions, from shopping and connecting with others to seeking entertainment and gathering information about various brands (Hootsuite 2024).

It was estimated that in 2018, people spent more than 2 hours on social media daily compared to 1 hour and a half in 2012 (Statista 2019). The extensive usage of social media is demonstrated as every minute; there are approximately 4.1 million likes on Facebook posts (DOMO 2016), 2.4 million likes (DOMO 2017) and 330,000 posts on Instagram (DOMO 2019), 400 hours of new video uploaded (DOMO 2017) and 4.5 million watches on YouTube and 511, 000 tweets shared on Twitter (DOMO 2019). Social media's role in people's daily lives remained consistent, with little disparity observed in the average time spent on social media daily between 2022 and 2023, approximately averaging 2 hours 24 minutes and 2 hours 23 minutes, respectively (Kemp 2024). The wide range of social media usage allows relationship-building among users of diverse backgrounds, creating a strong social structure (Kapoor et al. 2018).

2.4.2 Characteristics and Impact of Social Media

Social media has enabled people to connect socially, allowing them to create and share information through words, images, videos, and audio, making it a platform for communication and social interaction (Jun & Yi 2020; Zeng & Gerritsen 2014). Individuals generate their content (Molem et al. 2024; Phillips 2011) as they share their knowledge and information, like shopping experiences on social networking sites (Pitta & Fowler 2005). Social media allows consumers to publicise products and share their views through word-of-mouth or consumer reviews (Chen et al. 2011; Zhuang et al. 2023). Therefore, unlike in the past, consumers now receive, generate, and distribute product information based on their preferences and experiences while providing recommendations and interacting with product or service providers (Stewart & Pavlou 2002). These include posts related to food shared, for instance, on Instagram with trending hashtags like FoodPhotography or Foodie, which have millions of posts (Maria 2020). This dissemination of information related to businesses, industries, and society in general has significantly shaped consumer behaviour and preferences (Guo et al. 2020; Medhekar 2017).

Moreover, the social media landscape continues to evolve, with emerging trends such as increased focus on short-form video content driven particularly by platforms like TikTok and Instagram (through Reels) (Molem et al. 2024; Sprout Social 2024). Users actively create content, sharing their shopping experiences and opinions about products and services, influencing consumer preferences and purchasing decisions (Mayrhofer et al. 2020). Social media platforms have emerged as central hubs for consumer experiences, with users widely sharing food-related content using trending hashtags to influence product choices and promote businesses (van der Bend et al. 2022a).

Customer feedback received on social media enables businesses to engage directly with their audience, while product recommendations and consistent positive reviews help foster trust in brands and drive sales (Shaheen et al. 2020). Businesses seize this opportunity to market their products through digital ads and collaborate with social media influencers, whose endorsements carry significant weight due to their large

followings (van der Bend et al. 2022b). The integration of social media with e-commerce, known as social commerce, has facilitated purchase behaviours like impulse buying, leveraging the convenience of online shopping (Lina & Ahluwalia 2021). These developments underscore the dynamic nature of social media and its increasingly profound influence on how businesses shape consumer behaviour and how consumers, in turn, drive business strategies and operations (Kimiagari & Malafe 2021; Rao & Ko 2021).

Web 2.0 technologies and social media have transformed consumer behaviour, particularly online shopping (Shahpasandi et al. 2020). Social media platforms have become powerful business tools to attract customers and influence purchasing decisions (Busalim & Hussin 2016). These platforms provide consumers with a wealth of information from other users they have connected with, creating an environment conducive to spontaneous purchasing decisions (Wang & Chang 2013; Zafar et al. 2021b). The increased popularity and growing prevalence of social networking sites like Facebook, Instagram, and YouTube have led to the development of social commerce business models (Liang & Turban 2011; Sohn & Kim 2020). These models integrate social media into e-commerce platforms, capitalising on the convenience associated with online shopping to drive consumer purchase decisions, often impulsively (Dawson & Kim 2009; Hajli & Sims 2015; Zafar et al. 2021a).

Social media offers a wide range of opportunities for consumers and businesses as it is an effective tool for marketing (Dolega et al. 2021; Kaplan & Haenlein 2010). In today's challenging business environment, enterprises are actively exploring the potential of social media technologies to present and manage business online (Shi & Chow 2015; Sohn & Kim 2020). Recent trends indicate that social media platforms are increasingly influencing consumer behaviour, particularly in impulse buying (Aragoncillo & Orus 2018; Pellegrino et al. 2022). Recognising this opportunity, businesses are increasingly investing in social media advertising and marketing, driven by the gradual increase in users' social media time over the years (Kemp 2024; Statista 2019). The interactive nature of social media platforms has created an environment conducive to spontaneous purchasing decisions (Abdelsalam et al. 2020). These platforms incorporate features such as user-generated content (e.g., reviews and

ratings), social proof elements (e.g., popularity indicators), and personalised recommendations or advertising (Vrontas 2023; Zafar et al. 2021b). Digital advertisements on these platforms are experiencing unprecedented growth, with global digital ad spending across social media projected to reach \$517 billion by 2023, accounting for 61% of the world's total ad market for the first time (Maguire 2020).

The role of social media in guiding shopping behaviour is significantly influenced by social factors (Hajli & Sims 2015). Users can share their shopping experiences through reviews, recommendations, and ratings (Jun & Yi 2020; Lin et al. 2017). These peer reviews have proven to be highly influential in shaping buying behaviour, as they provide a basis for other users to evaluate products (Cecere et al. 2010; Zafar et al. 2021a), compare alternatives, and ultimately make purchase decisions (Park et al. 2007; Zhao et al. 2018). Social media reviews are crucial in building consumer trust towards products or services, influencing shopping behaviour (Hajli et al. 2014; Sohn & Kim 2020). Positive customer reviews have increased product sales (Chandra et al. 2022; Heinonen 2011). The relationship between consumer trust in businesses and their purchase intentions is moderated by inconsistent reviews, including positive and negative feedback (Zhang et al. 2014). The stronger the positive and negative comments are, the higher their impact on consumers' behavioural intentions (Li et al. 2019).

Word-of-mouth recommendations on social media platforms provide social support for potential buyers while establishing brand images (Kim & Johnson 2016; Sohn & Kim 2020; Zhuang et al. 2023). Positive brand images build strong customer relationships, creating purchase intentions while ensuring the business's long-term success (Kim & Ko 2010; Zafar et al. 2021a). The brand awareness created through these social media interactions can significantly stimulate shopping behaviours, such as impulse buying (Rao & Ko 2021).

More recently, the rise of social media influencers and celebrities has shaped consumer behaviour (Sokolova & Kefi 2020). Studies have found that social media influencers can significantly impact followers' purchase intentions and impulse buying (Koay et al. 2021). These influencers, who may be traditional celebrities or 'micro-

celebrities' with large social media followings, provide product recommendations and reviews that their audience perceives as more authentic and trustworthy than traditional advertising (Vazquez et al. 2020). The interactions between influencers and their followers create a dynamic environment where consumers seek information and validation for their purchase decisions (Szymkowiak et al. 2021). Research indicates that influencer marketing on platforms like Instagram can be particularly effective in driving impulse purchases, as followers develop parasocial relationships with influencers and aspire to emulate their lifestyles (Zafar et al. 2021c).

The COVID-19 pandemic has significantly impacted social media usage and online shopping behaviour (Šimić and Pap 2021; Taha et al. 2021). During movement restrictions, people increasingly turned to social platforms for information, communication, and entertainment (Khan et al. 2022; Saud et al. 2020). The percentage of users spending more than four hours daily on social media increased from 7.4% before the pandemic to 21.2% during quarantine (Boursier et al. 2020). Movement restrictions led individuals to buy online, often through social commerce platforms (Renming & Kian 2021). Social media platforms saw an increase in the spread of negative emotions during the pandemic (Li et al. 2020). These platforms, with their heightened usage and emotional content, combined with concerns about scarcity via social media, contributed to a rise in impulse buying behaviour during this period (Naeem 2020).

Social media has revolutionised communication and information sharing, enabling users to generate and disseminate content across various platforms (Jun & Yi 2020). Its characteristics include user-generated content, real-time interaction, and widespread accessibility (Hootsuite 2024; Zhuang et al. 2023). The impact of social media is far-reaching, influencing consumer behaviour, business practices, and social interactions (Shahpasandi et al. 2020; van der Bend et al. 2022b). It has transformed marketing strategies, facilitated the rise of social commerce, and created new avenues for influencer marketing (Koay et al. 2021; Zafar et al. 2021c). Social media's role in shaping purchase decisions, fostering brand relationships, and driving impulse buying behaviour underscores its significant impact on modern commerce and social dynamics (Rao & Ko 2021; Vazquez et al. 2020; Zafar et al. 2021a).

2.5 THE BIG FIVE PERSONALITY TRAITS

Unlike other aspects of individual's personality, like characteristic adaptations (values, attitudes, interests), self-concepts (self-esteem, identity), and objective biography (careers, background), personality traits are believed to be stable throughout the lifecycle of an individual (McAdams & Pals 2006; McCrae & Costa 1996). This makes personality traits determine how individuals react to the vast array of stimuli they encounter in the world, shaping behaviour and attitudes across a wide range of situations (Gerber et al. 2011). The Big Five personality traits or the FFM is one of the most prominent frameworks used to study personality traits in consumer behaviour research (Clark et al. 2020; Lim et al. 2020).

2.5.1 Five-Factor Model (FFM)

Over recent decades, researchers have proposed various perspectives on identifying and defining personality traits. In the 1980s, a five-factor structure emerged, known as the Big Five (Goldberg 1981) or the FFM (McCrae & Costa 1987). This structure was deemed largely sufficient to encompass trait-descriptive terms of personality, covering much of the covariation amongst self-ascriptions and peer ratings of personality descriptors (Benet & Waller 1995). Despite some changes in specific factor labels, the underlying composition has remained consistent (John & Srivastava 1999).

Most measures assessing individual differences in behaviour consider these five factors or domains, either partially or wholly (Digman 1990; McCrae & John 1992; Tupes & Christal 1992). The most commonly used labels for these domains are extraversion, agreeableness, conscientiousness, negative emotionality (also termed neuroticism or emotional stability), and open-mindedness (alternatively labelled openness to experience, openness, intellect, or imagination (Goldberg 1993; John et al. 2008; McCrae & Costa 2008; Rammstedt & John 2007).

Extraversion reflects an individual's sociability and outgoingness, encompassing traits such as assertiveness and high energy levels. Agreeableness pertains to a person's warmth, friendliness, and tact, including characteristics like

compassion, respectfulness, and trust. Conscientiousness relates to self-discipline, with traits including organisation, productivity, and responsibility. Neuroticism concerns one's emotional stability, associated with characteristics such as anxiety, depression, and emotional volatility. Lastly, openness indicates a person's intellectual curiosity, aesthetic sensitivity, and creative imagination (Khatri et al. 2022; Sun et al. 2004).

Researchers have developed various questionnaires to assess the traits and features of each Big Five domain. These include the NEO Five-Factor Inventory (Costa & McCrae 1989), the Big Five Inventory (BFI) (John et al. 1991), and BFI-2 (Soto & John 2017a). Scholars have created shorter adaptations of these questionnaires to save time, such as a 10-item adaptation of BFI (Rammstedt & John 2007), a 30-item BFI-2-S, and a 15-item BFI-2-XS (Soto & John 2017b).

The Big Five personality has emerged as a highly influential factor across various contexts, including social media use motives (e.g., Kircaburun et al. 2020), mobile application adoption (e.g., Xu et al. 2016), shopping motivations and behaviours (e.g., Gohary & Hanzaee 2014), impulse buying behaviour (e.g., Miao et al. 2020), pro-environmental behaviour (e.g., Kvasova 2015) and intention to reduce food waste (Jamaludin et al. 2020).

The relationship between personality and consumer behaviour has been debated for the past century (Kassarjian 1971; Foxall & Goldsmith 1988). While the FFM has provided a robust framework for understanding these relationships, the connection between a consumer's personality and behaviour continues to offer new insights into various topics. This ongoing significance has led several authors to emphasise the importance of expanding research in this area (Bosnjak et al. 2007; Khatri et al. 2022).

The Big Five personality traits—Neuroticism, Conscientiousness, Agreeableness, Extraversion, and Openness—drawn from the FFM are widely recognised for encompassing the broad spectrum of human personality (Machado-Oliveira et al. 2020). Scholars commonly utilise the Big Five in a multidimensional manner, applying this framework to dissect and predict the impact of the Big Five personality traits on various consumer behaviours (Clark et al. 2020; Lim et al. 2020).

This approach acknowledges the model's strength in forecasting consumer preferences and behaviours by recognising each trait as a first-order reflective construct of personality (Alivernini et al. 2021).

2.5.2 Neuroticism

Neuroticism deals with emotional instability, anxiety, sadness, self-consciousness, and vulnerability (Shahjehan et al. 2012; Valencia & Christian 2022). Neurotic people tend to be self-critical, sensitive to criticism, feel inadequate and have poor emotional adjustments (Turkyilmaza et al. 2015; Watson et al. 1994). It is considered a negative emotion and is also linked with depression, unhappiness, and low confidence levels (Costa & McCrae 1989; Kroencke et al. 2020). For individuals high on Neuroticism, negative responses are frequent and disproportionate to the given situation (McCrae & Costa 2003). The concept of retail therapy, where shopping is considered a way of reducing negative moods and emotions, explains the association of Neuroticism with impulse buying (Atalay & Meloy 2011; Fenton-O'Creevy et al. 2018).

It is deeply rooted in the individual's personality to buy impulsively (Verplanken & Herabadi 2001). Excessive buying is influenced by Neuroticism in both direct and indirect ways, which could make it a crucial factor in impulsive behaviour (Tarka et al. 2022). This adds to past studies (Indrajaya & Mahesha 2022; Otero-Lopez & Pol 2013; Thompson & Prendergast 2015), which support that Neuroticism positively predicts impulse buying behaviour. Even though some studies show this positive relation, Rehman and Manjur (2018) found that Neuroticism negatively affects impulse buying. This discrepancy in findings may be attributed to several methodological variations between the studies. Notably, Indrajaya and Mahesha (2022) employed a purposive sampling method with 100 respondents from Indonesia and utilised PLS-SEM for analysis. In contrast, Rehman and Manjur (2018) used convenience and snowball sampling techniques, gathering data from 200 respondents across Sweden, and applied multiple linear regression and ANOVA for their analysis. These differences in sample size, geographical focus, sampling methods, and analytical techniques could account for the conflicting results.

Personality traits, a core part of our beliefs, values, and attitudes, significantly impact individuals' waste management (Swami et al. 2011). Greater neuroticism is positively associated with pro-environmental behaviour or better waste management practices (Karbalaeei et al. 2014; Lange et al. 2014; Milfont & Sibley 2012; Opayemi et al. 2020).

2.5.3 Conscientiousness

Conscientiousness is connected to individual qualities such as perseverance, structured thinking, and effective self-regulation (Javaras et al. 2019). Before being extended to include attributes such as dependability and perseverance, the early definition of Conscientiousness included the characteristic of self-control (Costa & McCrae 1988). This characteristic helps identify the individuals' level of organisation, persistence, responsibility and need for achievement (Clark et al. 2020; Costa et al. 1991; Mulyanegara et al. 2009).

Individuals with this trait are less likely to buy impulsively, making on-the-spot decisions, and less likely to be associated with unplanned buying behaviour (Badgaiyan et al. 2017). The rise of problematic impulsive behaviours has been frequently associated with low Conscientiousness (Braet et al. 2007). Lower Conscientiousness scores indicate difficulty in concentration, perseverance, organisation, and motivation, all core characteristics of Conscientiousness (Miao et al. 2020). Previous studies suggest that individuals with higher conscientiousness are less inclined towards impulse buying behaviour (Fenton-O'Creevy & Furnham 2020; Kline 2022). In contrast, Parsad et al. (2019) argue otherwise, asserting that Conscientiousness increases the likelihood of individuals engaging in impulse buying. This discrepancy in findings could be due to the specific product category examined in Parsad et al.'s (2019) study, which may have influenced consumer behaviour differently.

Conscientiousness has been consistently linked to pro-environmental attitudes and behaviours, including waste reduction practices (Swami et al. 2010; Swami et al. 2011). Individuals high in Conscientiousness tend to exhibit greater concern for environmental issues and are more likely to engage in sustainable practices (Hong et al.

2023). In the context of food waste, Conscientiousness predicts more responsible consumption patterns and waste management behaviours (Abdelradi 2018; Kutlu 2022). Individuals high on Conscientiousness try to actively learn about waste reduction and classification, whereas those with low Conscientiousness are careless with household waste and have weak moral principles (Liu et al. 2019).

2.5.4 Agreeableness

Agreeableness includes characteristics such as trust, warmth, generosity, cooperativeness, and the tendency to engage in pleasant and positive relationships with others (Goldberg 1990; Lim et al. 2020). Individuals high on Agreeableness are more likely to learn from others and empathise compared to those low on Agreeableness (Leone et al. 2005). Agreeableness is a trait for those individuals who focus on maintaining positive relationships with others and figuring out outcomes that are favourable to a group (Jensen-Campbell & Graziano 2001; Kircaburun et al. 2020).

A study by Turkyilmaza et al. (2015) identified that people with high Agreeableness and Extraversion scores tend to prefer websites or platforms that allow users to interact with each other and share opinions and experiences. This increased online impulse buying behaviour, highlighting the importance of personality traits on buying behaviour. However, the relationship between Agreeableness and impulse buying has produced mixed results in the literature. Sofi (2020) and Shahjehan et al. (2012) found Agreeableness to be positively related to impulse buying. Conversely, studies by Lim et al. (2020) and Rehman and Manjur (2018) demonstrated a negative relationship between Agreeableness and impulse buying.

Further complicating the picture, Fenton-O'Creevy and Furnham (2020) and Farid and Ali (2018) found that Agreeableness does not significantly predict impulse buying behaviour. These conflicting findings suggest that additional factors or contextual variables may influence the relationship between Agreeableness and impulse buying. The discrepancies could be attributed to cultural differences, specific product contexts, and varying demographic ranges across the studies. For instance, studies finding positive relationships often focused on younger consumers or specific cultural

contexts where agreeableness might align with consumerist norms. Those reporting negative relationships frequently examined specific product categories or cultural settings where agreeable individuals may exercise more caution in purchasing. Studies finding no significant relationship often utilised broader demographic samples, potentially allowing for age-related variations to balance out.

Agreeableness has been positively associated with pro-environmental behaviours or values (Milfont & Sibley 2012; Swami et al. 2010). This personality trait, related to higher levels of morality, empathy, and greater concern for others, is linked to increased environmental concern (Hirsh 2010). Opayemi et al. (2020) found that agreeableness has a positive relationship with waste prevention behaviour. More specifically, this trait positively affects the intention to reduce food waste (Jamaludin et al. 2020). Nonetheless, Swami et al. (2011) found no significant effect between Agreeableness and waste management. These discrepancies might be explained by the timing of these studies, which spans nearly a decade, during which global environmental consciousness has evolved considerably. The positive relationships found in the more recent studies (2020) might reflect this shifting environmental consciousness, where agreeable individuals may have become more attuned to environmental concerns compared to 2011.

2.5.5 Extraversion

Extraversion encompasses characteristics such as sociability, assertiveness, energy, and a tendency towards seeking external stimulation and social interactions (Sharma 2021; Watson & Clark 1991). Individuals high on Extraversion are more likely to be outgoing and energetic compared to those low on Extraversion, displaying positive emotional expression and active engagement with others (Khatri et al. 2022; McCrae & Costa 2008). This trait characterises individuals who focus on external activities and social connections while maintaining independence in their interactions with others (John et al. 2008; Mooradian & Swan 2006).

Research suggests that extraverts' natural inclination towards social engagement and group activities not only fosters stronger support networks but also

serves as a protective factor against loneliness (Aquino & Lins 2023). Dammeyer (2020) attributes this to their combined traits of sociability and excitement-seeking behaviour. Conversely, individuals scoring low on extraversion tend to be less socially oriented and demonstrate lower impulsivity (Eysenck et al. 1993; Lim et al. 2020). High-scoring extraverts typically exhibit strong self-confidence and self-reliance that influence consumer behaviour patterns (John & Srivastava 1999; Miao et al. 2020).

The relationship between extraversion and impulse buying has generated mixed findings in the literature. Studies have identified a positive correlation between extraversion and impulse buying behaviours across specific contexts, such as online shopping (Indrajaya & Mahesha 2022), e-commerce (Wang et al. 2022) and restaurant food purchasing (Lu & Su 2018). However, contrasting evidence exists, with studies like Miao et al. (2020) demonstrating no relationship between extraversion and impulse buying. These inconsistent findings may be attributed to the context-specific nature of the studies.

Extraversion has been positively associated with waste management behaviours like waste prevention (Opayemi et al. 2020) and recycling (Poškus & Žukauskienė 2017). Specifically, Jamaludin et al. (2020) showed a positive link between extraversion and intentions to reduce food waste. Milfont & Sibley (2012) found that while greater cultural emphasis on environmental engagement and environmental values were associated with extraversion, there was no significant relationship between extraversion and actual environmental behaviours at the individual level. However, at the country level, extraversion shows stronger associations with environmental engagement (Milfont & Sibley 2012), possibly due to its links with self-expression values and subjective well-being that characterise post-industrial societies.

2.5.6 Openness

Openness, also referred to as 'intellect', characterises individuals who demonstrate originality, imaginative thinking, and diverse interests in their approach to life (Indrajaya & Mahesha 2022; McCrae & Costa 2008). Those scoring high on Openness readily adapt to novel situations, actively seek varied experiences, and maintain broad

intellectual curiosities while being receptive to others' viewpoints (John et al. 2008; Khatri et al. 2022). This personality dimension distinguishes individuals who are willing to consider different perspectives, with their flexible mindset driving a greater propensity to explore novel experiences rather than conventional approaches (Miao et al. 2020).

The intellectual curiosity characteristic of the Openness trait has been linked to impulsive behaviour (Farid & Ali 2018); however, research findings in this area remain inconsistent. While studies by Lim et al. (2020) and Rehman and Manjur (2018) established a positive relationship between Openness and impulse buying, Fenton-O'Creevy and Furnham (2020) demonstrated a negative association. These contrasting findings might be attributed to various factors, including differences in sample demographics and cultural contexts. For instance, Lim et al. (2020) and Rehman and Manjur (2018) focused predominantly on younger consumers and specific cultural contexts, as Malaysia and Sweden respectively, whereas Fenton-O'Creevy and Furnham (2020) examined a more diverse age range among British consumers.

Openness is one of the Big Five traits strongly associated with environmental engagement and waste management (Milfont & Sibley 2012). Individuals with high levels of Openness demonstrate a greater propensity to pursue environmentally friendly behaviours and engage in pro-environmental activities such as recycling, thus contributing to reduced waste (Fraj & Martinez 2006; Hirsh 2010). Research has consistently established a positive relationship between Openness and pro-environmental behaviour (Markowitz et al. 2012), with particular emphasis on its association with waste prevention behaviour (Bhutto et al. 2023; Opayemi et al. 2020).

2.5.7 Big Five Personality Traits' Effect on Consumer Behaviour During the COVID-19 Pandemic

The COVID-19 pandemic has significantly impacted consumer behaviour globally, disrupting typical purchasing patterns and preferences; consequently, several studies have examined how the pandemic has influenced consumer psychology and the role of the Big Five personality traits in decision-making (Abdelrahman 2022; Aschwanden et

al. 2021). Research has demonstrated that personality traits were crucial in shaping consumer responses to the pandemic. Ikizer et al. (2022) found that neuroticism was strongly associated with higher stress and loneliness during the pandemic, which could influence purchasing decisions (Atalay & Meloy 2011; Fenton-O’Creevy et al. 2018). Their large-scale study across 41 countries highlighted neuroticism as a key vulnerability factor.

Neuroticism has been associated with impulse buying, hoarding, and stockpiling behaviours during COVID-19 (Dammeyer 2020; Sharma 2021; Yoshino et al. 2021). Individuals high in neuroticism tend to experience more anxiety and emotional instability, making them more susceptible to fear-driven purchasing in times of crisis (Kurnaz 2022). Findings regarding the other Big Five personality traits have been more mixed. While some studies found conscientiousness negatively related to impulse buying, stockpiling and hoarding during the pandemic, as highly conscientious individuals tend to be more controlled in their actions, this relationship has not been consistent (Dammeyer 2020; Kline 2022; Kohút et al. 2021). Likewise, results for openness, extraversion, and agreeableness have varied across studies (Aquino & Lins 2023; Dammeyer 2020; Kurnaz 2022; Yoshino et al. 2021).

Overall, extensive literature exists on the Big Five personality traits and impulse buying behaviour (e.g., Indrajaya & Mahesha 2022; Leong et al. 2017; Shahjehan & Qureshi 2019), including during the COVID-19 pandemic (Dammeyer 2020; Sharma 2021). While some studies have focused on a specific personality trait, for example, Openness (Fitri 2018), others have selectively chosen personality traits like extraversion, conscientiousness, and neuroticism (Parsad et al. 2019; Wang et al. 2022). Relatively fewer studies consider all Big Five factors when investigating impulse buying behaviour (Fenton-O’Creevy & Furnham 2020). Research during the pandemic has particularly highlighted the role of neuroticism in driving impulse buying and stockpiling behaviours, while findings regarding other Big Five personality traits have shown mixed results (Dammeyer 2020; Sharma 2021; Yoshino et al. 2021).

Furthermore, a limited number of studies have examined the impact of the Big Five personality traits on food waste. Most existing research, such as Kutlu (2022) and

Abdelradi (2018), focused on specific traits like Conscientiousness, whereas Jamaludin et al. (2020) examined all Big Five traits but ultimately tested only Extraversion and Agreeableness. Additionally, prior studies examined Big Five personality traits associated with pro-environmental behaviours (Markowitz et al. 2012; Milfont & Sibley 2012; Poškus & Žukauskienė 2017), including waste prevention and management behaviours (Bhutto et al. 2023; Opayemi et al. 2020; Swami et al. 2011).

The literature reviewed in this section demonstrates that understanding the Big Five personality traits provides valuable insights into consumer behaviour in both impulse buying and waste management contexts, particularly during unprecedented situations like the COVID-19 pandemic.

2.6 FRUGALITY

Researchers' attention to frugality has increased over the years. This is mainly due to the growing environmental concerns that motivate consumers to move towards sustainable consumption, as well as the belief that frugality is a concept capable of countering the unfavourable effects of excessive consumption and personal life satisfaction on society and the environment (Awais et al. 2020).

Frugality has been studied from a variety of perspectives: religious (Agarwala et al. 2019; Kurt et al. 2018; Yeniaras & Akarsu 2017), innovation (Hossain 2018; Pisoni et al. 2018; Weyrauch & Herstatt 2016), environmental (Gatersleben et al. 2017; Thøgersen 2018), and lifestyle (Lhuissier 2012; Lim 2016; Westacott 2016). Regardless of the different perspectives from which frugality has been viewed, the impact in the marketplace is similar (Goldsmith et al. 2014).

Although frugality, rooted in individuals' psychological and cultural traits, has far-reaching implications for consumption, it has been less frequently studied in marketing and consumer behaviour (Awais et al. 2020; Shoham et al. 2017; Todd & Lawson 2003).

2.6.1 Frugality as a Concept

Lastovicka et al. (1999) produced the seminal work on frugality and described it as a consumer lifestyle orientation characterised by disciplined acquisition and resourceful use of goods to achieve longer-term goals. This concept of frugality as a lifestyle was supported by Todd and Lawson (2003), as their data tended to reflect frugality involving restraints and conservation in use. Goldsmith and Flynn (2015) and Goldsmith et al. (2014) suggested that this frugal lifestyle is the product of prudent spending and is driven by causes either internal, due to personal characteristics that influence the careful use of resources, or external, by constrained economic situations of oneself. Social behaviours stimulated by these characteristics include socially conscious consumption (Pepper et al. 2011), green consumption (Thøgersen 2018), and voluntary simplicity (Ballantine & Creery 2010), which can be either a cause or consequence of frugality.

2.6.2 Frugality and Related Factors

Several factors have led to the consumer behaviour phenomenon of frugality. Economic crises throughout history have significantly contributed to this trend. These crises typically result in consumers feeling uncertain and lacking confidence in the marketplace, leading to responses such as reduced spending, minimised waste, and delayed purchases (Shoham et al. 2017). More recently, the COVID-19 pandemic has further influenced frugal tendencies, as individuals have sought ways to reduce overall expenditure amidst economic constraints; this has led to a depletion of economic resources, prompting many to adopt a more frugal lifestyle (Rayburn et al. 2021). Market mavenism—having strong market information on a variety of products and shops, as well as sharing this information with other consumers (Feick & Price 1987) and shopping antipathy or dislike of shopping also have been studied as antecedents of frugality (Bove et al. 2009). Market mavens apply their knowledge of markets and products when making purchases, for example, by comparing prices (Awais et al. 2020) and demonstrating frugal behaviour (Awais et al. 2020; Bove et al. 2009; Flynn & Goldsmith 2016). On the other hand, it can be well argued that mavenism and shopping antipathy could be regarded not only as determinants of frugality but also as consequences (Goldsmith & Flynn 2015).

2.6.3 Frugal Characteristics

The most pervasive factor differentiating people from one another regarding their savings and spending is being frugal (Goldsmith & Flynn 2015). Frugal people are less materialistic, as the desire to own material goods contradicts the frugal lifestyle (Goldsmith & Flynn 2015; Goldsmith et al. 2014). Shoham et al. (2017) further supported this view by showing that materialism centrality, defined by Richins (2004) as possessions playing a central role in individuals' lives, was negatively related to frugality. Consequently, frugal individuals tend to buy less as they place less importance on acquiring possessions (Rose et al. 2010).

Frugal consumers spend more time and energy when shopping to maximise the use of the money they can spend (Tatzel 2002). Also, frugal purchasing is motivated by living a sustainable life that improves personal well-being without owning material goods (Balderjahn et al. 2013). Conversely, materialists are over-consuming—buying beyond what is necessary (Goldsmith et al. 2014)—and are associated with reduced life satisfaction (Abela 2006). As the desire to curb negative impact on lives is an aspect of frugal living (Pepper et al. 2009), consumerism and materialism are disliked and criticised by the frugal (Albinsson et al. 2010).

The frugal are also less influenced by others and have greater self-control over their spending (Lastovicka et al. 1999; Marselha & Botelho 2017). Frugal consumers, being independent, are not concerned about complying with existing social norms as they do not see the social benefit gained by purchasing a more expensive item; they value frugality more than social values (Goldsmith et al. 2014).

In addition, a greater tendency to reuse and repair broken goods for possible future use rather than disposing of products that are old or broken is evident among the frugal (Albinsson et al. 2010; Marselha & Botelho 2017). This is beneficial for the environment as repaired items retain most of their original materials while consuming less energy (Marselha & Botelho 2017). Therefore, frugal individuals exhibit more environmentally conscious attitudes and behaviours (Gatersleben et al. 2012; Pepper et al. 2011). Specifically, these individuals tend to adopt green practices (Carrete et al.

2012; Howell 2013), save energy to conserve resources (Gatersleben et al. 2012; Gatersleben et al. 2017) and express a strong dislike of ‘hyper-consumerism’ and low-quality, less durable products (Albinsson et al. 2010). Interestingly, studies reveal that these environmental behaviours are motivated by frugality rather than moral concerns about environmental preservation (Carrete et al. 2012; Gatersleben et al. 2017).

Frugal consumers are not only price-conscious but also value-conscious, while some even prioritise quality over price (Shoham & Brenčič 2004; Yenziaras & Akarsu 2017). However, Tatzel (2014) proposes that some frugal consumers are materialistic bargain seekers who like to buy cheaper products. Tatzel’s (2014) money conservation continuum shows two distinct frugal or thrifty consumer groups, namely ‘Value Seeker’ and ‘Non-spender’, that are tight with money. Tatzel (2014) argues that Value Seekers are materialist bargain seekers who resort to getting the best value for their money and adopt a rational economic approach. Non-spenders, on the contrary, lack material desires and, therefore, are reluctant to spend. The relationship between frugality and purchasing behaviour is complex. Although frugality typically correlates negatively with impulse buying (Haines & Lee 2022; Shoham et al. 2017), studies indicate that substantial discounts may trigger impulse purchases among frugal consumers (Kapitan et al. 2021).

Furthermore, the impact of frugality on excessive buying behaviour is not consistently established in the literature (Stancu & Lähteenmäki 2022). This complex interplay between frugality and purchasing patterns becomes particularly relevant during periods of economic uncertainty, as consumers navigate the tension between thrift and perceived value (Raippalinnä 2022; Rayburn et al. 2021). Therefore, frugality influences consumer behaviour, making frugal consumers an important market segment for both generic brands and discount stores (Flynn & Goldsmith 2016).

2.6.4 Frugality and Sustainable Consumption

The prevalent ‘throwawayism’—a casual attitude towards disposing of items—and current consumption patterns conflict with frugality, indicating a disregard for sustainability issues (Albinsson et al. 2010). When consumers keep their spending

within budget constraints, this indicates they consider the consequences of their consumption and practice sustainable behaviour (Quelch & Jocz 2007). The revival of frugal behaviour, driven by economic crises and environmental sustainability concerns, has led to more sustainable consumption patterns (Evans 2011b; Rayburn et al. 2021). This shift towards sustainable consumption has highlighted frugality as a key consumer practice (Pepper et al. 2009; Raippalinna 2022).

Although frugality is a restraint on consumption and avoiding waste that indirectly connects to the moral importance of environmental conservation, it may not necessarily follow a restraint on expenditure (Evans 2011b; Kutlu 2022). There is research that shows no relationship between frugality and coupon proneness despite frugality being associated with high price consciousness (Lastovicka et al. 1999; Lichtenstein et al. 1990; Shoham & Brenčič 2004). According to Yeniaras and Akarsu (2017), frugal consumers often prioritise their quality requirements over the price of products (Yeniaras & Akarsu 2017). Consumers are willing to pay extra to purchase items that are more sustainable and ecological, which helps avoid wasting money and resources by buying more durable goods (Shao et al. 2017). Indeed, spending more money can be considered frugal when it prevents waste (Evans 2011b).

Recent research has begun to explore frugality's influence on sustainable consumption patterns, particularly in the context of food waste behaviour (Raippalinna 2022). Frugality, rooted in cultural and religious traditions, shapes consumption patterns and waste avoidance practices across various domains, including food (Kansal et al. 2022). Studies indicate that frugal consumers may be more receptive to sustainable food options and waste reduction practices, as frugal orientation is positively associated with favourable attitudes towards responsible consumption (Aschemann-Witzel et al. 2020; Kutlu 2022). Moreover, framing sustainable consumption in terms of frugal resource use appears to resonate with consumers, potentially due to their inherited mentalities of respect for resources and willingness to avoid waste (Aschemann-Witzel et al. 2022). This suggests that emphasising frugality in communication strategies may be an effective approach for promoting sustainable food consumption and reducing food waste (Raippalinna 2022).

2.6.5 Frugality and Religion

Across religions, frugality is valued highly on moral standards (Kansal et al. 2022; Westacott 2016). Islam is the predominant religion of Malaysia (DOSM 2010), and like many other religions—Buddhism, Taoism, Hinduism, Christianity, and Judaism (Lastovicka et al. 1999)—does not welcome overspending and discourages excessive consumption (Goldsmith & Flynn 2015; Todd & Lawson 2003). Islam instructs its followers to avoid wastage, or ‘Israf’ as it is known in Arabic (Othman et al. 2015). The holy Quran itself is evidence of Islam’s stand on controlling consumption: "... for piling up worldly things diverts you "(Al-Quran, Al Takathur 102, 1). Frugality, or being prudent with money, as emphasised by many religions, is seen in practice: the more religious consumers are, the less they spend—for example, on grocery shopping—making fewer unplanned purchases (Kurt et al. 2018). Recent studies have continued to explore the moral and theological aspects of frugality in relation to consumption and waste, particularly in Islamic contexts (Sukri & Fadzillah 2020).

2.7 GENERATION X, Y, AND Z

Generations are groups that share the same birth years, major cultural and political experiences, and have similar views and principles (Gamaliel 2023; Keller & Kotler 2006). These groups are influenced by societal changes, economic conditions, and historical developments (Chicca & Shellenbarger 2019; Keller & Kotler 2006). Although there is much agreement on the birth dates of the Silent Generation/Matures and Baby Boomers, there are variations for later generations, such as Generations X, Y, and Z (Chowdhury & Robin 2006; Dimock 2019; Wahyuningsih et al. 2022).

2.7.1 Birth Years of Generation X, Y, and Z

The birth years defining generational cohorts vary among researchers. For example, Cilliers (2017) identified the Silent Generation as those born between 1928 and 1944, Baby Boomers as those born between 1945 and 1965, Generation X as those born between 1965 and 1979, Generation Y as those born between 1980 and 1995, and Generation Z as those born after 1995. However, Cilliers’ (2017) birth years have minor

discrepancies compared to Gronbach (2008) and Meredith and Schewe (2002), with differences of one year for each generation from the Silent Generation to Generation Y. Shams et al. (2020), James et al. (2019), and Koksai (2019) have determined birth years very similar to Cilliers (2017), identifying Generation X as born between 1965 and 1979, Generation Y as born between 1980 and 1994, and Generation Z as born between 1995 and 2000 or from 1995 onwards. Other studies, such as Herrando et al. (2019), report significant deviations: Generation X is defined as those born between 1960 and 1980, Generation Y between 1981 and 1990, and Generation Z between 1991 and 2000.

The Pew Research Center's definitions (Dimock 2019) align closely with previous studies (Cilliers 2017; Koksai 2019; Shams et al. 2020) but include slight variations in some generations. According to the Pew Research Center, the Silent Generation consists of those born between 1928 and 1945, Boomers between 1946 and 1964, Generation X between 1965 and 1980, Generation Y between 1981 and 1996, and Generation Z from 1997 onwards (Dimock 2019).

2.7.2 Generation X

Generation X grew up during the emergence of technology and significant global changes, fostering a sense of realism within this cohort (Betz 2019; Dabija et al. 2018). They are highly educated, contributing to their pragmatism, scepticism, and autonomy (Jackson et al. 2011; Mahmoud et al. 2021). Generation Xers are more reserved, scrutinise product reviews carefully, and display lower confidence in online environments (Cabeza-Ramírez et al. 2022).

This generation was introduced to mobile technology and social platforms during adulthood, making them more responsible in using technology and social media communication (Dabija & Grant 2016; Daragmeh et al. 2021). As Mitsis and Foley (2012) highlight, they use social media to expand their knowledge and perspectives. Their extensive life experiences and family responsibilities drive them to seek high-quality products and make informed purchasing decisions based on thorough research (Dabija et al. 2018). Additionally, Generation X is price-conscious and exhibits low

price sensitivity, significantly impacting their buying behaviour (Williams & Page 2011).

Crises like the COVID-19 pandemic have also affected their purchasing habits, leading them to prioritise essential items like food due to fear and concern for others (Eger et al. 2021). Fear was a significant factor that led to impulse buying during the pandemic (Naeem 2020). Although Generation X is less internet and tech-savvy compared to younger generations, they frequently engage in online shopping for relaxation, convenience, and in response to the pandemic (Dabija et al. 2018; Eger et al. 2021). Research shows that 32% of Generation X admit to making impulse purchases (Djafarova & Bowes 2021). The increased social media consumption during the pandemic due to movement restrictions and the need for information has contributed to impulse buying (Gazali 2020; Mylona et al. 2024). Generation X typically spends less time on social media than Generation Y and Z, averaging nearly two hours daily (Viens 2019). WhatsApp, Facebook, and YouTube were found to be the most popular social media platforms among Generation X (Dixon 2022).

Moreover, it is reported that 68% of Generation X's buying decisions are influenced by online reviews and recommendations on blogs, forums, and social networking sites; however, they are less susceptible to direct, personal word-of-mouth recommendations (Dabija et al. 2018). According to Mintel (2016), online advertising has a minor effect on purchasing decisions as they often ignore such ads. Conversely, Acar (2014) notes that Generation X can be easily influenced by recommendations and targeted through traditional advertising. Despite being termed the 'forgotten' generation by marketers, with more focus on younger generations, Generation X remains an important consumer group (Kowalewicz 2020).

2.7.3 Generation Y

Generation Y, commonly referred to as Millennials, unlike Generation X, were exposed to an environment where technology was more commonly used in everyday life (Gilal et al. 2021; Messarra et al. 2016). They grew up during the rapid rise and expansion of the internet, which has significantly influenced their values (Fromm & Garton 2013;

Taylor 2016). As a result, Generation Y is often characterised as highly tech-savvy, with some researchers referring to them as ‘digital natives’, though this term is more accurately applied to the following Generation Z (Ameen et al. 2021; Eger et al. 2021; Šimić & Pap 2021). Generation Y is recognised for their confidence, a sense of being special, team orientation, optimism, and idealism, traits more related to Baby Boomers than to Generation X (Eger et al. 2021; Howe & Strauss 2000; Iyer & Reisenwitz 2009). Fraone et al. (2008) note that while Generation Y can be high maintenance and potentially pose higher risks, they can produce high-quality work (Messarra et al. 2016).

For Generation Y, social media is essential for both personal and professional communication, where they frequently share their reality and actions publicly (Eastman & Liu 2012; Riley & Klein 2021). Their daily social media activity was reported to be two hours and thirty-eight minutes, exceeding that of Generation X (Viens 2019). Generation Y commonly uses social media platforms such as Facebook, Instagram, Twitter, and Snapchat (Jose 2021). Compared to previous generations, Generation Y places more importance on online comments, reviews, and posts, often sharing content without thoroughly verifying product information (Haydam et al. 2017; Kijek et al. 2020; Valentine & Powers 2013). They not only post reviews online but are also heavily influenced by word of mouth and online reviews (Bravo et al. 2020; Mangold & Smith 2012).

The large population of Generation Y, combined with their strong purchasing power (Cavazos-Arroyo & Máynez-Guaderrama 2022; Haydam et al. 2017; Viswanathan & Jain 2013) and their ability to influence others’ buying decisions, potentially makes them an attractive segment for marketing strategies (Cabeza-Ramírez et al. 2022; Euromonitor 2015). Being media-savvy and well-versed in the digital economy (Ruiz-Equihua et al. 2022), Generation Y understands the communication revolution that has transformed society, businesses, and other organisations more comprehensively than the preceding generation (Bravo et al. 2020; Lenhart et al. 2007). Unlike Generation X, traditional advertising is less effective for Generation Y, who prefer digital platforms (Valentine & Powers 2013; Young 2015).

The influence of social media on Generation Y's purchase decisions is significant, with 72% having purchased products based on Instagram posts and 84% influenced by user-generated content (Arnold 2019). Research on impulse buying behaviour indicates that Generation Y has a strong tendency to make impulse purchases, as 34% exhibit such behaviour (Cavazos-Arroyo & Máñez-Guaderrama 2022; Djafarova & Bowes 2021). Also, the rise in social media usage amid pandemic restrictions has influenced impulse buying behaviour (Gazali 2020; Mylona et al. 2024).

2.7.4 Generation Z

Compared to older generations, Generation Z—the youngest generation—was born and raised in an environment dominated by the internet, which shapes their understanding of access to content and the world (Adamson et al. 2018; Betz 2019; Dolot 2018). According to Jörg (2017), they have never known a world without social media. Generation Z are realistic and independent digital natives who prefer direct and time-bound social sharing platforms like Snapchat and Instagram Stories, whereas Millennials or Generation Y are fond of public posts (Jose 2021; Khanal 2019). Unlike their preceding generation, Generation Z favours communicating through images and seeks out creative content, often creating visual content using TikTok (Prakashyadav & Rai 2017; Siagian & Yuliana 2023). Furthermore, this generation uses social media primarily for entertainment and to pass the time rather than to connect with friends or update statuses, as Generation Y does (Maguire 2020). They exceed their predecessors in daily screen time on social media, averaging two hours and fifty-five minutes per day (Viens 2019).

Generation Z, often described as the most materialistic generation, seeks instant outcomes and values brand interactions through social media channels (Cavazos-Arroyo & Máñez-Guaderrama 2022; Djafarova & Bowes 2021). They find micro-celebrities to be more authentic and trustworthy (Tolani & Sao 2020). They are constantly connected to their mobile devices, with 44% checking their social media at least every hour, and they are highly likely to encounter digital advertisements on these platforms (Contreras 2017; Ninan et al. 2020). With Generation Z entering the workforce, they hold \$44 billion in buying power and are considered the future of the

global economy (Jörg 2017; Shay 2017). They are more inclined to make immediate purchases when they desire, and they particularly enjoy online shopping for food and clothes due to its convenience and perceived cost-effectiveness (Simangunsong 2018). Similar observations were made during the COVID-19 pandemic, where impulse buying of food items was reported (Marusak et al. 2021; Šimić & Pap 2021). Research indicates that Generation Z comprises the most impulsive buyers, exceeding both Generation Y and Generation X, with 41% engaging in impulse buying (Djafarova & Bowes 2021). Additionally, Generation Z constitutes around 32% of the world's population, making them the largest generation (Miller & Lu 2018). Their characteristics and tendency towards impulse buying present significant opportunities for marketers (Lina et al. 2022).

2.7.5 Generation as a Moderator

There has been increasing recognition of the role of moderator variables in marketing literature, with scholars acknowledging their significance in predicting consumer behaviour (Herrando et al. 2019; McMullan 2005). Evanschitzky et al. (2008) note that the importance of moderators has grown due to their ability to enhance the relationship between independent and dependent variables. As a moderating variable, generation influences the relationship between social media usage and impulse buying (Alić et al. 2022; Dabića et al. 2018). Generation has been utilised as a moderator in various studies, including those examining consumer behaviour (Gilal et al. 2021; Wang et al. 2018), workplace dynamics (Lamm & Meeks 2009), and the relationship between personality traits and conflict management styles (Messarra et al. 2016).

While the moderating effect of generation has been examined in consumer behaviour research (Alić et al. 2022; Huang & Veen 2018; Ruiz-Equihua et al. 2022), relatively few studies have specifically considered the effects of the three distinct generational cohorts: Generation X, Y, and Z (Gilal et al. 2021; Herrando et al. 2019). Although cohort differences can be generalised, they are not entirely objective (Markert 2004; Nikhashemi & Valaei 2017; Rotolo & Wilson 2004). For example, an individual born in 1979 may not be fundamentally different from someone born in 1981, despite belonging to different cohorts. However, evidence supports the generalisation of

cohorts by age, which aids in understanding and predicting individual characteristics (Nikhashemi & Valaei 2017; Twenge & Campbell 2008).

Shared experiences during childhood and early adulthood contribute to identifiable generational characteristics, which in turn influence attitudes and values in personal and social contexts (Schuman & Scott 1989; Thach et al. 2020). This understanding is crucial for predicting consumer behaviour and tailoring marketing strategies accordingly (Cabeza-Ramírez et al. 2022; Djafarova & Bowes 2021).

2.8 GAPS IN THE LITERATURE

After reviewing the consumer food waste literature, several gaps have been identified. While food waste is a complex behaviour influenced by multiple factors, there is limited knowledge about the underlying causes that drive or impede consumer food waste, despite growing academic interest in this area (Graham-Rowe et al. 2014; Wakefield & Axon 2020; Schanes et al. 2018). This gap in understanding is particularly evident in the context of the COVID-19 pandemic, which significantly altered consumption behaviours. Despite the increase in consumer food waste studies during this period, there remains a relative paucity of comprehensive insights that effectively guide practitioners in developing food waste reduction plans (Aldaco et al. 2020; Berjan et al. 2022; Pappalardo et al. 2020). An analysis of food waste drivers has revealed several areas requiring further theoretical development in consumer food waste research, particularly concerning the pandemic context.

The pandemic heightened excessive food impulse buying, spurred by fear and movement restriction measures, leading to increased waste (Australian Associated Press 2020; Berjan et al. 2022). Promotional strategies and unplanned shopping have been identified as factors contributing to over-purchasing (Belbağ 2022; Welch et al. 2018). While previous studies have explored food waste through various lenses, including sociological perspectives such as social norms and cultural practices, there remains a need for a more in-depth investigation into individual behaviours and cognitive aspects (Kutlu 2022; Närvänen et al. 2018; Porpino 2016; Welch et al. 2018). Although past studies highlight the role of food impulse buying in creating excessive

purchases that fuel food waste, there is a lack of quantitative research examining the direct effect of impulse buying behaviour on food waste using validated measurement scales (Porpino 2016; Principato et al. 2021). Scacchi et al. (2021) examined the relationship between impulse buying and food waste but did not employ specific validated scales for quantitatively measuring these variables, instead relying on self-perceived changes and simple yes/no responses, which may lack precision. Other studies, such as Bravi et al. (2020) and Brook Lyndhurst (2007), have included impulse buying as an item or indicator within broader variables like in-store behaviour rather than focusing on impulse buying behaviour itself with validated scales.

More recently, Stancu and Lähteenmäki (2022) explored impulse buying tendency concerning food waste. However, their focus on tendency rather than actual behaviour leaves a crucial gap in the literature. Their study found an indirect relationship between impulse buying tendency and food waste, mediated by excessive buying, but did not establish a direct relationship between impulse buying tendency and food waste (Stancu & Lähteenmäki 2022). This distinction between tendency and behaviour is critical, as actual purchasing decisions may have a more immediate impact on food waste generation. Studying behaviour allows for the examination of factors such as social media usage, personality traits, and frugality that influence purchasing decisions, potentially leading to over-purchasing and subsequent waste (Berjan et al. 2022; Fenton-O'Creevy et al. 2020; Kapitan et al. 2021; Zafar et al. 2021a). Furthermore, measuring actual behaviour through validated scales could provide more precise insights into the relationship between impulse buying and food waste, informing targeted interventions (Jribi et al. 2020; Porpino 2016). There is a need for research that moves beyond the tendency to examine how specific impulse buying behaviours directly contribute to food waste, especially in the context of social media influences, personality factors, and frugality (Di Crosta et al. 2021; Djafarova & Bowes 2021; Haines & Lee 2022; Porpino 2016). Therefore, there remains a significant need for research that explicitly examines impulse buying behaviour and its direct effects on food waste using robust, validated measurement tools, particularly in relation to these factors (Leal Filho et al. 2021; Reynolds et al. 2019).

Both before and during the COVID-19 pandemic, social media's substantial influence on consumer behaviour has grown significantly, attracting considerable scholarly attention (Hossain et al. 2020; Mayrhofer et al. 2020; van der Bend et al. 2022a). While there is extensive research on how social media affects online purchases, its impact on potentially more detrimental consumer behaviours, specifically impulse buying and overconsumption which may pose a threat to sustainability, has received relatively less attention (Djafarova & Bowes 2021; Gupta & Vohra 2019; Zafar et al. 2021b). Most social media studies on impulse buying are situated in the social commerce context, examining impulse purchases via social media platforms like Instagram (e.g., Kimiagari & Malafe 2021; Koay et al. 2021; Shahpasandi et al. 2020), Facebook (e.g., Kim & Johnson 2016; Ko 2018; Zafar et al. 2021c), WeChat (e.g., Chen et al. 2019; Rao & Ko 2021), and Weibo (e.g., Vazquez et al. 2020). Moreover, such studies mostly focus on young consumers since they are more inclined to follow social media and engage in impulse buying (Zafar et al. 2021a). In the context of social media-related food impulse buying, studies often narrow their focus to certain types of food, such as organic food (Tariq et al. 2020; Tariq et al. 2019a; Tariq et al. 2019b) or restaurant food (Chung et al. 2017; Song et al. 2015), limiting the scope of their findings.

The research area examining social media's effects on consumer behaviour associated with sustainable food consumption remains relatively under-explored, as noted by Simeone and Scarpato (2020). Their study examines the influence of social media on food choices. Specifically, it assesses how social media usage impacts behaviours related to food waste, such as attention to expiration dates. This focus, while directly linked to food waste behaviour, is explored within a limited scope, indicating an initial exploration rather than a comprehensive analysis. This observation aligns with findings from Teoh et al. (2022) and Yasseri & Sanford (2020), who explore broader consumer habits and attitudes towards waste without fully establishing a direct link to food waste behaviours. Furthermore, although studies frequently reveal negative attitudes towards food waste, Schanes et al. (2018) and Stefan et al. (2013) observe that these attitudes or intentions to reduce food waste do not reliably translate into proactive food waste prevention actions, emphasising a gap between attitudes and actual behaviours.

A corporate report from Sainsbury's (2016), the United Kingdom's second-largest supermarket chain, explicitly cites platforms, such as Instagram for directly contributing to food waste generation. This contrasts with some academic literature that examines the role of social media in addressing food waste issues (Närvänen et al. 2018; Sutinen & Närvänen 2022) and discusses technology's role in sustainability more broadly (Demir & Bertan 2023). While these studies provide valuable insights into how food waste is discussed and framed on social media, they do not directly measure social media's impact on food waste. Young et al.'s (2017) study on food waste provided some preliminary insights, but it focused on a specific intervention rather than general social media usage. Moreover, their food waste measures, while based on previous research, were relatively simple and not extensively validated scales in the traditional academic sense. This disparity underscores a significant gap in the current academic discourse: the lack of rigorous studies examining the direct influence of social media usage on food waste behaviour using validated measurement scales.

While the Big Five personality traits are frequently explored among personality researchers, comprehensive analyses of these five factors on specific food-related consumer behaviours, such as food impulse buying and food waste, remain under-researched (Fenton-O'Creevy et al. 2020; Jamaludin et al. 2020). This notable gap is particularly evident in the context of the COVID-19 pandemic (Di Crosta et al. 2021). Even in the broader field of consumer behaviour research, existing studies present mixed findings. For instance, Fenton-O'Creevy et al. (2020) reported a positive relationship between neuroticism and impulse buying, whereas Previšić et al. (2022) found the opposite. Furthermore, discrepancies exist in the relationship between traits like agreeableness and waste management behaviours, as evidenced by Jamaludin et al. (2020) and Swami et al. (2011). Prior studies have also limited their scope to select traits, such as extraversion and openness, and to specific contexts like restaurant food buying settings (Lu & Su 2018). Others have considered certain personality traits, such as conscientiousness, extraversion, or agreeableness, concerning waste management practices and food waste reduction (Abdelradi 2018; Jamaludin et al. 2020; Kutlu 2022).

The increased propensity for food impulse buying during the pandemic highlights the need to investigate the Big Five personality traits' role in such consumer

behaviours (Keenan 2021; Khatri et al. 2022). While Di Crosta et al. (2021) have contributed to the understanding of personality factors concerning necessity purchases during the pandemic, a comprehensive analysis encompassing all Big Five traits and their specific impacts on food impulse buying and subsequent waste remains unexplored. This gap in the literature presents an opportunity for a more holistic examination of the Big Five personality traits' influence on food consumption and waste behaviour during unprecedented pandemic circumstances.

Understanding consumer behaviour during economic downturns is vital, yet insights into consumption decisions during these periods remain limited, particularly in the context of the COVID-19 pandemic (Sarmiento et al. 2020). The relationship between frugality and impulse buying is complex, with conflicting findings in the literature. While some researchers have found a negative relationship between frugality and impulse buying (Haines & Lee 2022; Shoham et al. 2017), others suggest that frugal consumers may become susceptible to impulse buying when confronted with discounts (Kapitan et al. 2021). Additionally, Stancu & Lähteenmäki (2022) report that frugality does not significantly impact excessive buying behaviour, which, while distinct from impulse buying, adds to the complex picture of frugality's influence on purchasing patterns. This tendency could be particularly relevant during periods of economic constraint, like the COVID-19 pandemic, as individuals seek ways to reduce overall spending (Rayburn et al. 2021).

Frugality's influence on food waste behaviour, a critical aspect of sustainable consumption, is an emerging area of interest (Raippalinna 2022). However, the literature often lacks a direct examination of the link between frugality and food waste at the behavioural level, instead focusing on attitudinal aspects or waste reduction communications (Kansal et al. 2022; Kutlu 2022; Raghunathan & Chandrasekaran 2021; Stancu & Lähteenmäki 2022). While some research investigates the association of frugality with the consumption of suboptimal or upcycled food—which indirectly relates to waste minimisation—these studies typically do not extend to direct waste behaviours (Aschemann-Witzel et al. 2020; Aschemann-Witzel et al. 2022).

Cultural influences play a significant role in shaping frugality and consequent food waste behaviour (Kansal et al. 2022; Raippalinna 2022), yet specific patterns within the Malaysian context are not fully understood. Most empirical research in Malaysia has centred on the hospitality sector's approach to frugality, which does not fully capture its broader effects on consumer waste (e.g., Sodom et al. 2022a; Sodom et al. 2022b, 2022c). Furthermore, Sukri and Fadzillah (2020) approach the connection between frugality and food waste from a moral and theological perspective, noting food waste issues in Malaysia. This highlights a potential gap in empirical research on this topic in the Malaysian context.

Classical behavioural theories like the Theory of Planned Behaviour (Ajzen 1991), while prevalent in food waste studies (e.g., Chun T'ing et al. 2021; Stancu et al. 2016; Visschers et al. 2016), often do not fully capture the nuances of consumer food waste behaviour. These theories typically focus on attitudes and behavioural intentions, presuming they directly predict actual behaviour, which is not always the case—thus leading to a notable attitude-behaviour gap (Schanes et al. 2018; Stefan et al. 2013). Hence, a more effective theoretical framework, such as the Stimulus-Organism-Response (S-O-R) model, is needed for a holistic understanding of food waste behaviour (Talwar et al. 2021; Talwar et al. 2022).

While the S-O-R model and the Five-Factor Model (FFM) are prominent frameworks in studying impulse buying (Redine et al. 2022), their combined application to food waste research is lacking. Both models have examined impulse buying (Fenton-O'Creevy et al. 2020) and food waste behaviour (Jamaludin et al. 2020) separately, but a comprehensive approach that investigates how personality traits influence both impulse buying and food waste, as well as how impulse buying itself might relate to food waste behaviour, remains unexplored. This gap limits the understanding of the psychological mechanisms underlying the connection among these behaviours.

Despite the S-O-R framework's prevalence in impulse buying studies (Redine et al. 2022), its application to subsequent behaviours like food waste is less common (Zafar et al. 2021b). Moreover, the role of impulse buying behaviour as a mediator in food waste studies is under-explored. This gap in research hinders a comprehensive

understanding of the factors contributing to food waste and impedes efforts to develop effective mitigation strategies (Reynolds et al. 2019; Schanes et al. 2018). The examination of impulse buying behaviour both as a mediating variable and as an initial response behaviour in the S-O-R model is an approach that has received little attention in the existing literature (Talwar et al. 2021).

While previous research has demonstrated distinct consumer behaviours among Generation X, Y, and Z (Gilal et al. 2021; Wahyuningsih et al. 2022), studies often focus on individual generations such as Generation Y (e.g., Lee & Gan 2020) or Generation Z (e.g., Djafarova & Bowes 2021) or compare only two cohorts such as Generation Y and Z (e.g., Cavazos-Arroyo & Máynez-Guaderrama 2022) or Generation X and Y (e.g., Cabeza-Ramírez et al. 2022). Comprehensive analyses across all three groups are limited and require further research (Ameen et al. 2021). Although the literature on social media usage and impulse buying has primarily focused on younger consumers, due to their high social media engagement and susceptibility to impulse buying (Zafar et al. 2021a), pandemic-induced changes have affected all age groups (Koh et al. 2020).

The COVID-19 pandemic has significantly altered behavioural patterns across demographics, leading to increased social media consumption and impulse buying (Gazali 2020; Naeem 2020). Current literature, however, lacks a comprehensive examination of how the pandemic-induced shifts in social media usage have influenced impulse buying among different generational cohorts. Existing research often explores relationships between generational characteristics and either social media habits (e.g., Taha et al. 2021) or impulse buying tendencies (e.g., James et al. 2019) separately. Studies examining social media and impulse buying tend to focus on younger generations (Djafarova & Bowes 2021; Lina et al. 2022). Comparative analyses integrating social media usage, impulse buying behaviour, and generational differences remain under-explored in the current literature, particularly in the context of a global crisis. Although some studies have explored related aspects (Dabija et al. 2018; Jílková & Králová 2021), a comprehensive examination of these factors across multiple generations in the context of the COVID-19 pandemic remains an area for further research.

While generational cohort theory has been widely used to study consumer behaviour and buying habits, there appears to be a lack of research applying this theory to examine differences among Generation X, Y, and Z as a moderator in the relationship between social media usage and impulse buying behaviour (Alić et al. 2022; Eger et al. 2021; Gilal et al. 2021). Additionally, examining moderating effects within the S-O-R framework, such as generational differences, has been infrequent in food waste-related studies, which could potentially enrich insights in the field (Talwar et al. 2022; Zhang et al. 2022).

Consumer food waste studies have predominantly focused on Western contexts (e.g., Allison et al. 2022; Filimonau et al. 2020; Stancu & Lähteenmäki 2022) while a substantial body of research has examined household environments (Principato et al. 2021). Despite households being major contributors to food waste, the considerable impact of out-of-home dining on waste generation necessitates further investigation (Roe & The Conversation 2022; UNEP 2021; Zeineddine 2021). While food waste has garnered increasing attention in Malaysia, research efforts in this area are hampered by several critical gaps. Existing studies, while providing valuable insights, often have limited scope or depth, constraining comprehensive understanding (Ghafar 2017; Mansor et al. 2022; Sulaiman & Ahmad 2018; Wafi & Tumiran 2022). Many studies have been confined to narrow sectors like hospitality/food service (Kasavan et al. 2019; Papargyropoulou et al. 2016; Papargyropoulou et al. 2019) or educational institutions (Jalil et al. 2019; Jamaludin et al. 2020; Ong et al. 2019; Zulkifli et al. 2019), often focusing on single establishments. While valuable, these studies may not fully capture broader consumer-level dynamics.

Furthermore, several studies have explored various aspects of food waste, including attitudes, awareness, knowledge, and habits (Amirudin & Gim 2019; Jereme et al. 2018; Zainal & Hassan 2019), as well as behavioural intentions (Chun T'ing et al. 2021; Jamaludin et al. 2020) and conceptual frameworks (Nik Masdek et al. 2021). While these studies have contributed significantly to understanding consumer perspectives and food waste behaviours, their primary focus has been on household food waste. Consequently, there remains an opportunity for research that captures additional dimensions of food waste practices in real-world settings. Expanding the

scope to encompass both household and out-of-home food waste, alongside emerging factors such as digital influences, while also considering broader consumer traits, could further enhance understanding of this complex issue (Di Crosta et al. 2021; Simeone & Scarpato 2020; Zeineddine 2021). This comprehensive approach can contribute to developing more targeted and effective mitigation strategies (Reynolds et al. 2019).

Research during the COVID-19 pandemic in Malaysia has primarily quantified food waste across MCO phases and explored general consumer awareness (Arumugam et al. 2021; Brohan et al. 2021; Ismail et al. 2020; Zakarya et al. 2022). However, there appears to be a gap in comprehensive studies examining the nuanced effects of pandemic-induced changes in consumer behaviour on food waste in Malaysia. The implications of altered digital engagement, personality trait responses, frugality adjustments, and impulse buying habits on food waste dynamics remain under-explored, particularly when considering generational differences. Therefore, this research aims to address these gaps by investigating consumer food waste, both at home and outside, along with its antecedents: impulse buying behaviour, social media usage, personality traits, and frugality in Malaysia during the COVID-19 pandemic. Additionally, this study will examine the moderating effect of Generation X, Y, and Z on the relationship between social media usage and impulse buying behaviour. This approach will contribute to a more comprehensive understanding of food waste dynamics in a non-Western context during unprecedented times.

Considering the gaps identified in the literature, this study aims to address the knowledge deficiencies by holistically examining the antecedents of consumer food waste. A summary of these gaps is provided in Table 2.6. Building upon the discussion and theoretical insights outlined in the subsequent section, the research model for this study was developed.

Table 2.6 Summary of gaps in the literature

Area of research	Existing literature source	Gaps in the literature
Food waste	Graham-Rowe et al. (2014); Wakefield & Axon (2020); Schanes et al. (2018); Pappalardo et al. (2020); Aldaco et al. (2020); Berjan et al. (2022)	Limited knowledge about the underlying causes of consumer food waste. A relative paucity of comprehensive insights that effectively guide practitioners in developing food waste reduction plans.
	Chun T'ing et al. (2021); Schanes et al. (2018); Stancu et al. (2016); Visschers et al. (2016)	Food waste studies predominantly based on the Theory of Planned Behaviour focus on attitudes and behavioural intentions, which may not fully predict actual behaviour, leading to a notable attitude-behaviour gap.
Impulse buying behaviour and food waste	Närvänen et al. (2018); Porpino (2016); Welch et al. (2018)	Previous studies explored food waste through various lenses, including sociological perspectives such as social norms and cultural practices; examination of consumer behaviours, like impulse buying on food waste require further examination.
	Porpino (2016); Principato et al. (2021)	Lack of quantitative research examining the direct effect of impulse buying behaviour on food waste using validated measurement scales.
	Scacchi et al. (2021); Bravi et al. (2020); Brook Lyndhurst (2007); Stancu and Lähteenmäki (2022)	Prior studies explored the relationship between impulse buying and food waste without using specific validated scales, examined impulse buying as an item or indicator within the broader variable of in-store behaviour rather than focusing on impulse buying behaviour itself with validated scales, or explored impulse buying tendency instead of behaviour.
	Fenton-O'Creevy et al. (2020); Jamaludin et al. (2020); Redine et al. (2022)	Like the S-O-R model, the FFM has examined impulse buying and food waste behaviour separately. A comprehensive approach that combines both models to investigate how personality traits influence impulse buying and food waste, as well as the impact of impulse buying on food waste behaviour remains unexplored. This limits the understanding of the psychological mechanisms underlying the connection among impulse buying and food waste behaviours.
	Redine et al. (2022); Zafar et al. (2021b)	Despite the predominant utilisation of the S-O-R framework in impulse buying studies, its application to subsequent behaviours like food waste is less common.
	Porpino (2016); Principato et al. (2021); Redine et al. (2022)	The exploration of impulse buying behaviour as a mediator in food waste studies is under-researched.
	Talwar et al. (2021)	The examination of mediators, such as impulse buying, both as a mediating variable and as an initial response behaviour in the S-O-R model, is an approach that has received little attention in the existing literature.
Social media and impulse buying behaviour	Djafarova & Bowes (2021); Gupta & Vohra (2019); Zafar et al. (2021b)	Social media's influence on detrimental consumer behaviours, like impulse buying and overconsumption, posing a threat to sustainability has received relatively less attention.

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	Chen et al. (2019); Kim & Johnson (2016); Kimiagari & Malafe (2021); Ko (2018); Koay et al. (2021); Shahpasandi et al. (2020); Rao & Ko (2021); Vazquez et al. (2020); Zafar et al. (2021c)	Most social media studies examine impulse buying pertained to online environment as they are commonly situated in the social commerce context—impulse buying via social media platforms, like Instagram, Facebook, WeChat, and Weibo.
	Chung et al. (2017); Song et al. (2015); Tariq et al. (2020); Tariq et al. (2019a) Tariq et al. (2019b)	Social media-related food impulse buying studies often limit the scope to certain food types, such as organic food or restaurant food.
Social media and food waste	Simeone & Scarpato (2020); Teoh et al. (2022); Yasseri & Sanford (2020)	The relationship between social media usage and food waste is examined as an initial exploration rather than a comprehensive analysis, for example, specific analysis on attention to expiration dates to reduce food waste or exploration of broader consumer habits and attitudes towards waste, without fully establishing a direct link to food waste behaviours.
	Sainsbury's (2016); Demir & Bertan (2023); Närvänen et al. (2018); Sutinen & Närvänen (2022)	A corporate report explicitly cites platforms, such as Instagram for directly contributing to food waste generation. This contrasts with some academic literature, which provides valuable insights into how food waste is discussed and framed on social media but does not directly measure social media's impact on food waste.
	Young et al. (2017)	Some preliminary insights are provided by focusing on a specific intervention rather than general social media usage, using relatively simple food waste measures and not extensively validated scales in the traditional academic sense.
	Sainsbury's (2016); Sutinen & Närvänen (2022); Teoh et al. (2022); Young et al. (2017)	Lack of rigorous studies that examine the direct influence of social media usage on food waste behaviour using validated scales on a scholarly level.
Big Five personality traits and impulse buying behaviour	Di Crosta et al. (2021); Fenton-O'Creevy et al. (2020); Previšić et al. (2022)	Comprehensive analyses of the Big Five on specific food-related consumer behaviours, such as food impulse buying remain under-researched, particularly during the COVID-19 pandemic. Notable studies present mixed findings; for instance, while some studies report a positive relationship between neuroticism and impulse buying, others found the opposite.
	Lu & Su (2018)	Studies often limited their scope to select traits, such as extraversion and openness, and to specific contexts like restaurant food buying settings.
Big Five personality traits and food waste	Di Crosta et al. (2021); Jamaludin et al. (2020); Swami et al. (2011)	Comprehensive analyses of the Big Five on food waste remain under-researched, especially during the pandemic. The literature presents inconsistencies in how the Big Five personality traits (e.g., agreeableness) relate to waste management behaviours.
	Abdelradi (2018); Jamaludin et al. (2020); Kutlu (2022)	Prior research narrowed their focus to certain traits, such as conscientiousness, extraversion or agreeableness concerning waste management practices and food waste reduction.

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	Di Crosta et al. (2021)	A comprehensive analysis that encompasses all Big Five traits and their specific impacts on food impulse buying, and subsequent waste remains unexplored.
Frugality and impulse buying behaviour	Haines & Lee (2022); Shoham et al. (2017); Kapitan et al. (2021)	The relationship between frugality and impulse buying is complex. While some researchers indicate a negative link, suggesting frugal consumers make fewer impulse buys, others suggest frugal individuals may engage in impulse buying, especially when discounts are involved.
	Sarmiento et al. (2020)	Limited knowledge exists into consumption decisions during global crises like COVID-19, despite the importance of understanding consumer behaviour in economic downturns.
Frugality and food waste	Aschemann-Witzel et al. (2022); Aschemann-Witzel, et al. (2020); Kansal et al. (2022); Kutlu (2022); Raghunathan & Chandrasekaran (2021); Stancu & Lähteenmäki (2022)	The direct association between frugality and food waste behaviour is often overlooked. Studies typically focus on attitudinal aspects or examine frugality in waste reduction communications. Frugality is also studied in relation to suboptimal or upcycled food consumption, which indirectly relates to food waste, but typically does not extend to examining direct food waste behaviours.
	Kansal et al. (2022); Raippalinna (2022); Sadom et al. (2022a); Sadom et al. (2022b); Sadom et al. (2022c)	Although culture plays a vital role in shaping frugality, the direct impact of frugality on food waste behaviour within the Malaysian cultural context remains under-explored. Existing empirical research in Malaysia has primarily focused on frugality within the hospitality sector, overlooking its broader implications for consumer waste practices.
Generation X, Y, and Z	Djafarova & Bowes (2021); Gilal et al. (2021); Lee & Gan (2020); Wahyuningsih et al. (2022)	Predominance of studies focusing separately on Generation Z or Generation Y, while past studies have demonstrated distinct consumer behaviours among Generation X, Y, and Z.
	Ameen et al. (2021); Cabeza-Ramírez et al. (2022); Cavazos-Arroyo & Máñez-Guaderrama (2022)	Direct comparisons are often made between only two cohorts at a time, for instance, among Generation Y and Z or Generation X and Y, leaving a limited comprehensive analysis across all three groups (Generation X, Y, and Z).
Generation X, Y, and Z and their social media usage and impulse buying behaviour	James et al. (2019); Taha et al. (2021)	Existing research often explores relationships between generational characteristics and either social media habits or impulse buying tendencies separately.
	Djafarova & Bowes (2021); Lina et al. (2022); Koh et al. (2020); Zafar et al. (2021a)	Studies examining both social media and impulse buying together tend to focus on younger generations due to their high social media engagement and susceptibility to impulse buying. However, the pandemic-induced environmental and behavioural changes have not been limited to specific age group.
	Eger et al. (2021); Gazali (2020); James et al. (2019); Naeem (2020); Taha et al. (2021); Djafarova & Bowes (2021); Lina et al. (2022)	Comparative analyses integrating social media usage, impulse buying behaviour, and generational differences remain under-explored in the current literature, especially during the pandemic, which altered behaviour across demographics.

to be continued...

...continuation

	Alić et al. (2022); Eger et al. (2021); Gilal et al. (2021)	While generational cohort theory has been widely used to study consumer behaviour and buying habits, there appears to be a lack of research applying this theory to examine differences among Generation X, Y, and Z as a moderator in the relationship between social media usage and impulse buying behaviour.
	Talwar et al. (2022); Zhang et al. (2022)	The examination of moderating effects, such as Generations X, Y, and Z, within the S-O-R framework, which could enrich insights, has been infrequent in food waste-related studies.
Food waste behaviour worldwide	Allison et al. (2022); Filimonau et al. (2020); Stancu & Lähteenmäki (2022)	Most consumer food waste studies have been concentrated on the west.
	Principato et al. (2021); Roe & The Conversation (2022); UNEP (2021); Zeineddine (2021)	A substantial body of research has focused on the household environment; although households are major contributors to food waste, the scale of food wastage in out-of-home dining is considerable and warrants further investigation.
Food waste behaviour in Malaysia	Ghafar (2017); Mansor et al. (2022); Sulaiman & Ahmad (2018); Wafi & Tumiran (2022)	Existing studies often have limited scope or depth, constraining comprehensive understanding of the problem.
	Jalil et al. (2019); Jamaludin et al. (2020); Kasavan et al. (2019); Papargyropoulou et al. (2019); Papargyropoulou et al. (2016); Ong et al. (2019); Zulkifli et al. (2019)	Many studies have been confined to narrow sectors, such as hospitality/food service or educational institutions, often focusing on a single establishment or entity. The limited scope may not fully capture the broader dynamics of food waste at the consumer level.
	Amirudin & Gim (2019); Chun T'ing et al. (2021); Jamaludin et al. (2020); Jereme et al. (2018); Nik Masdek et al. (2021); Zainal & Hassan (2019)	Several studies have explored various aspects of food waste, including attitudes, awareness, knowledge, and habits as well as behavioural intentions and conceptual frameworks. These studies primarily focus on household food waste, limiting broader consumer insights. There is a gap in comprehensive studies examining food waste practices across various real-world contexts beyond the household setting.
	Di Crosta et al. (2021); Reynolds et al. (2019); Simeone & Scarpato (2020); Zeineddine (2021)	Expanding the scope to include both household and out-of-home food waste, along with emerging factors such as digital influences, while also considering broader consumer traits could further enhance understanding and contribute to developing more targeted and effective mitigation strategies.
Food waste behaviour in Malaysia during the COVID-19 pandemic	Arumugam et al. (2021); Brohan et al. (2021); Ismail et al. (2020); Zakarya et al. (2022)	Existing research has primarily focused on quantifying the food waste produced across various phases of MCO and exploring general consumer awareness. There is a gap in comprehensive studies examining the nuanced effects of pandemic-induced changes in consumer behaviour on food waste in Malaysia. The implications of altered digital engagement patterns, shifts in personality trait responses, frugality adjustments, and variations in impulse buying habits on food waste dynamics remain under-explored, particularly when considering generational differences.

2.9 UNDERPINNING THEORY AND MODELS OF THE STUDY AND THEIR APPLICATION

Theories establish connections between variables, and justification of a research model with an existing theory or framework will help demonstrate a broader theoretical significance that forms the basis of the work (Saunders et al. 2009). This study examines food waste's determinants based on the S-O-R model, FFM, and generational cohort theory.

2.9.1 Stimulus-Organism-Response (S-O-R) Model

Mehrabian and Russell's (1974) S-O-R model, an environment psychology framework, posits the effect of a Stimulus (S) on an Organism (O) which, in turn, corresponds with a Response (R). Although the S-O-R is commonly referred to as a model rather than a fully developed theory, it has been widely adopted in various disciplines as a conceptual framework for explaining behavioural responses to stimuli (Hashmi et al. 2020; Zhang et al. 2021). As Sultan et al. (2021) note, the S-O-R model has proven successful in explaining behavioural variances resulting from marketing stimuli as well as cognitive and emotional factors, underscoring its theoretical applicability.

Furthermore, Jacoby (2002) highlights the framework's adaptability as a key strength, allowing it to be applied flexibly across various research contexts. Despite its designation as a 'model,' the S-O-R's comprehensive scope and empirical support grant it the robustness and versatility commonly associated with theoretical frameworks (Ampadu et al. 2022; Islam et al. 2021). Therefore, it serves as a suitable underpinning theory for this study, as it systematically captures the dynamic interplay between stimuli, organismic states, and resultant behaviours (Tandon et al. 2021). This model offers the flexibility to explore a wide range of internal and external stimuli (S), both tangible and intangible. It encompasses diverse experiential and non-experiential aspects within organisms (O), such as attitudes, emotions, traits, and perceptions. Additionally, the framework incorporates various response (R) factors like intentions,

behaviours, and avoidance, allowing for comprehensive analysis (Amarnath & Jaidev 2021; Chan et al. 2017).

The concept of S-O-R has gained enormous popularity among consumer behaviour researchers and has been widely used to investigate consumer and consumption behaviour for example, users' knowledge sharing online (Zhou 2019), purchasing (e.g., Albarq 2021), repurchasing (e.g., Zhu et al. 2020), impulse buying (e.g., Li et al. 2019) and sustainable behaviour that include green purchase (Han et al. 2022), green practices (Hameed et al. 2022) and food waste reduction (Talwar et al. 2022).

Traditionally, the S-O-R model was studied in a sequential manner to understand the cause-and-effect relationships between external stimuli, internal processes, and observable behaviours (Mehrabian & Russell 1974). Initially, the stimuli included external factors or cues in the environment, like marketing strategies that are intended to influence individuals. Subsequently, the focus turned to understanding the internal mental processes or psychological mechanisms through which individuals interpret these stimuli. This encompassed exploring cognitive and emotional reactions, attitudes, beliefs, and perceptions that arise within individuals in response to the provided stimuli. Finally, researchers observe and analyse the behavioural responses resulting from the interaction between stimuli and organisms. These responses can encompass a wide range of actions, decisions, or behaviours exhibited by individuals due to the stimuli and their internal processing.

Studying the S-O-R model in a sequential manner does have its limitations (Jacoby 2002). For example, in real-life situations, stimuli and organism processes can occur simultaneously and interact in real-time. A sequential approach might create artificial temporal discrepancies, overlooking the parallel and interactive nature of these elements. Moreover, sequential studies often focus on conscious cognitive and emotional processes. This potentially overlooks the role of unconscious processes that can significantly influence behaviour. These are especially applicable to the traits of an individual. Also, human responses or behaviours can influence subsequent stimuli, creating feedback loops. A sequential study might miss the dynamic nature of how

responses can loop back to affect stimuli and organisms in ongoing cycles. In response to the limitations associated with studying S-O-R in a sequential approach, Jacoby (2002) reconceptualised the S-O-R framework to address overlaps in Stimulus (S), Organism (O), and Response (R) sectors. This reconceptualisation acknowledges the interplay and simultaneous occurrence of these elements, providing a more comprehensive understanding of consumer behaviour. This reconceptualisation also accounts for both conscious and unconscious processing of stimuli, reflecting the complexity of consumer decision-making processes.

Based on this model, consumers' responses can vary from each other subject to the stimuli they have been exposed to and depending on how they process these factors internally (Nunthiphatprueksa & Suntrayuth 2018). The S-O-R model has proven to be of great value in consumer behaviour research as it helps in conceptualising consumers' reactions to information by capturing factors involved in the complex process of consumer decision-making (Bagozzi 1983; Kumar et al. 2021).

a. Justification for Selecting the S-O-R Model as the Main Underpinning Theory

After thoroughly reviewing the consumer food waste literature, this study has chosen the S-O-R model as its foundational theoretical framework. This model effectively integrates key variables such as social media usage, Big Five personality traits, frugality, impulse buying behaviour, and food waste, providing a comprehensive basis for the study. The S-O-R model was selected over the predominantly used Theory of Planned Behaviour in food waste studies due to the latter's limited ability to predict actual behaviour, despite its focus on behavioural intention (Schanes et al. 2018; Stancu et al. 2016).

The Theory of Planned Behaviour (Ajzen 1991) provides valuable insights into the cognitive determinants of behaviour, such as attitudes, norms, and perceived control, but its effectiveness in predicting actual behaviour is limited (Schanes et al. 2018; Visschers et al. 2016). The Theory of Planned Behaviour posits that individual behaviour is primarily determined by the intention to perform that behaviour, influenced by three key components: attitudes towards the behaviour (i.e., an individual's positive

or negative evaluation of performing the behaviour), subjective norm (i.e., perceived social pressures to perform or not perform the behaviour), and perceived behavioural control (i.e., individual's perception of their ability to perform the behaviour). However, several studies (Graham-Rowe et al. 2015; Stancu et al. 2016) have shown a gap between intention and behaviour.

A high intention does not often lead to action (Stefan et al. 2013), which deviates from The Theory of Planned Behaviour's assumption that a high intention will translate into action (Ajzen 1991). A discrepancy often exists between holding environmental attitudes and performing environmentally friendly behaviours, leading to a reported gap between attitudes/values and actual behaviour (Graham-Rowe et al. 2015; Stancu et al. 2016). This makes cognitive aspects that form the basis of these theories, such as attitudes and values, not always good indicators of reduced food waste (Schanes et al. 2018).

Furthermore, while the Theory of Planned Behaviour considers some external influences through subjective norms, it may not fully capture the complex interplay between environmental stimuli, internal factors, and behaviour, particularly in the context of food waste (Miles 2012; Talwar et al. 2021; Talwar et al. 2022). The theory's focus on cognitive aspects potentially overlooks the influence of environmental factors and individual psychological traits that may play a significant role in food waste behaviour (Miles 2012; Swami et al. 2011; Welch et al. 2018).

The application of the S-O-R model in food waste literature has not been prevalent until recently (Talwar et al. 2021; Talwar et al. 2022). There is increasing evidence that theories offering a sequential explanation of consumer behaviour, like the S-O-R model, are more effective in modelling behaviours concerning the environment and sustainability than behavioural theories like The Theory of Planned Behaviour, which most food waste studies have been based on (Kumar et al. 2021; Talwar et al. 2021; Talwar et al. 2022).

In addition, this study will implement the S-O-R model as the primary theory for several reasons: (a) The S-O-R model offers a comprehensive approach to

understanding consumer behaviour, complementing insights from other models such as the attitude-behaviour-consequence (A-B-C) model (Skinner 1963). This approach can provide additional perspectives on the complexities of food waste behaviour. It may also help address the attitude-behaviour gap often observed in food waste studies (Schanes et al. 2018), offering insights into the complex factors influencing consumer behaviour;

(b) The S-O-R model is one of the most successful models for examining consumer behaviour as it helps to comprehend human behaviour-related issues by accounting for the external and internal factors of rationalisation and decision making. It effectively captures the decision-making process that begins with the individual-related (internal stimuli) or environmental (external stimuli) cues that induce internal processing (organism). This eventually manifests in a response that reflects the individual's traits and decision-making processes. The response can be either a favourable or avoidance behaviour;

(c) There is an inherent possibility of overlap between Stimulus (S), Organism (O), and Response (R) components, as suggested by researchers (e.g., Jacoby 2002), contrary to the originally conceptualised strictly sequential process of S-O-R. This denotes the existence of more dynamic interactions that surpass the linear theorisation conceptualised in the original S-O-R model. Such an approach allows for a more nuanced understanding of the complex interplay between external stimuli, internal processes, and behavioural responses in consumer behaviour;

(d) It supports an enhanced comprehension of how both external stimuli (e.g., social media usage) and internal factors (e.g., Big Five personality traits and frugality) influence responses such as impulse buying and food waste behaviour, areas which are currently limited in the literature (Di Crosta et al. 2021; Simeone & Scarpato 2020; Stancu & Lähtenmäki 2022);

(e) It is widely used to predict consumer behaviour (e.g., Albarq 2021), offers greater justification and validity, and explains high variance in consumer behaviour (Kumar et al. 2021). Its effective application in recent studies examining consumer food waste behaviour (Talwar et al. 2021; Talwar et al. 2022) signifies its relevance in explaining the complex relationships between stimuli, internal processes, and behavioural responses in this context. The S-O-R model captures the dynamic nature of how impulse buying, serving as both a response and a mediator, can influence subsequent food waste behaviour, creating a cyclical pattern of consumer behaviour.

2.9.2 Five-Factor Model (FFM)

The Five-Factor Model (FFM) is widely employed in current research, reflecting scholars' quest for a deeper understanding of its significant influence on consumer behaviour and consumption patterns (Clark et al. 2020; Kircaburun et al. 2020). Although termed a 'model', the FFM functions as a theoretical framework that explains individual differences in personality and behaviour (Aschwanden et al. 2021; McCrae & Costa 1996). It evolved from extensive empirical research and theoretical development in personality psychology, providing a comprehensive theoretical structure for understanding how personality traits influence human behaviour (Digman 1990; McCrae & John 1992). The model posits that personality variations can be attributed to five broad, stable, and biologically-based trait dimensions that consistently emerge throughout adulthood (McAdams & Pals 2006; McCrae & Costa 1996). These trait dimensions serve as theoretical constructs that explain and predict behavioural patterns, making FFM a robust theoretical foundation for understanding consumer behaviour (Costa & McCrae 1992; Kohút et al. 2021).

The FFM categorises personality into five key traits, often remembered through the acronyms OCEAN or CANOE (McCrae & John 1992): Neuroticism that indicates the degree of psychological instability or distress a person experiences, which might include feelings of depression, anxiety, or general unease; Conscientiousness measures a person's level of organisation, punctuality, reliability, and attention to detail; Agreeableness reflects an individual's tendency to be cooperative, avoid interpersonal conflicts, and strive for harmonious relationships; Extraversion refers to how sociable and outwardly focused an individual is, contrasting with their internal world; Openness describes one's inclination towards seeking and embracing new experiences and ideas.

The FFM is believed to encompass a significant portion of the similarities between how individuals describe themselves and how others perceive them in terms of personality traits (Benet & Waller 1995). While there have been adjustments to some of the specific labels for these factors, the fundamental makeup has remained consistent over time (John & Srivastava 1999).

Given that personality traits play a pivotal role in shaping consumer decision-making processes, they serve as key predictors of consumer behaviour (Alivernini et al. 2021). The FFM has been proven useful in a range of areas concerning consumer and sustainable consumption behaviour, including understanding purchasing behaviour, specifically impulse buying behaviour (e.g., Lim et al. 2020), food consumption behaviour (e.g., Machado-Oliveira et al. 2020) and food waste (e.g., Jamaludin et al. 2020).

2.9.3 Generational Cohort Theory

Building on Mannheim's (1952) concepts, the generational cohort theory categorises individuals into generations based on shared historical and social experiences. Mannheim (1952) proposed that a generation emerges from people born around the same time who not only share these experiences but also perceive themselves as a distinct group. This concept emphasises the common events and the self-awareness of a shared historical context (Bolin 2017). Researchers have since adapted this concept, often using birth periods as a practical means to delineate cohorts while recognising that shared experiences within these timeframes truly define a generation (Gilal et al. 2021; Herrando et al. 2019).

The theory posits that people who come of age during the same historical period tend to develop similar beliefs, values, and behavioural patterns (Meriac et al. 2010). These shared experiences shape each generation's identity during their developmental years, influencing their views, feelings, and behaviours (Bolin 2017). Societal transformations, political events, economic conditions, and cultural influences during childhood significantly affect individuals' maturity and perspectives (Inglehart 1997; Padayachee 2017). Inglehart (2008) suggests that by adulthood, a person's basic personality structure is essentially set and does not undergo significant fluctuations thereafter. This supports the belief that these generational effects remain constant throughout life (Sessa et al. 2007). Consequently, each generational cohort is expected to demonstrate similar consumer behaviours influenced by their shared value systems (McKercher 2023).

Researchers have applied this theory to various fields, particularly consumer behaviour (Shams et al. 2020; Ruiz-Equihua et al. 2022). Generational differences account for various age groups' distinct characteristics and preferences, impacting communication styles, socialising habits, and purchasing behaviour (Srinivasan 2012; Thangavel et al. 2022). Generations exposed to different technological advancements or cultural shifts may have unique preferences in how they communicate, make purchasing decisions, or interact with society (Thach et al. 2020). The application of generational cohort theory to consumer behaviour has become widespread, with researchers categorising individuals into segments such as Generation X, Y, and Z to study their distinct consumer preferences and behaviours (Alić et al. 2022; Eger et al. 2021; Gilal et al. 2021).

2.9.4 Application of the Theories in the Current Study

The integration of the S-O-R model, FFM, and generational cohort theory to form the research structure of this study would further elucidate the variance in food consumption and food waste behaviour. This study specifically employs Jacoby's (2002) reconceptualised S-O-R model, which emphasises the overlap between stimulus and organism, where external and internal stimuli can be processed simultaneously. Recent empirical evidence supports the effectiveness of this model in explaining food-related decision-making behaviours (Talwar et al. 2021; Tandon et al. 2021). Jacoby's (2002) reconceptualised S-O-R model is applied to guide the hypothesised relationships between social media usage, Big Five personality traits drawn from FFM (Neuroticism, Conscientiousness, Agreeableness, Extraversion, and Openness), frugality, impulse buying behaviour, and food waste. Additionally, generational cohort theory underpins the selection of Generation X, Y, and Z as a moderator in the relationship between social media usage and impulse buying in this study.

In the case of social media usage, users are exposed to a wide variety of content, particularly food-related content (Arnold 2019), which acts as an external Stimulus (S). This exposure may influence cognitive processes and internal states, representing an overlap between Stimulus (S) and Organism (O). The cognitive processes and internal

changes (Organism) directly lead to the Response (R) of impulse buying or food waste, either due to excessive purchases or food prepared beyond consumers' needs.

The overlap between Stimulus (S) and Organism (O) can occur simultaneously due to the nature of information processing (Kim & Johnson 2016). When individuals engage with social media feeds, they rapidly absorb and process visual and textual information. This rapid information processing involves cognitive functions like attention, perception, and evaluation. The dynamic interaction enables the seamless integration of external stimuli (S) and internal cognitive responses in the Organism (O), processing simultaneously and resulting in behavioural responses (R). For instance, encountering an appealing food product or a time-sensitive offer on social media can trigger immediate cognitive reactions, such as increased attention or altered decision-making processes. These cognitive changes can influence users' purchasing decisions or food management behaviours almost instantaneously, potentially through mechanisms such as perceived scarcity or social proof (Islam et al. 2021; Sobande 2024). Users engage with content in real-time, evaluating stimuli and experiencing internal changes that may lead to impulse buying or food waste behaviours (Lin & Utz 2015).

The Big Five: Neuroticism, Conscientiousness, Agreeableness, Extraversion and Openness from FFM, which form the personality traits of an individual and can generate internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their respective personality trait (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R). For instance, a person high in conscientiousness might internally feel the need to plan purchases and meals, budget effectively, and avoid impulsive decisions due to their organised and disciplined nature. This internal Stimulus (S) arises from their conscientiousness trait (Organism), influencing their thoughts and decision-making processes. This makes the overlap between the Stimulus (S) and Organism (O). This is followed by the engagement or avoidance of impulse buying or food waste behaviour (Response).

Similarly, the personality traits of Neuroticism, Agreeableness, Extraversion, and Openness act as internal stimuli within the Organism (O), influencing the individual's thoughts and decision-making processes (creating an overlap between Stimulus and Organism) and shaping their impulse buying as well as food waste behaviour (Response). The internal stimuli prompt the individual to assess impulsive urges and waste behaviour considering their traits' nature and influence on behavioural decision-making.

Likewise, frugality is an enduring individual characteristic that generates internal stimuli within the Organism (O). These internal stimuli (S) are activated by the individual's frugal tendencies (Organism), such as their inclination to save money and resources, avoid unnecessary expenses and waste, and seek value in purchases. These internal stimuli (S) influenced by frugality create an overlap between Stimulus (S) and Organism (O). This is followed by the behavioural Response (R), which includes impulse buying and food waste behaviour. For example, frugal individuals might consciously avoid impulse buying or excessive buying, plan meals efficiently, and use leftovers creatively to minimise waste.

The impulse buying behaviour, serving as a Response (R) in the reconceptualised S-O-R model, has also been considered a mediator in this study. This approach finds precedence in the food waste literature (Talwar et al. 2021), where an initial response in the S-O-R model has been employed as a mediator, leading to a subsequent behaviour (final response).

The impulse buying behaviour generates internal stimuli within the organism, i.e., when individuals engage in impulse buying, it can lead to changes in their cognitive processes and internal states. This reflects an overlap in the Stimulus (S) and Organism (O). For instance, after an impulsive shopping spree, a person might experience altered emotional states and cognitive changes. These changes influence their internal state, potentially leading to thoughts like, 'I need to use these items before they go bad' or 'I bought too much, and now I have to figure out how to use everything'. The resulting food waste behaviour (Response) is influenced by these internal stimuli. The cognitive processes and internal states triggered by impulse buying decisions impact how

individuals manage and consume the purchased items, potentially leading to food waste behaviours. If a person buys perishable items impulsively, these internal changes might influence their decision-making. For instance, they might forget about the items, not use them before they spoil, or feel overwhelmed by the excess, leading to wasteful behaviours.

This process creates a loop demonstrating the continuous cycle within the S-O-R framework. Initial stimuli from social media, the Big Five personality traits, and frugality impact impulse buying, generating internal stimuli influencing subsequent behaviour, i.e., food waste behaviour. The internal stimuli from impulse buying become new stimuli, perpetuating the cycle. Specifically, social media, the Big Five personality traits, and frugality affect cognitive processes and internal states within the individual (overlap in Stimulus and Organism), leading to impulse buying behaviour (initial response and Mediator). The impulse buying behaviour then influences the management of purchased items, potentially leading to food waste behaviour (final response). This captures the dynamic and cyclical nature of behaviours, illustrating how external and internal stimuli and responses influence each other in a continuous loop (Jacoby 2002), thus demonstrating how impulse buying behaviour mediates the relationship with food waste behaviour, aligning with Jacoby's (2002) reconceptualised S-O-R model (Talwar et al. 2021).

Besides, moderating effects have been examined in food consumption and waste research as they extend the S-O-R model and enhance comprehension of the framework and consumer behaviour (Talwar et al. 2022; Zhang et al. 2022). Generational cohort theory underpins the use of Generation X, Y, and Z as a moderator in this study (Gilal et al. 2021). Each generation, shaped by unique experiences, moderates how stimuli (S) from social media are interpreted and evaluated. For instance, Generation X might respond differently to social media stimuli compared to Generation Z (Taha et al. 2021). The response (R), i.e., impulse buying behaviour, varies across generations (James et al. 2019). Generation Y might be more prone to impulse buying, whereas Generation X might prioritise sustainability in their buying decisions (Djafarova & Bowes 2021). By examining the moderating effect of consumer generations, this study integrates generational cohort theory with the reconceptualised S-O-R model, offering a more

nuanced understanding of consumer behaviour. This approach acknowledges that each generation possesses distinct values, beliefs, and attitudes (Eger et al. 2021), which influence how external stimuli from social media are perceived, internally processed, and translated into impulse buying behavioural responses. Generational factors introduce variability into the S-O-R model, enriching the understanding of consumer behaviour.

Together, the reconceptualised S-O-R model, FFM, and generational cohort theory create a multifaceted approach to examining food waste that accounts for environmental, psychological, and demographic factors. In brief, this research proposes to (1) develop and (2) validate a conceptual model of the relationships that exist between factors influencing consumer food waste in the context of Malaysia during the COVID-19 pandemic.

2.10 THEORETICAL FRAMEWORK

Figure 2.1 illustrates the theoretical framework of this research. This theoretical framework has been developed to address the gaps discussed in the literature review, based on the S-O-R model, reconceptualised by Jacoby (2002), FFM (McCrae & John 1992), and generational cohort theory (Mannheim 1952).

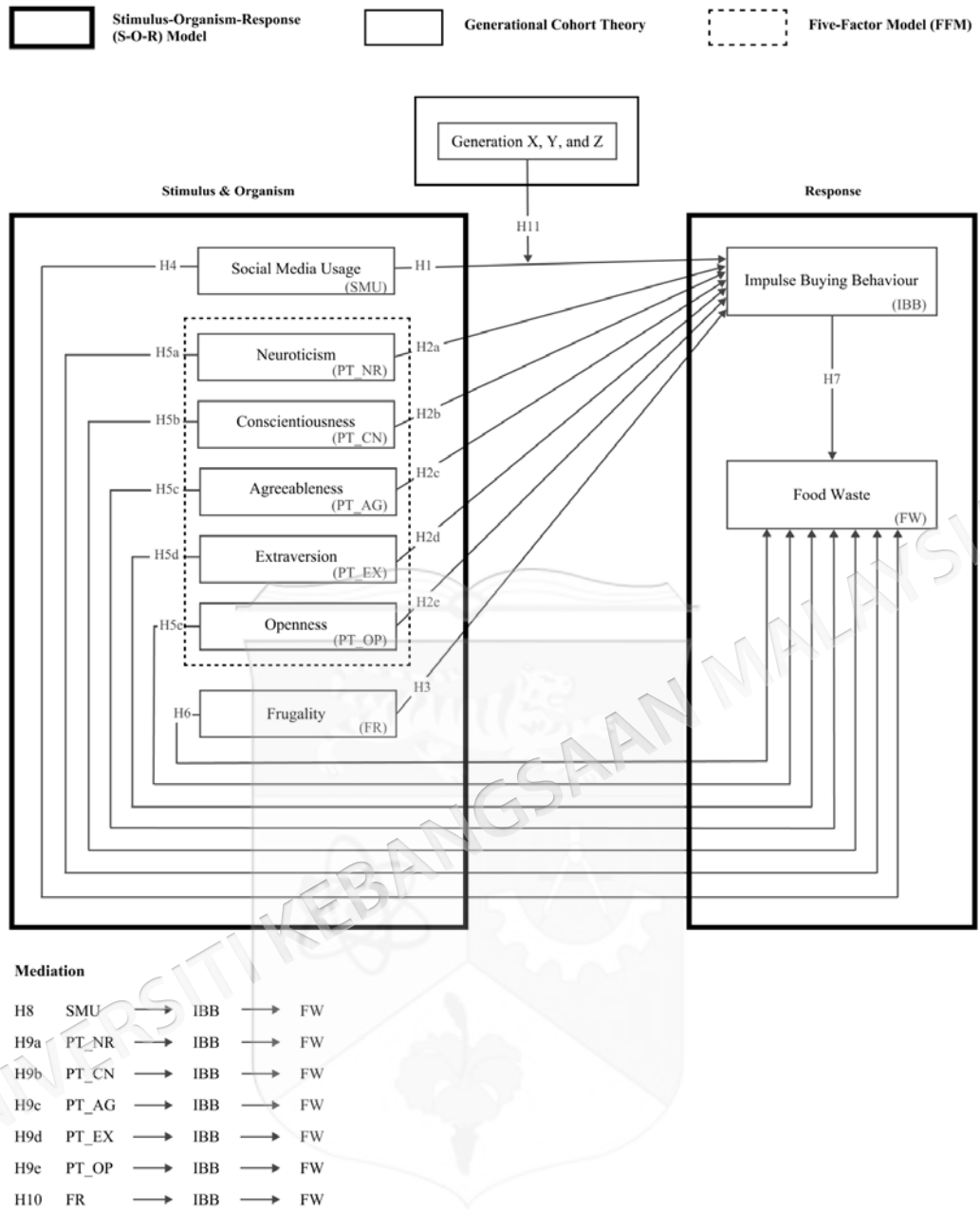


Figure 2.1 Theoretical framework

In this framework, social media usage, the Big Five personality traits, frugality and impulse buying behaviour have been identified as predictors of food waste. Furthermore, social media usage, the Big Five personality traits and frugality are antecedents of impulse buying behaviour. This enabled the prediction of impulse buying behaviour to mediate the relationships between social media usage and food waste, the Big Five personality traits and food waste, and frugality and food waste.

The reconceptualised S-O-R model (Jacoby 2002) explains how social media usage, the Big Five personality traits, and frugality cause impulse buying behaviour as well as food waste. The Big Five personality traits forming five factors—Neuroticism, Conscientiousness, Agreeableness, Extraversion, and Openness—leading to impulse buying behaviour and food waste are captured from the FFM (McCrae & John 1992). The mediation effects of impulse buying behaviour between social media usage, the Big Five personality traits, and frugality and food waste are also justified using the reconceptualised S-O-R model. Given the influence of Generation X, Y, and Z on social media usage and impulse buying, examining their moderating effect in the relationship between social media usage and impulse buying behaviour, based on generational cohort theory (Mannheim 1952), serves as an extension of the S-O-R model. This approach utilises the understanding that different generations, shaped by their unique experiences, react differently to social stimuli.

This theoretical framework comprises 23 hypotheses. Hypotheses (H1, H2 a-e, and H3) test antecedents of impulse buying behaviour, while Hypotheses (H4, H5 a-e, H6, and H7) test predictors of food waste. The mediating effect of impulse buying behaviour in the relationship between the antecedents (social media usage, the Big Five personality traits, and frugality) and the outcome variable (food waste) is proposed in Hypotheses (H8, H9 a-e, and H10). Finally, Hypothesis (H11) is proposed to test the moderating role of Generation X, Y, and Z in the relationship between social media usage and impulse buying behaviour.

2.11 HYPOTHESES

2.11.1 Social Media Usage and Impulse Buying Behaviour

The growing social media usage and increased business investments on these platforms have significantly affected consumer behaviour, leading to impulse purchases (Aragoncillo & Orus 2018; Snyder 2020; van der Bend et al. 2022b). This trend has been particularly pronounced during the COVID-19 pandemic, during which the MCO caused people to stay indoors, resulting in increased social media usage (Boursier et al. 2020; Gazali 2020). Under these new circumstances, many resorted to online shopping,

often associated with social media platforms known as social commerce—the buying and selling of products and services through social media or social networking sites (Marusak et al. 2021; Renming & Kian 2021). Features of such platforms, including website quality, task-related cues (such as information, ease of use, and navigability), and mood-related cues (like visual appeal), trigger users' arousal, making the browsing experience enjoyable and influencing impulse buying behaviour (Redine et al. 2022).

During the pandemic, social media platforms became increasingly influential in shaping consumer behaviour, particularly regarding food choices. While these platforms promoted healthy lifestyles and eating habits, research indicates that individuals adopted healthier food options during this period (Hernandez et al. 2022; Renzo et al. 2020). Concurrently, people experienced heightened exposure to promotions and advertisements (Taha et al. 2021). Social media's personalised advertisements have shown notable success in stimulating impulse buying (Zafar 2021b). These tailored adverts deliver product information based on users' demographics and preferences (Dehghani & Tumer 2015; Liu-Thompkins 2019), creating a more compelling call to action.

Moreover, marketing stimuli such as limited quantity and time-bound offers fostered a sense of urgency during the crisis, further encouraging impulse buying behaviour (Islam et al. 2021). Other strategies, including price reductions and promotions disseminated through social media channels, have also proven effective in driving impulse purchases (Kimiagari & Malafe 2021). Furthermore, the spread of information and misinformation through social media during this period contributed to panic-driven impulse buying behaviour, particularly for essential items such as food products (Naeem 2020).

This combination of factors—increased health consciousness, heightened social media engagement, exposure to targeted advertising, the abundance of appealing promotions, and the spread of information and misinformation—suggests that social media positively influences impulse buying behaviour during the pandemic, particularly in relation to food items. Thus, it is suggested that:

H1: Social media usage is positively related to impulse buying behaviour

2.11.2 The Big Five and Impulse Buying Behaviour

Neuroticism refers to emotional instability and negative emotions such as anxiety, sadness, low confidence, and psychological distress (Valencia & Christian 2022). Neurotic individuals are more likely to exhibit negative emotions than other people, and impulse buying is considered a way to reduce such emotions (Fenton-O’Creevy et al. 2018). Findings from Tarka et al. (2022) highlighted that neuroticism influences excessive buying both directly and indirectly, and, hence, it is an important vulnerability factor in impulse buying behaviour patterns. Some past studies (Indrajaya & Mahesha 2022; Wang et al. 2022) have found neuroticism to positively predict impulse buying, but the findings have not been conclusive, as other studies (Previšić et al. 2022; Rehman & Manjur 2018) did not support these results. Given the context of the COVID-19 pandemic in this study, it is believed that neuroticism can lead to impulse buying behaviour. This is because the fears associated with the pandemic, like fear of illness, price increases, and product scarcity, drove impulse buying behaviour, especially for essentials like food items (Anas et al. 2022; Naeem 2020). Furthermore, to relieve stress, neurotic individuals are likely to engage in impulse buying behaviour, as it is a coping mechanism to manage negative emotions (Fenton-O’Creevy et al. 2018). Therefore, it is hypothesised that:

H2a: Neuroticism is positively related to impulse buying behaviour.

Individual characteristics such as persistence, orderly thinking, and good self-control are linked to conscientiousness (Javaras et al. 2019). Conscientiousness is the displaying of responsible behaviour, and conscientious persons are less likely to make decisions impulsively and engage in unplanned buying than others (Badgaiyan et al. 2017). The rise of impulse behaviours has been frequently associated with low levels of conscientiousness (Braet et al. 2007). Past studies (e.g., Fenton-O’Creevy & Furnham 2020) have supported the notion that people with high conscientiousness scores are less susceptible to impulse buying behaviour. However, the findings were ambiguous. Parsad et al. (2019) found a positive relationship between

conscientiousness and impulse buying when respondents were presented with a specific product category rather than asked to select without a particular product.

In the context of the COVID-19 pandemic, conscientious individuals demonstrated more self-control and rational decision-making in their purchasing behaviours; their tendency to plan and organise led to more structured and less impulse buying patterns, even amidst the uncertainty and stress of the pandemic (Chakraborty & Sadachar 2022). Conscientious people were more likely to adhere to guidelines (Abdelrahman 2022; Aschwanden et al. 2021), making well-thought-out purchases based on genuine needs and resisting impulse buying (Kline 2022). This led to the following hypothesis:

H2b: Conscientiousness is negatively related to impulse buying behaviour.

Agreeableness is a social trait that allows individuals to develop sustainable relationships with peers, family, and others; agreeable people are described as cooperative and kind and engage in pro-social behaviours (Kircaburun et al. 2020). Past studies' association with agreeableness and impulse buying have been mixed; while studies such as Sofi (2020) and Shahjehan et al. (2012) found a positive relationship, other studies indicate a negative connection between agreeableness and impulse buying (Lim et al. 2020; Rehman & Manjur 2018). The discrepancies have been attributed to various methodological factors such as sample and cultural settings. During COVID-19, agreeable individuals have demonstrated a greater tendency to internalise and adhere to guidelines, which may extend to more mindful consumer behaviour (Moore et al. 2022). This propensity for considerate action and compliance with societal recommendations translates into more deliberate purchasing decisions that are less impulsive among agreeable individuals during the pandemic (Blagov 2021; Sharma 2021). Therefore, it is hypothesised that:

H2c: Agreeableness is negatively related to impulse buying behaviour.

Extraverts are outgoing, talkative, social, and energetic persons with positive emotions (Abe et al. 2019; Walker 2020). Individuals with high levels of extraversion

are likely to seek excitement and stimulation, and hence, they exhibit less self-control and are more likely to engage in impulse buying than other people (Chen 2011; Mathai & Haridas 2014). Research examining the relationship between extraversion and impulse buying has produced mixed findings. Several studies confirmed positive associations with impulse buying (Fenton-O’Creevy & Furnham 2020; Wang et al. 2022), while others reported no significant relationship (e.g., Miao et al. 2020). Studies in various contexts, including online shopping (Indrajaya & Mahesha 2022) and restaurant settings (Lu & Su 2018), have demonstrated positive links between extraversion and impulse buying.

Moreover, during the COVID-19 pandemic, extraverts may have experienced heightened stress due to social restrictions, potentially leading to increased impulse buying as a coping mechanism (Fenton-O’Creevy et al. 2018; Liu et al. 2020). The need for social interaction and excitement-seeking behaviour characteristic of extraverts could have manifested in more frequent online shopping or impulse buying during brief outings, as these activities may have provided a sense of normalcy and stimulation (Chakraborty & Sadachar 2022; Liu et al. 2020). Furthermore, the positive emotions associated with extraversion might have led to a more optimistic outlook, potentially resulting in less cautious spending behaviour and, consequently, more frequent impulse buying, even amidst the uncertainty of the pandemic (Walker 2020; Sharma 2021). Based on this information, it has been hypothesised that:

H2d: Extraversion is positively related to impulse buying behaviour.

Openness describes individuals proactively seeking and being open to new things; they tend to be more curious, creative, artistic, and open-minded than others (Ahmad & Maochun 2019). Modak (2010) described those with high levels of openness as people who were flexible in their values and expectations of others. They were open to listening and frequently willing to try new ideas and experiences (McCrae & Costa 2008). Consequently, they were more likely to buy impulsively (Badgaiyan & Verma 2014). Scholars such as Rehman and Manjur (2018) and Lim et al. (2020) found openness to positively affect impulse buying. In the context of the COVID-19 pandemic, individuals high in openness may have been more likely to explore new

online shopping platforms or try novel products, potentially leading to increased impulse buying behaviour. Their willingness to adapt to new circumstances might have manifested in more experimental purchasing patterns (Miao et al. 2020) as they sought to cope with the challenges and changes brought about by the pandemic (Airaksinen et al. 2021). Moreover, their inherent curiosity could have driven them to engage more frequently with targeted advertisements or promotional offers, further facilitating impulse purchases (Farid & Ali 2018). Based on this argument, it is proposed that:

H2e: Openness is positively related to impulse buying behaviour.

2.11.3 Frugality and Impulse Buying Behaviour

The economic instability caused by the COVID-19 pandemic led many individuals to adopt more frugal behaviours, likely reducing impulse purchases as part of a more intentional approach to managing finances (Rayburn et al. 2021). While frugality has been a topic of interest in consumer research for decades, the pandemic has brought it to the forefront, necessitating a re-examination of its relationship with impulse buying (Sarmiento et al. 2020; Shoham & Brenčič 2004). Moreover, Malaysia's multi-religious society, comprising Islam, Buddhism, Christianity, and Hinduism, generally emphasises the importance of frugal behaviour and discourages excessive consumption (DOSM 2010; Goldsmith & Flynn 2015). This cultural background, coupled with the spiritual aspects associated with frugality during crises (Cucato et al. 2022), likely strengthens frugal tendencies and potentially discourages impulse consumption.

The concept of frugality, characterised by disciplined acquisition and resourceful use of goods and services (Lastovicka et al. 1999), appears particularly relevant in the current economic climate. The unique context created by the pandemic, where the effects of frugality on consumer behaviour are more pronounced due to economic pressures and reinforced by cultural factors, suggests a potential inverse relationship between frugality and impulse buying behaviour. Furthermore, the psychological impact of economic uncertainty may enhance consumers' self-control mechanisms, which are integral to both frugal behaviour and the restraint of impulsive urges (Sarmiento et al. 2020).

Additionally, research has shown that frugal consumers tend to be more deliberate in their purchasing decisions, often prioritising necessity over desire (Lastovicka et al. 1999; Shoham et al. 2017). This deliberate approach to consumption stands in stark contrast to the spontaneous nature of impulse buying, further supporting the anticipated negative relationship (Haines & Lee 2022). Given these theoretical and contextual considerations, it is reasonable to expect that individuals exhibiting higher levels of frugality would be less prone to engage in impulse buying behaviours. Therefore, it is hypothesised that:

H3: Frugality is negatively related to impulse buying behaviour.

2.11.4 Social Media Usage and Food Waste

The COVID-19 pandemic has caused significant shifts in consumer behaviours and social media engagement patterns, necessitating re-evaluating the relationship between online interaction and food waste. The intensification of social media usage during this period may have inadvertently exacerbated food waste through an amplified pursuit of social appeal and validation (Gazali 2020; Tariq et al. 2020; Berjan et al. 2022). This phenomenon is potentially more pronounced as individuals endeavour to project an idealised lifestyle amidst MCO (David & Roberts 2023). The compulsion to create visually striking, 'Instagrammable' meals for social media dissemination and potentially limited culinary expertise and ingredient management skills could lead to increased food waste (Sobande 2024). This aligns with earlier findings from Sainsbury's (2016) study, highlighting the potential association between social media-driven food aesthetics and wastage.

Furthermore, the pandemic has engendered a 'new normal' in which digital platforms have become integral to social interaction and self-expression (Nawaz et al. 2024). This shift may have intensified the pressure to curate an online persona, potentially at the expense of practical considerations such as food conservation (Perrier & Swan 2020). The psychological implications of the MCO and the resultant need for digital social affirmation may further compound this issue (Jenkins et al. 2023). This increased reliance on social media for validation, coupled with the pressure to present

aesthetically pleasing and socially appealing meals, may lead to overpreparation and subsequent wastage of food (Perrier & Swan 2020; Sobande 2024). As individuals strive to maintain an idealised online persona during challenging times, the practical considerations of food conservation may be inadvertently compromised. Therefore, it is proposed that:

H4: Social media usage is positively related to food waste.

2.11.5 The Big Five and Food Waste

The COVID-19 pandemic introduced unprecedented stressors that likely influenced the relationship between personality traits and waste-related behaviours. While previous research by Opayemi et al. (2020), Karbalaei et al. (2014), and Lange et al. (2014) associated neuroticism with better waste management practices, studies conducted during the pandemic suggest a potential shift in this relationship. Dammeyer (2020) linked neuroticism to stockpiling behaviours that increase the likelihood of waste. COVID-19-related anxiety led to less frequent shopping but larger purchases (Horne & Furnham 2023), while altered shopping habits have been linked to increased food waste (Berjan et al. 2022). Furthermore, neuroticism influenced emotional eating during this period, potentially disrupting normal consumption patterns and contributing to food waste (Elmacioğlu et al. 2021; Gao et al. 2022). These findings suggest that the anxiety and emotional instability characteristic of neuroticism when exacerbated by pandemic-related stressors, may have led to behaviours that increased rather than reduced food waste. While pre-pandemic studies suggested neuroticism was associated with better waste management, the unique stressors and behavioural changes induced by COVID-19 may have altered this relationship. Additionally, individuals high in neuroticism may have struggled to adapt their food purchasing and consumption habits to the rapidly changing circumstances of the pandemic, potentially leading to increased food waste (Aldaco et al. 2020; Kurnaz 2022). Therefore, this study proposes that in the extraordinary circumstances of the COVID-19 pandemic:

H5a: Neuroticism is positively related to food waste.

Those who are high on conscientiousness are more mindful of and responsible towards their surroundings (Swami et al. 2010). Previous research by Abdelradi (2018) and Swami et al. (2011) has established a link between conscientiousness and reduced waste behaviours. Kutlu (2022) found conscientiousness to be positively associated with food waste aversion, suggesting that individuals high in this trait are more likely to avoid wasting food. This tendency towards waste aversion may stem from the characteristic thoroughness, carefulness, and adherence to principles associated with conscientiousness (Clark et al. 2020; Costa et al. 1991). While the COVID-19 pandemic increased stockpiling behaviour among individuals, Dammeyer (2020) and Roos (2024) found that higher levels of conscientiousness were associated with less stockpiling behaviour, potentially influencing food waste patterns.

Moreover, conscientious individuals typically exhibit better planning and organisational skills (Javaras et al. 2019), which may translate into more efficient food management practices, such as meal planning and proper food storage, further reducing waste. These behaviours align with Abdelradi's (2018) findings that conscientious individuals engage in more careful food consumption practices. Additionally, conscientiousness's sense of duty and responsibility may extend to environmental concerns (Hirsh 2010; Opayemi et al. 2020), motivating these individuals to minimise food waste as part of their commitment to sustainable practices. This corroborates Kutlu's (2022) observation of increased food waste aversion among conscientious individuals, suggesting a heightened awareness of the environmental impact of food waste. Given these findings, this study proposes that:

H5b: Conscientiousness is negatively related to food waste.

Agreeable individuals' characteristics include sharing with others and generosity (Lim et al. 2020; Swami et al. 2010). The relationship between agreeableness and waste practices has been complex; while Jamaludin et al. (2020) indicated a link between agreeableness and reduced waste, Swami et al. (2011) found no significant relationship. The COVID-19 pandemic provides a unique context to explore this relationship further. Recent studies offer insights into how agreeableness may influence food waste behaviour. This relationship may be amplified during a global crisis as

resource management and consideration for community needs become more critical; agreeable individuals, with their heightened awareness of societal welfare, can be particularly responsive to these pressures (Sharma et al. 2023). Myhrer et al. (2024) identified a consumer segment characterised by high agreeableness that showed greater environmental awareness, particularly regarding food waste. These findings suggest that the considerate nature, adaptability, and environmental consciousness associated with agreeableness may contribute to more efficient food use and waste reduction during the pandemic. Based on this evidence, this study proposes that:

H5c: Agreeableness is negatively related to food waste.

Extraversion is a trait that mainly deals with maintaining positive emotions and being more social (Chen 2011; Walker 2020). Previous research has shown a positive link between extraversion and intentions to reduce food waste (Jamaludin et al. 2020), suggesting that this personality trait may play a role in food waste behaviours. The COVID-19 pandemic has significantly altered social behaviours (Liu et al. 2020). Extraverts, known for their sociability and active lifestyles, adapted their food consumption habits during movement restrictions as a positive coping mechanism (Balling et al. 2021; Kohút et al. 2021). With reduced opportunities for dining out and social gatherings, they might have become more mindful of their at-home food management (Cranfield 2020). The strong sense of social responsibility often associated with extraversion (Sharma et al. 2023) might motivate more conscious efforts to reduce food waste as a way of positively contributing during the crisis. Extraverts' tendency to share experiences on social media (Kircaburun et al. 2020) suggests they might leverage online platforms to share their food management strategies. This behaviour could potentially lead to increased awareness and better practices in reducing food waste among their social networks, and as Roe et al. (2021) note, effective food management would indeed reduce food waste. Based on these arguments and the existing evidence linking extraversion to food waste reduction intentions (Jamaludin et al. 2020), it is hypothesised that:

H5d: Extraversion is negatively related to food waste.

Openness is a positive emotional trait linked to behaviours related to identifying opportunities and being more open-minded (Budiman et al. 2020; Lin 2010). Past studies found open individuals to be engaged with waste prevention (Bhutto et al. 2023; Opayemi et al. 2020). The COVID-19 pandemic has necessitated adaptability and openness to new experiences in various aspects of life, including food consumption and management (Di Crosta et al. 2021; Zager Kocjan et al. 2021). Individuals high in openness are typically curious, receptive to novel ideas, and highly adaptable (Miao et al. 2020). During the MCO, these characteristics may have prompted them to explore innovative meal planning and food preservation methods, facilitating effective adaptation to the crisis (Balling et al. 2021; Cranfield 2020).

The characteristic creativity and adaptability of individuals high in openness are likely to facilitate innovative approaches to using ingredients, which could significantly contribute to reducing food waste (Lim et al. 2020; Roe et al. 2021). This propensity for innovation aligns with the need for resourcefulness in food management during periods of restricted movement and limited shopping opportunities (Cranfield 2020). Moreover, openness is associated with greater environmental consciousness (Hirsh 2010), which may further motivate efforts to minimise food waste as an eco-friendly practice (Markowitz et al. 2012; Milfont & Sibley 2012). Notably, while stockpiling behaviour that often results in waste was prevalent during the health crisis (Brizi & Biraglia 2021), Harada et al. (2021) reported no stockpiling behaviour among open individuals. This finding indicates that individuals high in openness likely adopted more measured and thoughtful approaches to food acquisition and storage, potentially contributing to reduced waste. Collectively, these factors—innovative approaches to food use, environmental consciousness, and the absence of wasteful stockpiling behaviour—support the notion that openness may be inversely related to food waste generation. Therefore, it is proposed that:

H5e: Openness is negatively related to food waste.

2.11.6 Frugality and Food Waste

Frugality, characterised by careful and self-disciplined behaviours, often leads to more responsible food consumption practices (Pepper et al. 2011). This disposition towards resourcefulness and thrift became particularly salient during the COVID-19 pandemic, where increased frugality correlated with improved food management practices, including more effective meal planning (Özbük et al. 2022). The mindful consumption habits typical of frugal individuals, such as creatively using leftovers and proper food storage, further contribute to waste reduction (Gatersleben et al. 2017; Marselha & Botelho 2017).

In the Malaysian context, religious practices strongly emphasise prudent consumption and waste avoidance (Sukri & Fadzillah 2020). These values, while rooted in religious doctrine, often manifest through spiritual practices, particularly during crises (Cucato et al. 2022). This spiritual dimension of frugality may have been reinforced during the pandemic, potentially leading to reduced food waste. Furthermore, the economic uncertainties brought about by the pandemic likely reinforced frugal behaviours, encouraging individuals to maximise resource utilisation and minimise waste (Kutlu 2022). This aligns with the observation that crisis situations often prompt resource-conscious behaviours (Rayburn et al. 2021).

Frugal behaviours encompass practices that directly impact food waste reduction, including careful meal planning, efficient food storage, and creative use of leftovers (Özbük et al. 2022). The frugal mindset of 'waste not, want not' aligns closely with behaviours that prevent food from being discarded unnecessarily (Sadom et al. 2022b). Based on this understanding of frugality and its potential impact on food waste, particularly in the Malaysian context, it is hypothesised that:

H6: Frugality is negatively related to food waste.

2.11.7 Impulse Buying Behaviour and Food Waste

The tendency to make unplanned purchases driven by momentary desires rather than genuine needs characterises impulse buying behaviour (Fenton-O’Creevy & Furnham 2020). This often leads to acquiring surplus food items without immediate necessity (Dammeyer 2020). The unprecedented circumstances of the COVID-19 pandemic likely amplified this phenomenon, as crisis-induced anxieties and apprehensions about potential food scarcity heightened impulse buying behaviour (Naeem 2020). Emerging research on consumer behaviour and food waste during the pandemic supports this notion. For instance, Berjan et al. (2022) observed that alterations in shopping habits, particularly panic-driven impulse purchases resulting in excessive stockpiling, contributed to increased food waste. Corroborating these findings, separate studies by Aldaco et al. (2020) and Leal Filho et al. (2021) documented heightened levels of food waste throughout the pandemic period, attributing this trend to anxiety-induced impulse buying patterns.

The relationship between impulse buying and food waste is evident when examining the consequences of spontaneous purchases. Items acquired impulsively, particularly in quantities exceeding immediate needs, have an increased probability of deterioration or expiration prior to consumption; this behavioural pattern contributes to food waste generation, as the rapid acquisition often surpasses the individual’s ability to utilise the products efficiently (Roe et al. 2021). Therefore, it is hypothesised that:

H7: Impulse buying is positively related to food waste.

2.11.8 Mediating Role of Impulse Buying Behaviour

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), which builds on Mehrabian and Russell’s (1974) seminal work, this study posits that social media usage functions as a complex external Stimulus (S) that interacts with and simultaneously influences internal processes of the Organism (O). This interaction leads to an overlap between the Stimulus (S) and Organism (O), reflecting the rapid and simultaneous

nature of information processing (Kim & Johnson 2016). This interaction is followed by the Response (R), which may generate new stimuli, creating a cyclical process.

Social media users are continually exposed to a diverse array of content, particularly food-related material, especially during the COVID-19 pandemic, when social media usage spiked (Boursier et al. 2020; Sobande 2024). This constant exposure serves as an external stimulus, altering individuals' internal processes almost instantaneously (Lin & Utz 2015). The rapid and continuous nature of this interaction influences decision-making, particularly in the context of impulse buying behaviour. The stream of product advertisements, lifestyle showcases, and peer recommendations on social media can trigger impulse buying behaviours through mechanisms such as heightened emotional responses, perceived scarcity, or social proof (Abdelsalam et al. 2020; Sobande 2024). In the realm of food consumption, these impulse buys can manifest as overbuying or the acquisition of unnecessary items, potentially leading to increased food waste (Berjan et al. 2022).

The relationship between social media usage and food waste is thus hypothesised to be mediated by impulse buying behaviour. This mediation reflects the process whereby social media exposure influences internal processes, leading to an overlap between Stimulus (S) and Organism (O), which in turn affect purchasing decisions. These decisions manifest as impulse buying behaviour, an immediate behavioural response (initial response). Subsequently, this behaviour may lead to increased food waste, which represents a secondary response (final response). Importantly, these responses can serve as new stimuli, perpetuating the behavioural cycle. The act of impulse buying (initial response) generates new internal stimuli, influencing subsequent food management decisions and potentially exacerbating food waste behaviour (final response). This cyclical process demonstrates how the initial stimulus of social media usage ultimately results in multiple, interconnected responses that can, in turn, become new stimuli, illustrating the dynamic nature of the S-O-R model in the context of social media usage and food waste behaviour. The mediating role of impulse buying behaviour in this relationship reflects how an increase in impulsive purchases triggered by social media exposure can influence food waste outcomes. Therefore, it is hypothesised that:

H8: Impulse buying behaviour mediates the relationship between social media usage and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that neuroticism, one of the Big Five personality traits from the FFM, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their level of neuroticism (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, an individual high in neuroticism might internally experience heightened anxiety, stress, or negative emotions when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their neurotic trait (Organism), influencing their thoughts and decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in impulsive and emotionally-driven behaviour as a reflection of their anxious and unstable nature. Characterised by emotional instability, anxiety, and a propensity for negative affect, neurotic individuals are more likely to make impulsive decisions or engage in unplanned buying as a means of emotional regulation (Fenton-O'Creivy et al. 2018; Indrajaya & Mahesha 2022). This internal process is then followed by the engagement in impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially leading to food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, it is believed that neuroticism can lead to impulse buying behaviour, particularly for essential items like food. The fears associated with the pandemic, such as fear of illness, price increases, and product scarcity, have been shown to drive impulse buying behaviour (Anas et al. 2022; Naeem 2020). Neurotic individuals may be more susceptible to these fears, potentially

exacerbating their tendency towards impulse buying behaviour and, consequently, food waste. The mediating role of impulse buying behaviour in this relationship reflects how an increase in impulsive purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H9a: Impulse buying behaviour mediates the relationship between neuroticism and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that conscientiousness, one of the Big Five personality traits from the FFM, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their level of conscientiousness (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, a highly conscientious individual might internally experience a strong sense of responsibility, orderliness, and self-control when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their conscientious trait (Organism), influencing their thoughts and decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in planned, organised behaviour as a reflection of their persistent and responsible nature. Characterised by persistence, orderly thinking, and good self-control, conscientious individuals are less likely to make impulsive decisions or engage in unplanned buying (Javaras et al. 2019; Lim et al. 2020). This internal process is then followed by the engagement in reduced impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially leading to reduced food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, conscientious individuals demonstrated more self-control and rational decision-making in their purchasing behaviours, adhering to guidelines and making well-thought-out purchases based on genuine needs (Aschwanden et al. 2021; Kline 2022). This controlled buying behaviour is likely to extend to food management practices, potentially leading to reduced food waste. The mediating role of impulse buying behaviour in this relationship reflects how a reduction in impulsive purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H9b: Impulse buying behaviour mediates the relationship between conscientiousness and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that agreeableness, one of the Big Five personality traits from the FFM, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their level of agreeableness (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, a highly agreeable individual might internally experience a strong sense of cooperation, consideration for others, and adherence to social norms when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their agreeable trait (Organism), influencing their thoughts and decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in socially conscious and considerate behaviour as a reflection of their cooperative and kind nature. Characterised by their propensity for considerate action and compliance with societal recommendations, agreeable individuals are likely to make more deliberate purchasing decisions that are less impulsive (Sharma 2021). This internal process is then followed by the engagement in reduced impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially

leading to reduced food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, agreeable individuals have shown a greater propensity to internalise and adhere to guidelines, which may extend to more mindful consumer behaviour (Blagov 2021; Moore et al. 2022). This responsible approach to consumption is likely to influence not only their purchasing decisions but also their subsequent food management practices, potentially leading to reduced food waste. The mediating role of impulse buying behaviour in this relationship reflects how a reduction in impulsive purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H9c: Impulse buying behaviour mediates the relationship between agreeableness and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that extraversion, one of the Big Five personality traits from the FFM, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their level of extraversion (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, a highly extraverted individual might internally experience a strong desire for social interaction, excitement-seeking, and positive emotions when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their extraversion trait (Organism), influencing their thoughts and decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in socially-driven and excitement-seeking behaviour as a reflection of their outgoing and energetic nature. Characterised by their propensity for positive emotions and seeking stimulation, extraverted individuals are more likely to make impulsive decisions or

engage in unplanned buying (Walker 2020; Wang et al. 2022). This internal process is then followed by the engagement in increased impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially leading to increased food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, extraverted individuals may have experienced heightened stress due to social restrictions, potentially leading to increased impulse buying as a coping mechanism (Fenton-O’Creevy et al. 2018; Liu et al. 2020). This increased tendency towards impulse buying, driven by the need for social interaction and excitement-seeking behaviour, is likely to influence their purchasing decisions and subsequent food management practices, potentially leading to increased food waste. The mediating role of impulse buying behaviour in this relationship reflects how an increase in impulsive purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H9d: Impulse buying behaviour mediates the relationship between extraversion and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that openness, one of the Big Five personality traits from the FFM, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual’s thought patterns and decision-making processes related to their level of openness (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, an individual high in openness might internally experience a strong desire for novelty, creativity, and new experiences when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their openness trait (Organism), influencing their thoughts and

decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in exploratory and variety-seeking behaviour as a reflection of their curious and flexible nature. Characterised by their propensity for novel experiences and willingness to explore unfamiliar products, highly open individuals are more likely to make impulsive purchases (Ahmad & Maochun 2019; Miao et al. 2020). This internal process is then followed by the engagement in increased impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially leading to increased food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, individuals high in openness may have been more inclined to explore new online platforms and try novel products, potentially leading to increased impulse buying behaviour (Budiman et al. 2020). This increased tendency towards exploratory impulse buying, driven by curiosity and openness to new experiences, is likely to influence their purchasing decisions and subsequent food management practices, potentially leading to increased food waste. The mediating role of impulse buying behaviour in this relationship reflects how an increase in spontaneous, novelty-driven purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H9e: Impulse buying behaviour mediates the relationship between openness and food waste.

Drawing upon the reconceptualised S-O-R model (Jacoby 2002), this study posits that frugality, as an enduring individual characteristic, generates internal stimuli within the Organism (O). This internal Stimulus (S) is activated by changes in the individual's thought patterns and decision-making processes related to their level of frugality (Organism). This creates an overlap between Stimulus (S) and Organism (O), followed by the Response (R), which may generate new stimuli, creating a cyclical process.

For instance, a highly frugal individual might internally experience a strong inclination to save money and resources, avoid unnecessary expenses, and seek value when faced with decision-making situations, particularly those involving purchases or food management. This internal Stimulus (S) arises from their frugal tendencies (Organism), influencing their thoughts and decision-making processes. The overlap between Stimulus (S) and Organism (O) manifests as the individual's tendency to engage in disciplined acquisition and efficient use of resources as a reflection of their economical and thrifty nature. Characterised by their propensity for careful spending and resource conservation, frugal individuals are less likely to engage in impulsive decisions or unplanned buying behaviour (Lastovicka et al. 1999; Shoham et al. 2017). This internal process is then followed by the engagement in reduced impulse buying behaviour (initial response), which, in turn, generates new internal stimuli. These new stimuli can influence how individuals manage and consume the purchased items, potentially leading to reduced food waste behaviour (final response). This process illustrates the dynamic and cyclical nature of the S-O-R model, where responses can become new stimuli, perpetuating the behavioural cycle.

In the context of the COVID-19 pandemic, frugal individuals demonstrated more deliberate and planned purchasing behaviours, prioritising necessity over desire (Rayburn et al. 2021). This controlled buying behaviour is likely to extend to food management practices, potentially leading to reduced food waste. The mediating role of impulse buying behaviour in this relationship reflects how a reduction in impulsive purchases can influence food waste outcomes. Therefore, it is hypothesised that:

H10: Impulse buying behaviour mediates the relationship between frugality and food waste.

2.11.9 The Moderating Effect of Generation X, Y, and Z

Generations are identified with certain values and their shared experiences shape attitudes and consumption behaviour (Bolin 2017; Srinivasan 2012; Thangavel et al. 2022). While each generation exhibits diverse beliefs and behaviours, they typically share common consumption and behavioural trends that distinguish them from earlier

and later generations (McKercher 2023). The distinctions among generations' values and attitudes have important implications on their behavioural patterns (Thach et al. 2020).

Drawing from the generational cohort theory (Mannheim 1952), this study posits that generational differences will moderate the relationship between social media usage and impulse buying behaviour. The generational cohort theory provides a dynamic socio-cultural framework that identifies trends and behaviour across generational groups collectively, rather than focusing on individual differences, making it useful to understand consumer behaviours like social media usage and impulse buying behaviour (Eger et al. 2021; Li et al. 2013). This theory suggests that individuals born around the same time and experiencing similar historical and social events tend to share certain beliefs, values, and behavioural patterns, which remain relatively stable throughout their lives (Bolin 2017; Inglehart 2008; Sessa et al. 2007).

The usage of social media varies among generations. For example, Generation X uses social media more responsibly while their purpose is mainly to gain knowledge, connect with people, and stay up to date with current events (Dabija & Grant 2016; Daragmeh et al. 2021; Mitsis & Foley 2012). Unlike subsequent generations, Generation X is less tech-savvy and spends the least amount of time on social media, averaging around two hours daily (Viens 2019). Their purchasing decisions are influenced by reviews and recommendations on social media, and they make their purchases after careful research (Dabija et al. 2018; Man 2019). In the context of the COVID-19 pandemic, studies have shown that social media influences impulse buying (Gazali 2020; Naeem 2020). Research indicates that compared to Generation Y and Z, Generation X has the lowest percentage, i.e., 32%, engaging in impulse buying (Djafarova & Bowes 2021).

On the other hand, being internet savvy, social media is an essential part of the personal and professional lives of Generation Y as they frequently expose themselves on social media (Eastman & Liu 2012; Riley & Klein 2021). Generation Y finds online comments, reviews, and posts highly influential, often sharing content without thoroughly verifying product information (Haydam et al. 2017; Kijek et al. 2020;

Valentine & Powers 2013). They actively contribute their reviews online and are persuaded by word-of-mouth and online reviews (Bravo et al. 2020; Mangold & Smith 2012). Generation Y spends an average of two hours and thirty-eight minutes on social media daily, which exceeds the usage of Generation X (Viens 2019). The surge in social media engagement during pandemic restrictions has impacted consumer impulse buying habits (Gazali 2020; Mylona et al. 2024). According to recent research, Generation Y is notably prone to impulse buying, with 34% engaging in such behaviour (Cavazos-Arroyo & Máñez-Guaderrama 2022; Djafarova & Bowes 2021). The sizable Generation Y cohort, coupled with their significant spending habits (Cavazos-Arroyo & Máñez-Guaderrama 2022; Haydam et al. 2017; Viswanathan & Jain 2013), underscores their role in shaping consumer trends and attracting focused marketing efforts from businesses (Cabeza-Ramírez et al. 2022; Euromonitor 2015).

In contrast to earlier generations, Generation Z, the most recent cohort, was raised in a digital-centric environment, surrounded by technology and communication (Adamson et al. 2018; Betz 2019; Dolot 2018). They are constantly connected to mobile devices and frequently check social media (Contreras 2017; Ninan et al. 2020). Generation Z is the heaviest user of social media among all generations, averaging two hours and fifty-five minutes per day (Viens 2019). This is supported by Taha et al. (2021), who demonstrated that social media usage is a defining characteristic of Generation Z. Unlike older generations, they favour visual communication and actively seek creative content, often engaging in content creation on platforms like TikTok (Prakashyadav & Rai 2017; Siagian & Yuliana 2023). Often seen as highly materialistic, Generation Z values instant outcomes and prefers brand interactions via social media platforms (Cavazos-Arroyo & Máñez-Guaderrama 2022; Djafarova & Bowes 2021).

With significant buying power and a preference for immediate purchases (Shay 2017), Generation Z heavily engages in online shopping for its convenience and perceived cost-effectiveness, particularly for food and clothing (Lina et al. 2022; Simangunsong 2018; Thangavel et al. 2021). Similarly, Cavazos-Arroyo and Máñez-Guaderrama (2022) revealed that Generation Z's deep integration with digital technologies makes their immediate impulses more likely to result in actual purchases

than Generation Y. In addition, during the COVID-19 pandemic, there was an increase in impulse purchases of food items (Marusak et al. 2021; Šimić & Pap 2021). Research shows that Generation Z surpasses both Generation Y and Generation X in impulsiveness, with 41% participating in impulse buying (Djafarova & Bowes 2021).

Generational differences in social media usage and their impact on impulse buying behaviour suggest a potential moderating effect on this relationship. This hypothesis, grounded in the generational cohort theory, proposes that generational differences moderate the relationship between social media usage and impulse buying behaviour across three cohorts: Generation X, Y, and Z. While previous literature has focused mainly on younger consumers (Djafarova & Bowes 2021; Lina et al. 2022), this study broadens the scope by investigating the moderating effect across all three generations. Therefore, it is hypothesised that:

H11: Generation X, Y, and Z moderates the relationship between social media usage and impulse buying behaviour, such that the relationship will be stronger among Generation Z than among Generation Y and Generation X social media users.

2.12 SUMMARY

Reviews of relevant literature have revealed several gaps concerning food waste. To address these gaps, a theoretical framework was constructed based on literature drawn from past studies and pre-existing theories. The application of the reconceptualised S-O-R model, FFM, and generational cohort theory has formed the basis of this research in explaining food waste behaviour in relation to its predictors: social media usage, the Big Five personality traits, frugality, and impulse buying behaviour. In addition to the direct relationships between food waste and its antecedents, impulse buying behaviour is proposed as a mediator. Furthermore, the moderating effect of Generation X, Y, and Z is hypothesised in the relationship between social media usage and impulse buying behaviour. To confirm the predictions, 23 hypothesised relationships are developed. The next chapter details the methodological aspects of this research.

CHAPTER III

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter specifies the methodology adopted to empirically examine the proposed research framework and hypotheses. Specifically, section 3.2 provides a justification for the chosen research design, followed by section 3.3, which describes the population and the sample along with the sampling method employed. Section 3.4 details the measurement items used to investigate each construct, while section 3.5 explains the design of the questionnaire, including expert opinion, translation, and pretesting. Furthermore, the data collection procedure and data analysis techniques are discussed in sections 3.6 and 3.7, respectively. Finally, a summary in section 3.8 concludes this chapter.

3.2 RESEARCH DESIGN

How research design is defined or explained varies among researchers. Bryman and Bell (2011) state that research design reflects the decisions about priorities given to certain components of the research process while serving as a framework for data collection and analysis. This claim excludes the techniques or specific instruments used for data collection, like structured interviews or self-administered questionnaires. According to De Vaus (2001), the purpose of a research design is to ensure that the data gathered help answer the initial question at hand as clearly as possible. Sekaran and Bougie (2016), on the other hand, argue that research design involves five basic aspects: research strategies, extent of researcher interference, study setting, unit of analysis, and time horizon. Some of these elements are addressed in the popular research design

proposed by Saunders et al. (2009) that has been commonly embraced by social science researchers (Melnikovas 2018).

However, Sekaran and Bougie (2016) highlight three aspects not covered in the research onion (Saunders et al. 2009). These include the level of researcher interference, study setting and unit of analysis.

The level of researcher interference can vary depending on the research setting. It can either be a contrived environment where the researcher interferes greatly in an artificial environment or a non-contrived environment in which work continues as normal in a natural environment (Cavana et al. 2001). The approach adopted in this research would be the latter while ensuring minimal interference in the consumers' normal routine. Respondents will be invited to complete an online self-administered questionnaire based on the real-life situation in Malaysia.

Malaysia, as a geographical setting for this research, was selected because of the limited food waste studies conducted in the country and to focus on an emerging nation in which food waste is a major concern (Dermawan 2022).

The unit of analysis is defined as the person or object from which data is collected (Kumar 2018). According to Kumar (2018), these can be individuals, groups of individuals, organisations of individuals, countries, technologies, or even objects concerned in the study. For this research, the unit of analysis is individual consumers from which data is collected.

Apart from these features, Saunders et al. (2009) have identified numerous issues that must be clarified before the proper data collection techniques and analysis procedures can be decided. These are, namely, research philosophy, approach, strategy, choice, and time horizon illustrated in Figure 3.1 in what has been called the research 'onion'.

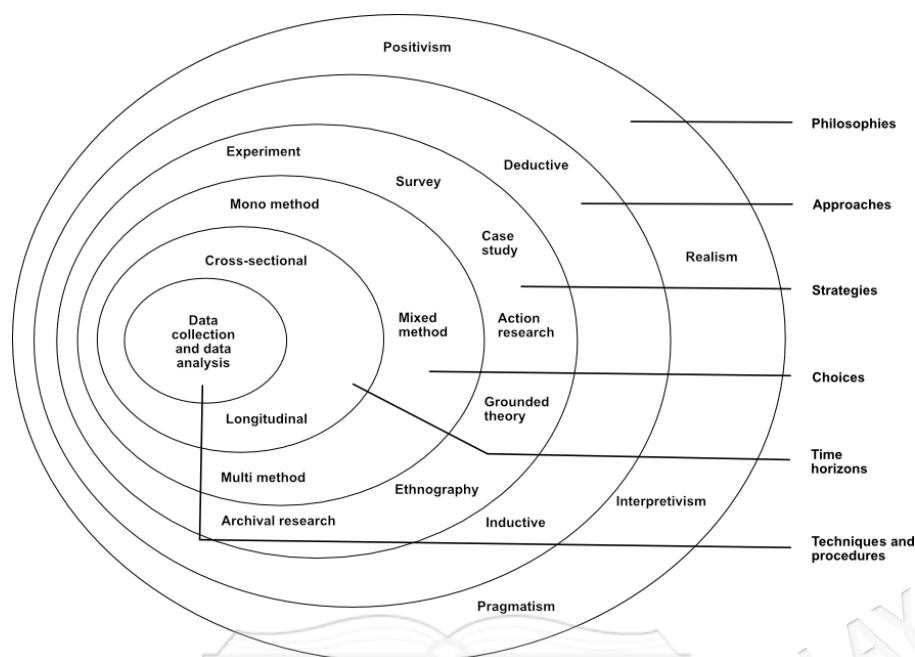


Figure 3.1 The research 'onion'

Source: Saunders et al. (2009: 108)

3.2.1 Research Philosophy

Saunders et al. (2009) have proposed research philosophical positions comprising positivism, realism, interpretivism, and pragmatism that could be used in business research. These research paradigms have been built on aspects of ontology, epistemology, and axiology (Saunders et al. 2009). Ontology is about the structure and type of reality; epistemology involves the philosophy of knowledge, while axiology concerns the information and knowledge that is valuable and important to the researcher (Aliyu et al. 2014; Saunders et al. 2009).

This research adopts a positivist paradigm for several reasons. First, although critical discussions have taken place on whether social science researchers can employ positivism in their studies due to concerns over reliability and validity (Kaboub 2008), the wide acceptance of positivist philosophy in social science research proves its relevance and applicability (Bryman & Bell 2011; Evely et al. 2008).

Second, as Bryman and Bell (2011) stress on the ontological assumption of positivism—social reality being objective and independent without being restricted to

a specific time or context—and theory being able to explain human behaviour (Evelly et al. 2008), the positivist philosophical position is best suited for this research in addressing the research problem, guided by theories to explain the consumer behaviour of food waste in relation to its antecedents.

Third, positivism aims to test hypotheses or predictions on an occurring phenomenon that was developed based on theory (Mukherji & Albon 2015). Since the purpose of this research is to examine consumer food waste behaviours in association with social media usage, personality traits, frugality, and impulse buying behaviour by testing several hypotheses, the adoption of positivism is most relevant to fulfilling this purpose.

Fourth, according to Kaboub (2008), positivism holds the belief that knowledge is true and certain, derived from previously established theories and past studies (Bhattacharjee 2012) and that only tested and proven hypotheses can be used as knowledge to explain phenomena (Saunders et al. 2009). Further, the emphasis positivists make on conducting an objective study that is free of bias can aid this research to produce a more valid and reliable finding (Bryman & Bell 2011; Saunders et al. 2009).

3.2.2 Research Approach

Deductive and inductive approaches are the two broad methods of reasoning in research (Burney & Saleem 2008). The deductive research approach, sometimes referred to as the ‘top-down’ approach, works from the more general to the more specific, as it begins with the selection of a suitable theory based on which hypotheses are developed and tested (Trochim & Donnelly 2006).

On the contrary, the inductive research approach, known as the ‘bottom-up’ approach, works from specific observations to broader generalisations and theories (Trochim & Donnelly 2006). This approach focuses on understanding a phenomenon specific to a certain time and context through the collection of qualitative data (Saunders et al. 2009).

With the adoption of the positivist research philosophy, this research follows a deductive approach (Holden & Lynch 2004). Using the existing theories, hypothesised relationships between constructs were developed followed by quantitative data collection from a sample of consumers and statistical analysis through appropriate methods. The analysed results are expected to be bias-free and hence objective.

3.2.3 Research Strategy, Choice, and Time Horizon

Following the selection of research philosophy and approach, the specific strategy, choice, and time horizon of the research will next be established.

As part of research strategies, business research can be branched into two main types, which are known as quantitative and qualitative (Antwi & Hamza 2015; Bryman & Bell 2011). While qualitative research is used to achieve an in-depth understanding of a given situation with a focus on theory building, quantitative research, on the other hand, is predictive based on which hypotheses and theories are tested (Cooper & Schindler 2014; Malhotra 2009). Also, qualitative research is exploratory in nature, involving an inductive approach, whereas quantitative research is descriptive or causal, entailing a deductive approach (Bryman & Bell 2011; Zikmund & Babin 2006). Major differences are also seen in the sample size, data type and analyses. Qualitative research interprets data from small sample sizes with data types and analyses based on verbal or non-numerical data. On the contrary, quantitative research draws explanations from large sample sizes, while data types and analyses are based on numerical data (Cooper & Schindler 2014; Saunders et al. 2009). The participation of the researcher or acting as a catalyst in the research makes qualitative research highly involved with the researcher, while in the case of quantitative research, there is typically limited involvement of the researcher, thus potentially limiting certain forms of bias (Bryman & Bell 2011; Malhotra 2009).

Both qualitative and quantitative research have their advantages and limitations. Qualitative research often allows for data collection in a timely and economical manner, but as Shukla (2008) notes, the results may have limitations in terms of generalisability. However, qualitative research can offer deep insights and uses different criteria for

ensuring rigour. Quantitative research, while sometimes costly and time-consuming, often produces results that are more readily generalisable due to larger sample sizes. The statistical methods employed in quantitative research can contribute to high levels of validity and reliability, though these are not guaranteed and depend on the quality of the research design and execution (Shukla 2008). Given that this research adopts a positivist position and deductive approach, quantitative research is most appropriate to examine the significance of relationships that exist between the variables selected in the research framework.

The selection of research design(s) by business researchers depends on whether they aim for theory building, which is commonly associated with qualitative research, or theory (hypothesis) testing, typically associated with quantitative research (Bhattacharjee 2012; Saunders et al. 2009). In-depth interviews, focus group discussions, and projective techniques are particularly suited for qualitative research, whereas observations, surveys and experiments are primarily used in quantitative research (Shukla 2008). Observations are excellent for investigating the behaviour of people in groups, teams, and organisations (Shukla 2008). While surveys are best suited to describe trends or to examine relationships among the underlying constructs, experiments are used to determine possible cause-and-effect relationships (Bhattacharjee 2012; Saunders et al. 2009).

Provided that this research employs a positivist paradigm with a deductive, quantitative approach to test the hypothesised relationships between variables, the survey strategy emerges as the most appropriate for this study. Furthermore, a survey strategy, which can be cost-effective and time-efficient for collecting data from large samples compared to many other strategies, also yields more precise results (Bhattacharjee 2012; Shukla 2008). Moreover, surveys have been commonly utilised to study consumer food waste behaviour (Abdelradi 2018; Aktas et al. 2018; Grandhi & Singh 2016).

In deciding on the choice of research, a researcher can either use a single data collection technique (mono-method) or more than one data collection technique (multiple methods) with their associated data analysis procedures (Saunders et al.

2009). In the context of food waste studies, researchers have deployed both mono-method (Evans 2011a; Stancu et al. 2016) and mixed-method (Aschemann-Witzel et al. 2019; Papargyropoulou et al. 2019). Since both methods have been widely accepted and applied in consumer food waste research, the mono method was chosen for this research.

Further, data can be collected at two different time horizons: longitudinal, by collecting data on more than one occasion from the same sample over an extended period, or cross-sectional, by collecting data only once at a given time (Hair et al. 2011; Payne & Payne 2004; Saunders et al. 2009). In contrast to longitudinal research, cross-sectional studies are generally quicker, easier, and less expensive to perform (Greener 2008; Sedgwick 2014). They can provide a snapshot of variables at a specific point in time, though they may not capture changes over time as longitudinal studies do. Considering the research objectives, time constraints, and resource limitations, a cross-sectional study was deemed more appropriate and, hence, adopted for this research.

3.2.4 Data Collection Technique

Since the survey was chosen as the research strategy for this study, it is important to note the three different types of survey strategies that exist: structured observation, structured interview, and self-administered questionnaire (Saunders et al. 2009). Structured observation concerns the frequency of actions and, hence, has been utilised in food waste research (Papargyropoulou et al. 2016; Wansink & Ittersum 2013). However, this type of survey is costly and slows down the data collection process (Saunders et al. 2009).

Compared with structured interviews, self-administered questionnaires are considerably cheaper and can accommodate larger sample sizes, potentially leading to more statistically robust results (Jackson 2011; Shukla 2008). Additionally, substantial evidence suggests that respondents are more likely to provide honest answers to self-administered questionnaires than to interviews (Dillman 2007). Based on this argument and given the time and financial constraints faced, self-administered questionnaires were regarded as the most suitable data collection technique for this research.

Among the self-administered questionnaire survey strategies, an internet survey posted on a website can reach a large audience, generating larger sample sizes than other self-administered questionnaire types quickly and with minimal cost (Zikmund et al. 2013). Other benefits of internet surveys include: respondent anonymity that encourages honest answers to sensitive questions, personalised and flexible questioning that allows sequencing of questions (with some being skipped based on the previous response), and a visually appealing questionnaire design with the use of colours and backgrounds to draw the interest of respondents (Zikmund et al. 2013). Additionally, with the MCO placed in Malaysia due to the ongoing COVID-19 pandemic, an internet survey was deemed most suitable considering the situation. Hence, this research conducted an internet survey for data gathering.

Figure 3.2 depicts the research design of this study.

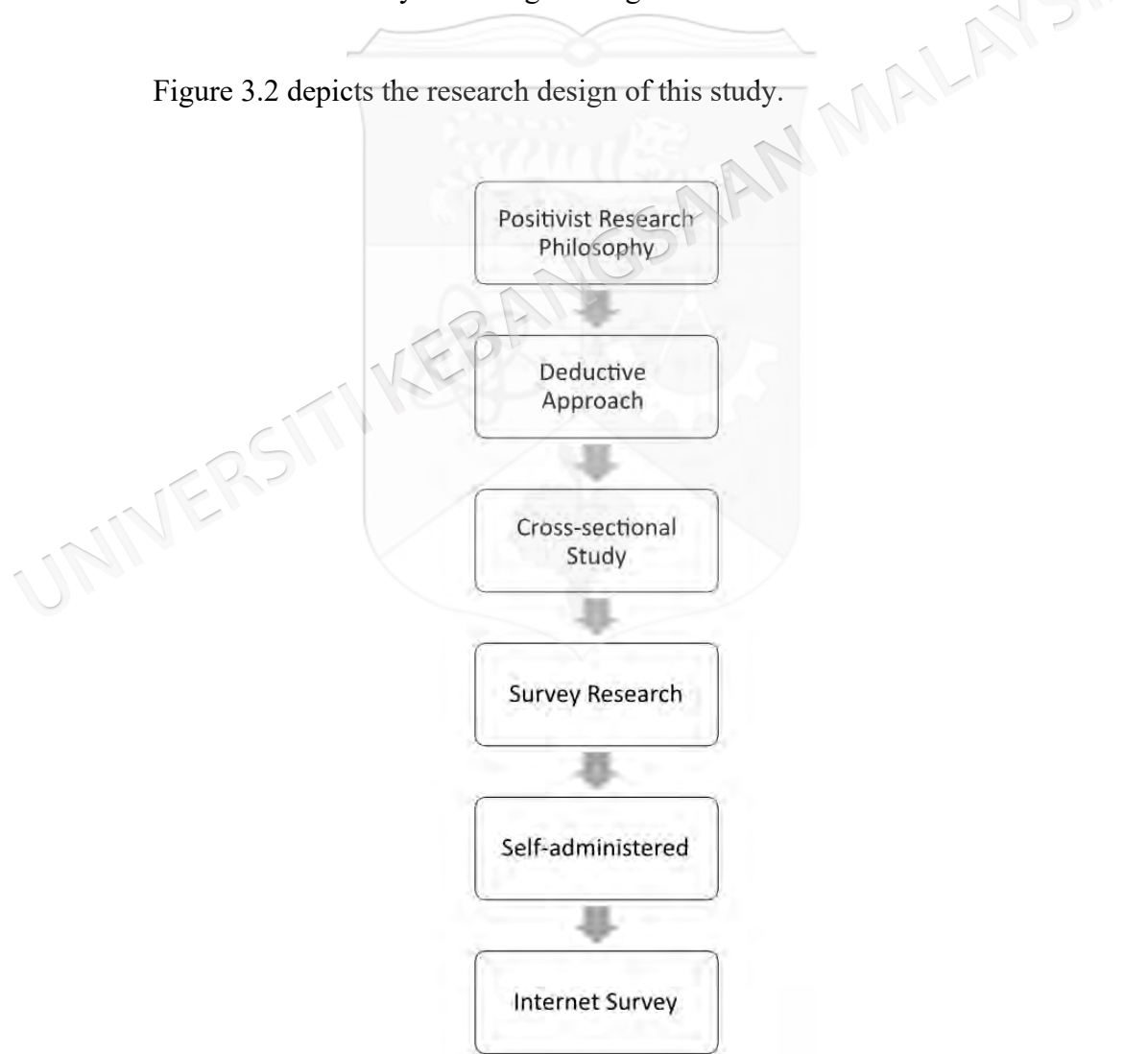


Figure 3.2 Research design

3.3 POPULATION AND SAMPLING

Cooper and Schindler (2014) identify populations as people, events, or records that research intends to examine. Given Malaysia's significant food waste problem and the limited empirical research on food waste in the Malaysian context, this study aims to investigate the country's existing issue. Taking this into consideration, the population of this research has been chosen as Malaysian consumers belonging to Generation X, Y, and Z.

Since it would be impossible to collect data from every element in the population, otherwise known as census, due to time and financial restrictions, a sample from the population was selected (Saunders et al. 2009). There are two basic sampling designs: probability and non-probability, each further divided into several sampling techniques (Shukla 2008). Probability sampling is costly and time-consuming; after carefully considering non-probability sampling specifically, convenience sampling was chosen for this research as it is generally recognised as a time-efficient and cost-effective method (Cooper & Schindler 2014; Shukla 2008).

Convenience sampling, as the name suggests, involves the selection of cases that are convenient or easiest to obtain until the required sample size has been reached (Saunders et al. 2009). Several food waste studies have used convenience sampling for data collection (e.g., Chisnall 2017; Stefan et al. 2013). The sample for this research comprises Malaysian consumers born between 1965 and 2001, corresponding to Generations X, Y, and Z, as operationalised in the subsequent section of this chapter. This classification is based on Dimock's (2019) definitions presented in Chapter 1, with a modification for Generation Z detailed in the next section of this chapter. According to Dimock's (2019) definition, Generation X begins with those born in 1965 and does not provide a chronological endpoint for Generation Z. For the purposes of this study, the endpoint for Generation Z has been set at 2001. This operationalisation allows for a comprehensive examination of three distinct generational cohorts within the Malaysian context: Generation X, born between 1965 and 1980; Generation Y, born between 1981 and 1996; and Generation Z, born between 1997 and 2001. These ranges are reflected in the questionnaire (Appendix A) used for data collection, where consumer birth year

groups are specified in accordance with how the different generations have been classified for this research.

Given the study's focus on social media usage, the sample characteristics also include individuals who are regular social media users. To ensure this criterion was met, when distributing the survey questionnaire via email, WhatsApp, and Viber, explicit instructions were provided in the message body accompanying the survey link. These instructions specified that respondents must be regular social media users to participate in the study. For clarity, the instructions defined 'regular social media users' as individuals who use social media platforms at least several times a week and engage with one or more of the following social media platforms: Facebook, Instagram, Twitter, LinkedIn, TikTok, YouTube, WhatsApp, Telegram, Snapchat, Viber, and Pinterest. This criterion was established to ensure that the research sample aligns with the study's focus on social media usage among Malaysian consumers born between 1965 and 2001, corresponding to the defined Generation X, Y, and Z cohorts as outlined in the section followed.

By providing these specific guidelines in the survey distribution message, the aim was to attract respondents who were sufficiently engaged with social media to provide meaningful insights into the relationship between social media usage, the Big Five personality traits, frugality, and food waste, with impulse buying behaviour as a mediator and Generation X, Y and Z as a moderator.

It is acknowledged that different generational cohorts may exhibit varying preferences for social media platforms. However, the primary focus of this study was to examine social media engagement in general rather than specific platform preferences. This approach was chosen to maintain a broader perspective on social media usage across generations, recognising that platform preferences can change rapidly and may not be consistently associated with specific generations.

Determining an appropriate sample size is vital as it can impact results. Too small or too large sample sizes can affect the statistical test, either by making it too insensitive or overly sensitive, respectively (Hair et al. 2019). The larger the sample

size, the smaller the standard error and the margin of error, associated with a higher statistical power and a more precise confidence interval (Cohen 1994; Liu et al. 2014). Despite the increased reliability of large sample sizes, deciding on the sample size must be made based on several aspects in relation to the model complexity, expected rate of missing data, and estimation procedures employed (Hair et al. 2019).

Various researchers have contributed to the literature in determining an appropriate sample size to be used in studies. Malhotra (2009) recommended a minimum sample size of 500 for explanatory research, yet the sample size can increase from 1000 to 2500, subject to the number of variables being investigated. According to Bryman and Bell (2011), the precision in the data increases until the sample size reaches 1000 based on the law of diminishing returns, whereby it is believed the precision begins to decrease beyond 1000, making it less worthwhile to collect responses over this number. To examine hypotheses using structural equation modeling (SEM), Hair et al. (2010) proposed a sample size minimum of 100 to 500 but stressed that the number could increase depending on the model complexity and basic measurement characteristics. In contrast, Kline (2011) asserts that a specific sample size of 200 is sufficient to test a hypothesised framework using SEM.

Furthermore, G*Power (Erdfelder et al. 1996), a power analysis program for statistical tests, is used to calculate sample sizes. The required minimum sample size, N , is determined using a priori analysis with a prespecified significance level α and a power level $(1-\beta)$ along with the population effect size to be detected with probability $1-\beta$ (Mayr et al. 2007). Due to the wide application of G*Power in social and behavioural sciences, this research has used version G*Power 3.1.9.4 (Faul et al. 2007) to decide on the appropriate minimum sample size. In the application, the F-test of regression was used. The power analysis is set for multiple regression comprising nine predictors to determine the accurate sample size. The test used an alpha value of 0.05, a power of 0.80, and a medium effect size of $f^2 = 0.15$ since 80 percent is considered the minimum acceptable power in most social sciences studies (Gefen et al. 2011). Based on the calculations, the minimum sample size, N , was determined to be 114 respondents.

To accurately represent the perspectives of Generation X, Y, and Z and to ensure robust statistical analyses, this study sought to collect a sample of at least 114 respondents from each generational cohort through convenience sampling. This target aligns with the statistical requirements for the study's design and objectives. The objective was to achieve the minimum sample size from each generational cohort. Once it was ensured that the minimum had been surpassed for each cohort, data collection was concluded. This approach resulted in a relatively balanced distribution of responses across generations, with each cohort comfortably exceeding the calculated minimum of 114 respondents.

This sampling strategy meets the statistical requirements of the study and aligns with practices observed in the field. To ensure comparability and robustness of findings, this study considered approaches used in previous research, including studies that collected data with a relatively balanced number of respondents from each consumer generation cohort. For example, Thi et al. (2022) reported data collection that included 47.7% of respondents from Generation Z and 52.3% from Generation Y via convenience sampling, indicating a distribution that allows for cross-cohort comparison and analysis. Furthermore, previous consumer food waste research has employed various sample sizes. These include 158 respondents (Grandhi & Singh 2016), 189 samples (Werf et al. 2020), 231 respondents (Abeliotis et al. 2014), 277 respondents (Aktas et al. 2018), and as high as 796 respondents (Visschers et al. 2016). Since past studies have used sample sizes similar to that of this research, this indicates an appropriate sample size.

3.4 MEASUREMENT ITEMS

Based on the literature review, measurement items for the constructs were selected. The selection of these measurements was guided by their alignment with the operational definitions of the constructs outlined in this chapter, which were based on the conceptual definitions provided in Chapter 1. This alignment ensures that the selected items accurately capture the intended constructs and provide reliable and valid data for analysis. Specifically, the items were selected based on three criteria: items should represent the relationship between food waste behaviour and its predictor variables,

must best match the operational definitions presented in this chapter, and have an acceptable degree of validity and reliability. Using existing instruments in the questionnaire development comes with two major advantages. The first benefit is that they have already been tested for validity and reliability, while the second is comparisons can be made with the results from previous research (Kitchenham & Pfleeger 2002). Since the measurements used in this research are taken from past studies, they have already been validated and confirmed reliable. Additionally, for this research, the proposed items will be assessed for validity and reliability before data collection.

3.4.1 Social Media Usage

This study defines social media usage as sharing opinions and experiences by posting content and interacting with others on social media platforms (Lai & Turban 2008). The study operationalised the construct as follows: Social media usage refers to the frequency and duration of accessing social media platforms, as well as the extent of active participation through posting, viewing, sharing, and interacting with content and other users. To measure this operationalised construct, the study adapted Xu et al.'s (2012) scale, which includes items assessing how often users access social media, the duration of their sessions, and the frequency of specific activities such as posting, viewing, sharing, and replying to content on social media platforms.

The study reviewed relevant literature to find measurement items for social media usage that align with the operational definition used in this research. The scale developed by Xu et al. (2012) was selected because it encapsulates the aspects of active engagement and frequency of use addressed in the operationalised definition and reflects the intricate nature of social media usage, which includes both content consumption and interaction. This selection contrasts with other measures, such as those used by Gironde & Korgaonkar (2014) and Hughes et al. (2012), which focus more broadly on the frequency of social media use or social media as a tool for maintaining social contacts, respectively.

Furthermore, the selected measurement scale demonstrated good psychometric properties in its validation, suggesting its reliability for measuring social media usage (Xu et al. 2012). The seven-item scale developed by Xu et al. (2012) has been slightly modified by replacing ‘SNS’ (social networking sites) with ‘social media’ since the construct of this research is named ‘social media usage’ instead of ‘social networking sites usage’.

Table 3.1 shows the operational definition and scale items for social media usage and their source.

Table 3.1 Operational definition and measurement items for social media usage

Operational definition	Items
The frequency and duration of accessing social media platforms, as well as the extent of active participation through posting, viewing, sharing, and interacting with content and other users.	On average, each week I use social media often For each log session, I use social media long On social media, I often post something On social media, I often view something On social media, I often share something On social media, I often reply to others On social media, I often play website games

Source: Adapted from Xu et al. (2012)

3.4.2 Big Five Personality Traits

This study defined the Big Five personality traits (Costa & McCrae 1992; Goldberg 1993): neuroticism as the tendency to experience negative emotions, such as anxiety, depression, and vulnerability; conscientiousness as the tendency to show self-discipline, act dutifully, and aim for achievement; agreeableness as the tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others; extraversion as the tendency to seek stimulation in the company of others and to express positive emotions; and openness as the tendency to be open to new aesthetic, cultural, or intellectual experiences. For this study, each of the Big Five personality traits was operationalised: neuroticism, characterised by traits such as moodiness, emotional volatility, testiness, temperamentality, fretfulness, jealousy, and touchiness; conscientiousness, characterised by traits such as organisation, orderliness, and efficiency, as well as the absence of disorganisation and sloppiness; agreeableness characterised by traits such as sympathy, kindness, warmth, and tenderheartedness

towards others, as well as the absence of coldness, unsympathetic attitudes, and rudeness in interpersonal relations; extraversion characterised by traits such as talkativeness when with others, comfort in social situations, outgoing behaviour, and feeling confident more than others, as well as the absence of shyness and social withdrawal; and openness characterised by traits such as originality, creativity, appreciation for art and beauty, imagination, and the ability to find novel solutions, as well as the absence of uncreative tendencies.

Based on the operationalisation, Sun et al.'s (2004) 33-item scale was deemed suitable for the study. This selection was made to achieve a balance between comprehensiveness and practicality in measuring the Big Five factors. While longer scales such as the 60-item Big Five Inventory (BFI) developed by Costa and McCrae (1992) and the 44-item version by John and Srivastava (1999) are well-established, their length could lead to respondent fatigue, potentially affecting completion rates and response reliability in a broad survey. Conversely, shorter versions like the 10-item inventory by Gosling et al. (2003) and Rammstedt and John (2007), which include only two items per Big Five personality trait, may lack the depth to effectively capture each personality trait's nuances, despite their brevity.

The measurement scale by Sun et al. (2004) provides a detailed assessment of each Big Five factor while maintaining a manageable length for participants. This scale not only ensures a more in-depth exploration of each Big Five personality trait but also respects the respondents' time and attention, which is particularly important in a study involving three generational cohorts. Each item was carefully reviewed to ensure it accurately represents the key characteristics of its corresponding trait, considering both positive and negative aspects, allowing for a balanced and comprehensive personality assessment.

Furthermore, this measurement scale has demonstrated reliability and validity, adding to its appropriateness in this study (Sun et al. 2004). The adaptation of this scale for the current research also considered the context of the study, ensuring that the items are culturally appropriate and relevant to the contemporary social environment in which the research is situated. Minor modifications were made to enhance comprehension and

balance. For instance, synonyms for certain adjectives were included; 'outgoing' was added to 'Extroverted when with people' under Extraversion. Additionally, two items under Extraversion were reversed to form a balance between negative and positive emotions experienced, i.e., 'feel uncomfortable in a group of people' was changed to 'feel comfortable in a group of people' and 'feel bashful more than others' was changed to 'feel confident more than others'.

The 33 items in the scale comprised seven items related to Neuroticism and five items concerned with Conscientiousness, while Agreeableness, Extraversion, and Openness each have seven items associated with them. The operational definition and measurement items for the Big Five personality traits are presented in Table 3.2.



Table 3.2 Operational definition and measurement items for the Big Five personality traits

Operational definition	Items
Characterised by traits such as moodiness, emotional volatility, testiness, temperamentality, fretfulness, jealousy, and touchiness.	Neuroticism Moody more than others Emotions go way up and down Testy more than others Temperamental Fretful Jealous Touchy/Sensitive
Characterised by traits such as organisation, orderliness, and efficiency, as well as the absence of disorganisation and sloppiness.	Conscientiousness Organised Disorganised Orderly Efficient Sloppy
Characterised by traits such as sympathy, kindness, warmth, and tenderheartedness towards others, as well as the absence of coldness, unsympathetic attitudes, and rudeness in interpersonal relations.	Agreeableness Sympathetic Kind to others Warm Tenderhearted with others Cold to others Unsympathetic Rude with others
Characterised by traits such as talkativeness when with others, comfort in social situations, outgoing behaviour, and feeling confident more than others, as well as the absence of shyness and social withdrawal.	Extraversion Quiet when with people Shy Talkative when with others Withdrawn from others Feel comfortable in a group of people Feel confident more than others Extroverted/Outgoing when with people
Characterised by traits such as originality, creativity, appreciation for art and beauty, imagination, and the ability to find novel solutions, as well as the absence of uncreative tendencies.	Openness More original than others Frequently feel highly creative Appreciate art Enjoy beauty more than others Find novel solutions Imaginative Uncreative

Source: Adapted from Sun et al. (2004)

3.4.3 Frugality

This study defines frugality as a consumer lifestyle orientation characterised by disciplined acquisition and resourceful use of goods to achieve longer-term goals (Lastovicka et al. 1999). Operationally, frugality is defined as the degree to which consumers exhibit disciplined purchasing behaviours, resourceful product usage, and a

focus on long-term financial goals. This study employs the eight-item scale developed by Lastovicka et al. (1999) to measure frugality. This scale was selected for several reasons: first, it aligns closely with the operational definition, addressing key components such as disciplined acquisition, resourceful use, and long-term orientation. Second, its widespread use and validation in the literature, as demonstrated in works by Agnihotri and Bhattacharya (2019), Evers et al. (2018), Goldsmith and Flynn (2015), and Goldsmith et al. (2014), underscores its reliability and acceptance within the academic community. Third, its extensive adoption in consumer behaviour research allows for comparability with other studies in the field. Finally, the scale provides comprehensive coverage, capturing both observable frugal behaviours and the immediate motivations driving these behaviours, thus offering a holistic measurement of the construct.

While other scales, such as Corral-Verdugo and Pinheiro's (2004) scale offers valuable insights into environmentally responsible consumption, Lastovicka et al.'s (1999) scale provides a more comprehensive measure of frugality that aligns more closely with this study's operational definition. This scale encompasses a broader range of behaviours related to careful resource use and waste avoidance, including financial management and delayed gratification. Its focus on purchase, spending, reuse, waste, consumption, and saving habits encapsulates frugality's multifaceted nature, offering a nuanced representation of the construct. This comprehensive approach is particularly relevant in evolving consumer behaviour and resource management patterns.

Moreover, Lastovicka et al.'s (1999) scale moves beyond examining frugal self-identity, as measured by Stancu and Lähteenmäki (2022), to capture actual frugal behaviours. While Stancu and Lähteenmäki's (2022) approach focused on attitudinal aspects specific to food consumption, Lastovicka et al.'s (1999) scale, although not specifically focused on food, captures a range of frugal practices applicable to food-related behaviours, including purchasing and resource use. This behavioural focus aligns well with the study's objectives of examining frugality's impact on impulse buying behaviour and food waste.

The eight items in Lastovicka et al.'s (1999) scale reflect practical, frugal behaviours relevant to consumption patterns while also considering the underlying psychological dimensions that influence these actions. These items, covering aspects such as saving, consumption, reuse, and delayed gratification in purchasing, are particularly pertinent to understanding impulse buying behaviour and potential food waste.

In summary, Lastovicka et al.'s (1999) eight-item scale was chosen for its established use in the field, comprehensive scope aligned with this study's operational definition of frugality, and demonstrated applicability across varied consumer studies. Table 3.3 displays the operational definition and measurement items for frugality.

Table 3.3 Operational definition and measurement items for frugality

Operational definition	Items
The degree to which consumers exhibit disciplined purchasing behaviours, resourceful product usage, and a focus on long-term financial goals.	<p>If you take good care of your possessions, you will definitely save money in the long run</p> <p>There are many things that are normally thrown away that are still quite useful</p> <p>Making better use of my resources makes me feel good</p> <p>If you can re-use an item you already have, there's no sense in buying something new</p> <p>I believe in being careful in how I spend my money</p> <p>I discipline myself to get the most from my money</p> <p>I am willing to wait on a purchase I want so that I can save money</p> <p>There are things I resist buying today so I can save for tomorrow</p>

Source: Adopted from Lastovicka et al. (1999)

3.4.4 Impulse Buying Behaviour

This study uses a definition of impulse buying that draws heavily from Rook's (1987) seminal work, conceptualising it as a sudden, compelling, hedonically complex purchase behaviour characterised by a powerful and persistent urge to buy immediately, which may stimulate emotional conflict and occurs with diminished regard for its consequences. While Rook's (1987) original conceptualisation also included an element of emotional conflict, this study's operational definition, based on Rook and Fisher's (1995) scale, focuses primarily on the behavioural and cognitive aspects of

impulse buying. Considering these, this study's operational definition of impulse buying behaviour is a sudden, compelling, and hedonically complex food purchase behaviour characterised by a powerful and persistent urge to buy immediately, with diminished regard for its consequences. This approach allows measuring the construct effectively within the context of food purchasing while remaining consistent with the core elements of impulse buying as established in the literature.

In operationalising the construct on food impulse buying, Rook and Fisher's (1995) scale items have been adapted to specifically address food purchase behaviours. This adaptation allows examination of impulse buying behaviour specifically for food purchases. This was achieved by modifying the original scale to focus on food by contextualising impulse-buying descriptions for food items.

Rook and Fisher's (1995) nine-item scale is highly regarded and extensively validated, and has been a popular choice among researchers (e.g., Amos et al. 2014; Lee & Johnson 2010; Lim et al. 2017). Unlike scales measuring impulse buying tendency, such as Verplanken and Herabadi's (2001) 20-item scale or Badgaiyan et al.'s (2016) eight-item scale, this study aims to capture actual impulse buying behaviours. While Stancu and Lähteenmäki (2022) adapted two items from Rook and Fisher's (1995) scale to measure impulse buying tendency, this study utilises the full scale to capture the broader spectrum of impulse buying behaviours rather than just tendencies.

Rook and Fisher's (1995) nine-item scale was selected for its specific focus on behaviour rather than tendency. It offers a balance between comprehensiveness and practicality, surpassing the limitations of briefer scales like Kacen and Lee's (2002) one-item measure ('How often do you buy things on impulse?') or Mattila and Wirtz's (2008) two-item measure.

The adaptation of Rook and Fisher's (1995) scale, considering its established empirical support and this study's context, provides a robust framework for evaluating impulse buying behaviour in food purchasing. This scale was selected for its specific focus on actual behaviours rather than tendencies, offering a comprehensive yet practical approach to measurement. It is particularly well-suited to measure the

operationalised construct of impulse buying behaviour in food contexts, as it captures the sudden, compelling, and hedonically complex aspects of such purchases. The nine-item structure allows for a nuanced assessment of impulse buying, surpassing the limitations of briefer measures while remaining manageable for respondents. Moreover, its adaptability to the food context ensures that the scale maintains its relevance and validity for this study's specific aims. Table 3.4 illustrates the operational definition and amended measurement items in terms of food context.

Table 3.4 Operational definition and measurement items for impulse buying behaviour

Operational definition	Items
A sudden, compelling, and hedonically complex food purchase behaviour characterised by a powerful and persistent urge to buy immediately, with diminished regard for its consequences.	I often buy food spontaneously 'Just do it' describes the way I buy food I often buy food without thinking 'I see it, I buy it' describes my food shopping behaviour 'Buy now, think about it later' describes my food shopping behaviour Most of the time I buy food without planning in advance I buy food according to how I feel at the moment I do not plan most of my food purchases Sometimes I am a bit reckless about the food I buy

Source: Adapted from Rook and Fisher (1995)

3.4.5 Food Waste

In this study, food waste is defined as food that was originally produced for human consumption but then discarded or not consumed by humans. This includes food that spoiled before disposal and is still edible when thrown away (Thyberg & Tonjes 2016). Food waste is operationalised in this study as the extent to which individuals engage in behaviours that result in discarding food (both edible and spoiled) across different settings and situations. These behaviours include leaving leftover food after meals, cooking excess food, not using saved food, discarding opened but unused or partially used packaged products, wasting food during social outings, when hosting guests, at work/school, and at home prior to travelling.

In selecting the measurement items for food waste, a comprehensive review of existing scales was conducted to identify instruments that align with the study's operational definition of food waste, encompassing behaviours that result in discarding

food (both edible and spoiled) across different settings and situations. Special attention was given to selecting measurement items that specifically assessed consumer food waste 'behaviour' rather than 'intention' to reduce food waste, which has been extensively explored in food waste studies. When examining the 'intention' of food waste reduction, items are typically worded as 'I want to finish all the food..' or 'I will order as much food as I can eat' (Iriyadi et al. 2023), or 'I intend to reduce the amount of fruit and vegetables that gets thrown away' (Graham-Rowe et al. 2015), or 'I am willing to eat all the food..' (Coşkun & Özbük 2020). These statements reflect individuals' plans, motivations, and willingness to reduce food waste rather than describing the behaviours themselves. Therefore, it was ensured that the measurement selected for the study was in line with how food waste was defined, focusing on the behaviour itself, for example, 'I waste food..' or 'I always have food leftover..'

Moreover, the food waste behaviour definition in this study is not confined to waste occurring in a specific context and encompasses different settings and situations; therefore, the measurement scales selected must include food waste occurring both at home and in other contexts, such as workplaces or dining out. Existing scales like those proposed by Stancu et al. (2016), Stefan et al. (2013), and Visschers et al. (2016) predominantly focus on household food waste. While they offer valuable insights, they do not fully encompass the broader consumer food waste contexts addressed in this study. Therefore, scales that capture food waste behaviour in various settings were sought. The combined measurement scales of Abdelradi (2018) and Aktas (2018) were identified as the most suitable for the study's purposes due to their effective capturing of the operationalised food waste construct through their comprehensive approach to measuring consumer food waste behaviour across diverse situations. The Abdelradi (2018) scale was slightly modified to enhance clarity and consistency in sentence structure, ensuring respondents from diverse backgrounds easily understand items. The items from Aktas (2018) were adopted without modification as they matched the research context and were deemed suitable for measuring the defined scope of food waste.

The integration of these scales provides a holistic measurement of food waste that aligns with the research aims to assess the impact of consumer behaviour on food

waste beyond the confines of the household. This approach allows for capturing food waste behaviours in various scenarios, including social gatherings, work or school environments, and pre-travel situations, offering a nuanced understanding of the research problem.

The criteria for selecting the measurement items included their relevance to the research definition of food waste focused specifically on food waste ‘behaviour’ rather than ‘intention’ to reduce waste, their proven reliability and validity in prior studies, and their applicability to the diverse settings in which consumer food waste occurs. This careful selection process ensures that the resulting data provides a comprehensive and accurate representation of consumer food waste behaviours as operationalised by the study. Table 3.5 lists the combined scale items for the food waste construct and the operational definition of food waste.

Table 3.5 Operational definition and measurement items for food waste

Operational definition	Items
The extent to which individuals engage in behaviours that result in discarding food (both edible and spoiled) across different settings and situations. These behaviours include leaving leftover food after meals, cooking excess food, not using saved food, discarding opened but unused or partially used packaged products, wasting food during social outings, when hosting guests, at work/school, and at home prior to travelling.	Food leftover on a plate after a meal Cooked food more than what is needed Saved food and eventually not used Opened products (cans, sauces, etc...) and haven't been used I waste food whenever I go out with friends/family I waste food whenever I have guests at home I waste food at work/school I waste food at home whenever I am due to travel

Source: Adapted from Abdelradi (2018) and adopted from Aktas (2018)

3.4.6 Generation X, Y, and Z

The generational cohorts in this study are defined as Generation X as those born from 1965 to 1980, Generation Y (also known as Millennials) from 1981 to 1996, and Generation Z from 1997 onwards, with no chronological endpoint set (Dimock 2019). For the purpose of this research, it was necessary to set a chronological endpoint for Generation Z to create a bounded category for analysis. Thus, the study operationalised Generation Z as those born from 1997 to 2001, a decision informed by the objective to include young individuals who have reached adulthood and are likely to demonstrate independent consumer behaviour.

In determining a scale to measure Generation X, Y, and Z, this research encountered the challenge of varying and sometimes overlapping age ranges across the literature. It was observed that the age ranges provided in studies such as Dabija et al. (2018), Kusá & Záziková (2016), and Messarra et al. (2016) are not consistently applied, which can cause ambiguity when identifying generational cohorts. Given the need for precise and widely accepted generational boundaries, this study referred to the measurement scale of the Pew Research Center (Dimock 2019). The Pew Research Center is renowned for its methodological rigour and is frequently referenced in academic and practical contexts for definitions of demographic cohorts (e.g., Fisher 2020). These measurement items of age groups are selected for their clarity and recentness, reflecting a contemporary understanding of generational cohorts.

The criteria for selecting the Pew Research Center's measurement scale included their relevance to operationalising Generation Z, acceptance among scholars and practitioners, recentness, and applicability to the contemporary social context. While the measurement items for Generation X and Y were adopted directly from the Pew Research Center (Dimock 2019), the operationalised definition for Generation Z with a specific endpoint was necessary to be reflected in its scale item for this study's analytical purposes. By setting a defined range for Generation Z, this study aimed to ensure that the generational cohorts were distinct and meaningfully representative of different birth year groups within the population, allowing for the examination of generation-specific behaviours.

The selection of the Pew Research Center's birth year ranges, along with a specified endpoint for Generation Z, provides a clear and justified framework for analysing generational differences, thereby enhancing the reliability and relevance of the study's findings. Table 3.6 shows the measurement items presenting the birth years of Generation X, Y, and Z as operationalised in this study.

Table 3.6 Operational definition and measurement items for Generation X, Y, and Z

Operational definition	Items
Generation X: Consumers born from 1965 to 1980.	Birth year: 1965-1980
Generation Y: Consumers born from 1981 to 1996.	Birth year: 1981-1996
Generation Y: Consumers born from 1997 to 2001.	Birth year: 1997-2001

Source: Adapted from Pew Research Center (Dimock 2019)

3.5 QUESTIONNAIRE

As discussed earlier, a structured survey questionnaire was used to collect data for this research. To obtain usable and accurate data for quantitative analysis, it is vital for the questionnaire to be well-designed (Cavana et al. 2001; Cooper & Schindler 2014). Every effort was made to ensure that the questionnaire was properly designed by carefully considering the choice of words, the sequence of the questions, and its general appearance.

3.5.1 General Questionnaire Design

Clear and comprehensive language was used to motivate respondents' full participation throughout the questionnaire and improve the accuracy of the data (Cooper & Schindler 2014; Zikmund & Babin 2006). As suggested by researchers, Malhotra (2009) and Saunders et al. (2009), the questionnaire starts with questions specifically targeted to achieve the research purpose and ends with classification questions that might be sensitive for the respondents. The questionnaire was presented with a cover letter explaining the purpose of the research and assuring confidentiality and anonymity for the respondents. This was followed by seven sections: Consumer Information (Section A) aimed to collect general information on consumption behaviour, while Social Media Usage (Section B), Impulse Buying Behaviour (Section C), Frugality (Section D), Personality Traits (Section E), and Food Waste (Section F) were intended to gather data for the research constructs using the measurement items detailed in the previous section. Lastly, the Demographic Profile (Section G) sought to obtain consumers' demographic information.

This questionnaire used a Likert scale to measure responses as it is not only simple to administer but also easy to understand (Malhotra 2009; Zikmund et al. 2013). Based on the Likert scale's best possible usability, there have been debates concerning the reliability and validity of the number of points on the scale (Colman et al. 1997). According to Wijters et al. (2010), the two most popular formats used by marketing researchers are five- and seven-point Likert scales. Although both five- and seven-point scales are considered reliable (Malhotra 2009; Weijters et al. 2010), a seven-point scale has a larger spectrum of choices compared to a five-point scale, allowing respondents to choose the exact answer that they prefer most instead of selecting a close option (Dawes 2008).

Moreover, when the research topic is pertinent to the respondents themselves, as in the case of this research, the provision of more options minimises ambiguity in responses and hence may improve the content and construct validity of the scale (Finstad 2010). While respondents face difficulty when forced to choose between two equally undesirable options on the five-point scale, the more choices offered by the seven-point scale can address this dilemma as it increases the possibility of selecting the desired option (Pearse 2011). Additionally, the human mind has a span of absolute judgement that can distinguish around seven categories at a time, making the use of a seven-point scale appropriate (Miller 1956). Therefore, based on these arguments, a seven-point scale was chosen for this research.

After the questionnaire was developed, it was sent for expert opinion analysis to ensure the clarity, relevance, and appropriateness of the questions, as well as to confirm that the measurement items would effectively capture the necessary data for the research.

3.5.2 Expert Opinion

Three experts were invited to assess and improve the content validity and overall quality of the questionnaire. The expert panel comprised an academician in the marketing field, a marketing practitioner, and an academician-cum-practitioner. These experts were asked to evaluate the questions in relation to the operational definition of each construct

to determine the relevancy and representativeness of the items and the clarity of language. Several items were rephrased based on the experts' feedback to enhance understanding. Once the items were revised, the updated questionnaire was sent to experts who had provided their recommendations for re-evaluation. Based on the second round of review, it was ensured that all issues had been adequately addressed. Table 3.7 shows expert review feedback and the decisions made on the questionnaire items. The revised questionnaire was then deemed suitable for translation into Malay to ensure cultural and linguistic appropriateness, after which it was pretested with potential respondents.



Table 3.7 Expert review feedback and decisions on questionnaire items

Comments/Recommendations	Decision
Expert 1: Academician-cum-practitioner	
FW1: 'Food leftover on a plate after a meal' – need item to be consistent with others of this construct. Replace with 'I always have food leftover on my plate after a meal'.	Adopt the suggestion – I always have food leftover on my plate after a meal.
FW2: Cooked food more than what is needed – need item to be consistent with others of this construct. Replace with 'I cook food more than what is needed'.	Adopt the suggestion – I cook food more than what is needed.
FW3: Saved food and eventually not used – need item to be consistent with others of this construct. Replace with 'I often save food but eventually not use them'.	Adopt the suggestion – I often save food but eventually not use them.
FW4: Opened products (cans, sauces, etc. . .) and haven't been used – need items to be consistent with others of this construct. Replace with 'I often open products (cans, sauces, etc.. .) but eventually not use them'.	Adopt the suggestion – I often open products (cans, sauces, etc.. .) but eventually not use them.
NR3: Add 'Bad-tempered' to detail 'testy' so the outcome description would be 'Testy/Bad tempered more than others'.	Adopt the suggestion – Testy/Bad-tempered more than others.
NR4: Add 'Cranky' to detail 'Temperamental' – outcome description would be 'Temperamental/Cranky'.	Adopt the suggestion – Temperamental/Cranky.
NR5: Add 'Uneasy' to detail 'Fretful' – outcome description would be 'Fretful/Uneasy'.	Adopt the suggestion – Fretful/Uneasy.
CN5: Add 'Careless' to detail 'Sloppy' – outcome description would be 'Sloppy/Careless'.	Adopt the suggestion – Sloppy/Careless.
AG1: Add 'Understanding' to detail 'Sympathetic' – outcome description would be 'Sympathetic/Understanding'.	Adopt the suggestion – Sympathetic/Understanding.
AG4: Add 'Caring' to detail 'Tenderhearted with others' – outcome description would be 'Tenderhearted with others/Caring'.	Adopt the suggestion – Tenderhearted with others/Caring.
OP5: Add 'unique' to detail 'novel' – outcome would be 'Find novel/unique solutions'.	Adopt the suggestion – Find novel/unique solutions.
Expert 2: Practitioner	
No specific comments and indicated that the questionnaire was fine to be used for data collection.	-
Expert 3: Academician	
FR1: If you take good care of your possessions, you will definitely save money in the long run – replace 'long run' with 'long-term'.	Carries the meaning – retain 'long run'.
IBB6: Most of the time I buy food without planning in advance – change to 'Most of the time I buy food without prior planning'.	No change in meaning – retain 'Most of the time I buy food without planning in advance'.

3.5.3 Translation

As this research was undertaken in Malaysia, the questionnaire, originally formulated in English, was translated into Malay, the native language of the respondents, to minimise any potential discrepancies arising from cultural and linguistic differences (Kim & Han 2004). To ensure accuracy in translation, this research adopted the back-translation technique, which is widely used and recognised for its effectiveness and suitability in translating survey questionnaires, compared to other methods such as direct or parallel translation (McGorry 2000).

Three Malay-English experts were involved in the translation process. First, translation from English (source language) to Malay (target language) was conducted by one of the experts. A second bilingual translator, who was not familiar with the measurements, served as a back-translator, translating the Malay version of the questionnaire into English. Finally, another expert was invited to check the accuracy of the translations between the original and back-translated questionnaires. Once consistency in the meaning of translations was achieved, the questionnaire was prepared for pretesting.

3.5.4 Pretesting

Prior to proceeding with data collection, it is vital for the questionnaire to be pretested (Saunders et al. 2009). The purpose of the pretest is to refine the questionnaire by identifying any issues the respondents might encounter while answering the questions, examining the appropriateness of the questionnaire in terms of sequence, clarity, and level of difficulty, as well as determining the duration required for respondents to complete the questionnaire (Malhotra 2009). Furthermore, pretests can ensure that the data collected can answer the proposed research questions and allow for the assessment of the likely validity and reliability of the measurement items (Saunders et al. 2009). Hence, to enhance the questionnaire and validate the measurement items, a pretest was conducted with potential respondents who possessed the same characteristics as the intended study participants.

Although Malhotra (2009) suggests personal interviews for pretesting, a self-administered questionnaire via Google Forms was chosen for this study. This method enabled participants to independently assess the questionnaire and provide comprehensive feedback about completion time, questionnaire length, language clarity, and any difficulties encountered while answering the questions (Hair et al. 2010; Zikmund & Babin 2006). Given the MCO in place, this online approach also ensured the safe and efficient pretesting of the questionnaire.

When considering the sample size for a pretest, there is a lack of consensus among researchers on a specific number. Kumar et al. (2013) stated a sample size of at least 50 respondents must be asked to participate, whereas others suggested a sample comprising 30 respondents is reasonable (Perneger et al. 2015). Willis (2005) suggested a sample size of between 5 and 15 participants for large-scale surveys. According to Memon et al. (2017), there is no clear-cut rule for the pretest sample size, and hence, it should be decided based on the length and complexity of the questionnaire. Taking this into consideration, this research followed Perneger et al.'s (2015) recommendation to choose a sample of 30 individuals for the pretest.

Through convenience sampling, 30 respondents were selected, and the link to access the questionnaire on Google Forms was shared via email, WhatsApp, and Viber. At the end of the survey, respondents were asked to provide their comments on the difficulties experienced when filling out the questionnaire and ways for improvement. Feedback from the pretest concerning clarity of phrasing, instructions provided, and time taken to complete the questionnaire was overall positive. However, a few respondents reported that the labelling of Likert scale points would have been helpful. In response to this feedback, the seven points of the Likert scale were labelled and presented along with the instructions for each section. The questionnaire was finalised accordingly and used to proceed with the actual field research.

3.6 DATA COLLECTION PROCEDURE

To administer the questionnaire (Appendix A) in the actual field research, data were collected using convenience sampling via a self-administered online survey

questionnaire. As discussed earlier, the convenience sampling method coupled with a self-administered online survey questionnaire is not only time and cost-effective but also allows for the gathering of a large number of responses based on the ease of obtaining them (Shukla 2008; Zikmund et al. 2013).

The questionnaire link was distributed to the targeted population via email, WhatsApp, and Viber, inviting them to participate in the study. A 'chain referral' recruitment strategy (Khatiwada et al. 2021) was promoted, where participants were encouraged to share the survey invitation link with other potential respondents as desired. Hence, the link was further shared with potential respondents apart from the first point of contact.

To ensure the ethical conduct of this research, several measures were implemented. These included obtaining informed consent by notifying respondents that their participation was voluntary and that they could withdraw at any point during the study (Saunders et al. 2009; Zikmund et al. 2013). Participants were also assured of their anonymity, as no identifying data were collected, and the information they provided would be treated confidentially and used solely for research purposes (Saunders et al. 2009; Zikmund et al. 2013). Additionally, to improve respondents' willingness to participate, they were informed about the purpose of the research and the researcher's academic status (Bhattacharjee 2012; Greener 2008). This information was provided at the beginning of the survey questionnaire.

3.7 DATA ANALYSIS

The data analysis comprises both descriptive and inferential statistical analyses. For descriptive statistical analysis, the Statistical Package for Social Sciences (SPSS) will be used to calculate means, frequencies, percentages, and standard deviations to describe the sample characteristics and analyse the study constructs (Cooper & Schindler 2014). Since the online questionnaire has a feature that makes responses to all questions mandatory, handling missing data will not be required in this research; this issue would have been more likely with offline questionnaires (Jackson et al. 2009).

Next, to conduct the inferential statistical analysis, SEM has been adopted due to its growing application in marketing research (Hair et al. 2011). Specifically, partial least squares SEM (PLS-SEM) has been chosen over covariance-based SEM (CB-SEM) for several reasons. These include the integration of theories (i.e., the reconceptualised S-O-R model, FFM, and generational cohort theory) with the representation of various variables to develop the conceptual model. Hence, this study is centred on theory development and prediction, making PLS-SEM more suitable than CB-SEM, which is more appropriate for theory testing (Rigdon 1998). Also, the conceptual model of this study comprises 10 constructs, testing 15 direct hypotheses, seven mediation hypotheses, and one moderator hypothesis. The complexity of this model further supports the choice of PLS-SEM (Richter et al. 2016; Rigdon 2012, 2014). Moreover, due to the difficulty in obtaining normally distributed data for this research, SmartPLS 3 is deemed the most appropriate software for statistical analysis (Hair et al. 2017; Wold 1980). Additionally, using PLS-SEM offers researchers enhanced statistical power over CB-SEM (Reinartz et al. 2009; Hair et al. 2017).

3.7.1 Measurement Model Evaluation

The assessment of the measurement model differs depending on whether the measurement is reflective or formative (Hair et al. 2019). Since this research involves a reflective measurement model, it will be evaluated based on four aspects as addressed by Hair et al. (2019): size and significance of indicator loadings, construct reliability, convergent validity, and discriminant validity.

Indicator reliability assessment aims to evaluate the level of consistency of an indicator or indicators with what it is intended to measure (Urbach & Ahlemann 2010). The indicator reliability represents the extent of indicator variance associated with its respective construct. Several values for indicator reliability or loadings have been established as acceptable; the minimum value is 0.4 (Ramayah et al. 2018). Indicator loadings equal to and greater than 0.5 are acceptable if the summation of loadings results in high loading scores that contribute to AVE scores greater than 0.5 (Byrne 2016). Indicators with loadings that do not satisfy these acceptable values will be

deleted, as they are not considered reliable in terms of measuring what they were intended for (Hair et al. 2010).

Construct reliability evaluates the internal consistency of a construct (Hair et al. 2019). Although researchers have predominantly used Cronbach's alpha to measure construct reliability, it has the limitation of not weighing individual indicators in the assessment (Hair et al. 2014). This limitation can be addressed by applying composite reliability, which considers indicator loadings (Gefen et al. 2000). However, Cronbach's alpha should not be eliminated because it provides a lower bound estimate of internal consistency reliability (Henseler et al. 2009). The cut-off value indicating acceptable reliability for both measures is 0.70 (Hair et al. 2017).

According to Urbach and Ahlemann (2010), convergent validity is the extent to which the indicators of a construct converge in comparison with indicators measuring other constructs. Convergent validity is assessed by evaluating the Average Variance Extracted (AVE), which explains the variance of indicators for a construct (Hair et al. 2019). The acceptable AVE is 0.50 or greater, meaning the construct must account for at least 50 percent or more of the variance in its items (Hair et al. 2019).

Finally, discriminant validity refers to the degree to which a construct being examined is distinct from other constructs (Ramayah et al. 2018). The commonly applied traditional metric suggested by Fornell-Larcker (1981), in which the AVE of a latent construct is compared with squared correlations between the construct and any other latent construct in the model, has been found to be unsuitable for discriminant validity assessment (Henseler et al. 2015). As an alternative, Henseler et al. (2015) suggested the heterotrait-monotrait (HTMT) ratio of the correlations (Voorhees et al. 2016). HTMT refers to the ratio of correlations within the constructs to correlations between the constructs (Ramayah et al. 2018).

HTMT values greater than the threshold value of 0.90 (for conceptually similar constructs) or 0.85 (for conceptually distinct constructs) indicate a lack of discriminant validity (Henseler et al. 2015). Furthermore, bootstrapping can be applied to assess whether the HTMT value significantly differs from 1.00 (Henseler et al. 2015) or from

specified threshold values of either 0.85 or 0.90, depending on the conceptual model (Franke & Sarstedt 2019). Specifically, it can be investigated whether the upper bound of the 95 percent confidence interval of HTMT is lower than 0.90 or 0.85 (Hair et al. 2019).

3.7.2 Structural Model Evaluation

Upon confirmation of the construct measures as reliable and valid, the analyses will then be focused on the structural model assessment, which indicates the model's capability to predict the relationship between constructs. The evaluation of the structural model involves a step-by-step procedure presented in Figure 3.3. It comprises assessment of the structural model for collinearity (Step 1), the significance of the path coefficients (Step 2), the level of R^2 values (Step 3), f^2 effect size (Step 4), and predictive relevance Q^2 (Step 5) (Hair et al. 2017).

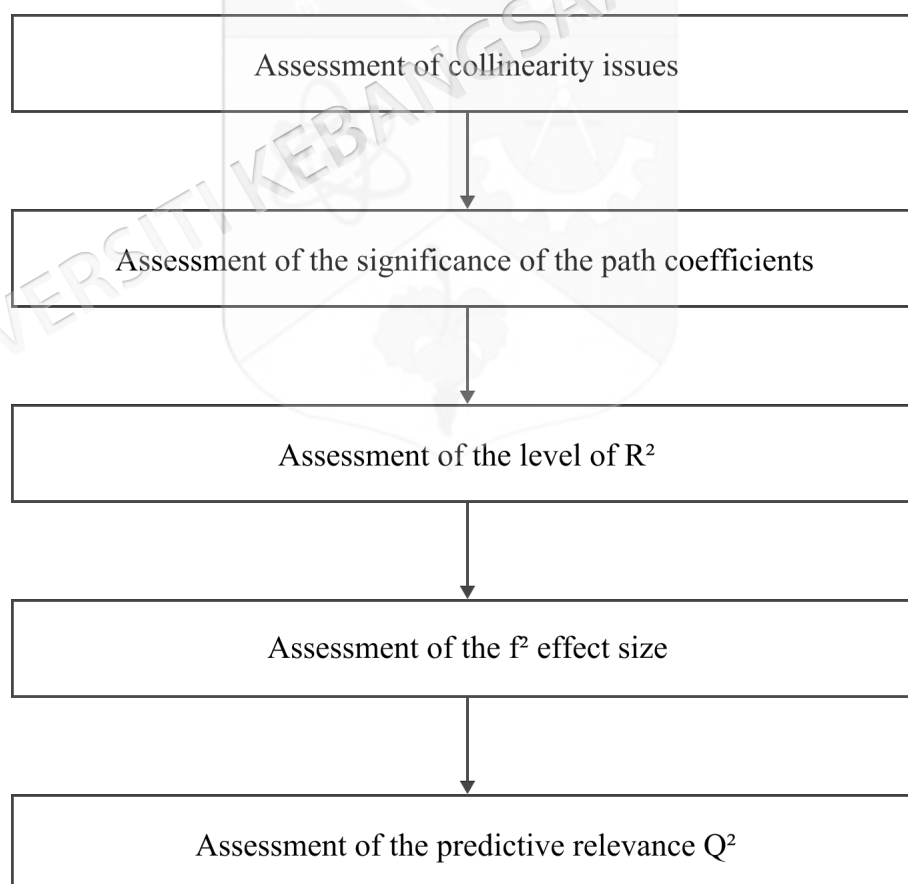


Figure 3.3 Steps to assess the structural model

Source: Adapted from Hair et al. (2017)

In the initial stage of assessing the structural model, it is vital to report on any collinearity issues, for which tolerance and variance inflation factor (VIF) values will be calculated (Ramayah et al. 2018). For this evaluation, tolerance values below 0.20 or VIF values above 5.0 indicate potential collinearity (Hair et al. 2017).

In step 2, estimates are obtained for the structural model path coefficients that test hypothesised relationships among the constructs (Hair et al. 2017). To assess the path coefficient's significance and evaluate its standardised values that generally are between -1 and +1, bootstrapping is applied (Hair et al. 2019). Coefficients closer to +1 suggest a strong positive relationship, whereas coefficients closer to -1 imply a strong negative relationship (Hair et al. 2014). To test the significance, a standard error is obtained by running bootstrapping with a minimum sample of 5000 (Ramayah et al. 2018). The bootstrap standard error allows the computation of t values that deduce if the coefficient is statistically significant at a certain error probability or significance level (Hair et al. 2019). The significance level generally assumed by marketing researchers is 5% (Hair et al. 2017). However, using a 10% significance level, including testing moderating effects, has been practised by researchers in the field (Park 2008; Shelley 2016).

The next step is to assess the coefficient of determination, R^2 value, which is a measure of the model's predictive accuracy (Hair et al. 2014). In other words, R^2 represents the combined effect of the exogenous variables on the endogenous variable(s) (Ramayah et al. 2018). The effect ranges from 0 to 1, with higher values indicating a greater explanatory power or higher levels of predictive accuracy (Hair et al. 2019). Cohen (1988) interprets R^2 values: 0.26, 0.13, and 0.02, respectively, as substantial, moderate, and weak levels of predictive accuracy.

Upon assessment of R^2 , the fourth step is to calculate the effect size for each path model using Cohen's f^2 (Hair et al. 2014). The effect size evaluates how the elimination of a certain predictor construct affects the R^2 value of an endogenous construct (Hair et al. 2019). As a rule of thumb, f^2 values of 0.35, 0.15, and 0.02 represent large, medium, and small effect sizes, respectively (Cohen 1988). The effect size is calculated using the following formula (Hair et al. 2017):

$$f^2 = \frac{R^2_{included} - R^2_{excluded}}{1 - R^2_{included}} \quad \dots(3.1)$$

The final step involves the evaluation of predictive relevance, Q^2 , which represents a measure of how well the path model can predict the originally observed values (Hair et al. 2017). Q^2 is obtained using the PLSpredict method, a holdout sample-based procedure that generates case-level predictions at an item or a construct level using a 10-fold procedure to assess predictive relevance (Shmueli et al. 2019). As a guideline, Q^2 values larger than 0 indicate that the exogenous constructs have predictive relevance for the endogenous constructs under study (Hair et al. 2019). Additionally, the predictive power is assessed by comparing the root mean squared error (RMSE) of predictions between the Partial Least Squares (PLS) model and a linear regression model (LM). If all item differences (PLS-LM) are lower than the LM values, this indicates strong predictive power. If the majority of item differences (PLS-LM) are lower, this indicates moderate predictive power (Shmueli et al. 2019).

3.7.3 Mediation Analysis

This study proposes to examine seven mediating effects, i.e., impulse buying behaviour as a mediator in the relationships between social media usage and food waste; Neuroticism and food waste; Conscientiousness and food waste; Agreeableness and food waste; Extraversion and food waste; Openness and food waste; and frugality and food waste. The mediating effects are tested using the bootstrapping procedure (Preacher & Hayes 2004, 2008) as it is the recommended approach by Hair et al. (2017). This test examines the indirect effects by observing the confidence interval of upper and lower limits. If the confidence interval does not straddle zero, it can be concluded that the indirect effects are statistically significant.

3.7.4 Moderation Analysis

There are three approaches that can be adopted to conduct moderator analysis or to test interaction effects, namely, the product indicator approach, orthogonalizing approach, and two-stage approach (Hair et al. 2017). Among these, the two-stage approach will

be employed to test the 3-category nominal moderating variable, Generation X, Y, and Z. This approach was chosen over others since it yields the most accurate estimates of the single effects, and it has higher statistical power (Type 1 and Type 2 error) when compared to the product indicator approach or orthogonalizing approach (Ramayah et al. 2018). To test the moderating effect of the categorical variable (Generation X, Y, and Z), two dummy variables will be formed to represent Generation Y and Generation Z, while Generation X serves as the benchmark for analysis purposes.

Besides, the orthogonalizing approach works best with a small sample size, i.e., a maximum of 200, and few indicators per construct, i.e., at most four indicators, making this approach less suitable for this research as the number indicators for each construct exceeds the specified number (Henseler & Chin 2010). On the other hand, the product indicator approach has a significantly weaker statistical power compared to the two-stage and orthogonalizing approaches (Henseler & Chin 2010).

3.8 SUMMARY

This research employs positivism, deductive and quantitative approaches, adopting a survey strategy with a cross-sectional design. An online self-administered survey questionnaire using a seven-point Likert scale was chosen to collect data in this study. A minimum sample size of 114 respondents from each generational cohort (Generation X, Y, and Z) was determined to be collected using the convenience sampling method for the actual survey. To enhance the questionnaire and validate constructs, expert opinion and pretesting were conducted, with the questionnaire translated from English to Malay using back-translation. Finally, it was proposed to use SPSS to describe the data and SEM to test the hypothesised relationships, with SmartPLS 3 specifically adopted for measurement and structural model evaluation. The empirical results of the data analyses are presented in the next chapter.

CHAPTER IV

DATA ANALYSIS

4.1 INTRODUCTION

This chapter presents the statistical analysis and findings of the research based on the methodology outlined in the previous chapter. Following the introduction, section 4.2 discusses the preliminary analysis procedures employed to prepare the data before statistical testing using PLS-SEM. Section 4.3 details the descriptive statistics of the study respondents, while sections 4.4 and 4.5 report the results of the measurement model validation and structural model evaluation, respectively. Finally, a summary of the chapter concludes section 4.6.

4.2 DATA PREPARATION

4.2.1 Data Coding

Each possible response for all question items was assigned a numerical score before data collection to ensure this pre-coding process facilitates data entry (Pallant 2016). The numerical code of the study's responses is presented in Appendix B. To ensure all data had been entered correctly, data were screened using frequency tables in SPSS version 28 (Pallant 2016). Any errors detected during this process were corrected in accordance with the response given on the original questionnaire.

4.2.2 Straightlining Analysis

The data were screened for any straightlining pattern, that occurs when a respondent provides the same response for most of the questions (Hair et al. 2017). Microsoft Excel

was used to conduct the assessment for straightlining. Out of the 433 cases tested, 7 cases were identified with straightlining and hence, they were excluded from the data leaving 426 cases for further analysis.

4.2.3 Missing Value Analysis

Data were collected using a questionnaire developed via Google Forms. This allowed the researcher to set questions as mandatory to be answered. Hence, respondents were required to provide their responses to all the questions before they could submit the form. SPSS version 28 was employed to test for missing data, and it was found that there were no missing values in the data. Appendix C presents the results of the missing value analysis conducted.

4.2.4 Outliers

To identify outliers, this study performed the Mahalanobis D^2 measure, a multivariate evaluation of each observation across a set of variables (Hair et al. 2010). Using the $p < 0.001$ criterion for Mahalanobis D^2 (Pallant 2016), 39 extreme cases were identified as outliers that should be removed from the sample (Hair et al. 2010). Table 4.1 shows the 39 cases of outliers detected in the sample. Among these outliers, 22 cases belonged to Generation Z, whereas 17 cases were from Generation Y. Removing the outliers did not affect the minimum sample size (i.e., 114 responses) required from each generation. The deletion of 39 outliers resulted in 387 observations, specifically 125, 129 and 133 cases from Generation X, Y, and Z, respectively, remaining for further analysis. The overall result of Mahalanobis D^2 analysis is presented in Appendix D.

Table 4.1 Outliers

No	Case number	Mahalanobis D ²	P-value
1	114	188.61655	.0000
2	140	175.00018	.0000
3	111	162.85484	.0000
4	268	151.16503	.0000
5	137	147.97859	.0000
6	154	139.65272	.0000
7	218	137.29562	.0000
8	288	136.06771	.0000
9	134	133.30453	.0000
10	198	131.42294	.0000
11	124	131.28702	.0000
12	275	130.19657	.0000
13	100	129.97772	.0000
14	145	127.89794	.0000
15	180	127.72683	.0000
16	61	126.86588	.0000
17	135	125.21703	.0000
18	99	124.06847	.0000
19	136	122.52404	.0000
20	186	118.85064	.0001
21	174	118.71533	.0001
22	170	118.00909	.0001
23	148	117.78084	.0001
24	139	114.27068	.0002
25	279	113.68633	.0002
26	93	112.51306	.0002
27	78	112.47052	.0002
28	255	111.96609	.0003
29	109	111.63540	.0003
30	245	111.58455	.0003
31	182	111.57464	.0003
32	119	111.31218	.0003
33	295	110.90510	.0003
34	207	110.43417	.0004
35	221	108.11945	.0006
36	129	108.01447	.0006
37	133	107.96266	.0007
38	232	106.40279	.0009
39	189	106.30615	.0009

4.2.5 Assessment of Normality

Once the data had been cleaned, a test for normality was conducted as it is the first assumption in multivariate analysis, i.e., a normal distribution is assumed in each item

and all linear combinations of items (Tabachnick & Fidell 2013). The normality assumption was assessed based on Mardia's multivariate kurtosis using the software available on the statistical analysis website (Cain et al. 2016; Hair et al. 2017). The result of the assessment is shown in Appendix E.

The results indicate that the data is not normally distributed, as skewness ($\beta = 10.385$, $p < 0.01$) and kurtosis ($\beta = 112.429$, $p < 0.01$) were displayed. Based on the results, it is confirmed that the normal distribution assumption of the data has been violated and hence warranted the use of Smart PLS, a non-parametric analysis tool.

4.2.6 Response Bias Check

The data were checked to ensure the responses received were free from bias for the findings and conclusions of the study to be valid. Two groups were formed that is to compare the responses of late respondents with those of early respondents on key demographic variables and principal constructs (Armstrong & Overton 1977). In this analysis, the early respondents (69 percent of the sample), refer to those that responded in the first two weeks (Pavlou & El Sawy 2006; Verreyne 2005), were compared with late respondents (31 percent of the sample) using an independent samples t-test. The result enclosed in Appendix F shows that the group effect is not significant at the 0.05 level, which reveals that the early and late respondents have no significant difference in the constructs. Thus, it can be concluded that the early and late respondents did not discriminate the results, and hence, the data is free from bias.

4.2.7 Common Method Variance

Common method variance is defined as a systematic error variance that is shared among variables which are measured from the same sources or methods (Richardson et al. 2009). To address this issue, both procedural and statistical remedies have been suggested (Podsakoff et al. 2003). The procedural remedies, for example, adapting the measurement items or scales from different sources and refining measurement items based on the study context, as well as keeping the respondent anonymity and

confidentially with no correct or wrong answers (Podsakoff et al. 2003), have been considered in this study.

As a statistical remedy, the data were first assessed for common method variance using Harman's single-factor test (Podsakoff et al. 2003). Using the exploratory factor analysis, all items were extracted to only one factor (Gaskin 2012). As shown in Table 4.2, the largest factor accounted for only 18.955% of the variance, which is less than 50%, i.e., the cut-off value suggested by Podsakoff et al. (2003). Thus, it can be concluded that there is no common method bias present in the data (Gaskin 2012). The detailed results of the extracted items are presented in Appendix G.

Table 4.2 EFA results for Harman's single-factor test

Total Variance Explained					
Initial Eigenvalues			Extraction Sums of Squared Loadings		
Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
13.015	20.023	20.023	12.321	18.955	18.955

Despite Harman's single-factor test being widely used in social science research, there are disadvantages associated with it. The test is said to be incomplete and insensitive (Podsakoff et al. 2003) and only provides information on the absence or presence of common method variance (Tehseen et al. 2017). Therefore, an additional full collinearity test was conducted to identify any construct that reflects the variance inflation factor (VIF) equal to or greater than 3.3 (Kock & Lynn 2012). The results in Appendix H reveal that pathological VIFs for all constructs range from 1.339 to 1.820, confirming that common method variance is not a problem in this study.

4.3 DESCRIPTIVE ANALYSIS

4.3.1 Response Rate

The data used in this research were obtained from Malaysian consumers born from 1965 to 2001 to ensure they represent the Generation cohorts of X, Y, and Z as defined by the Pew Research Center (Dimock 2019). Generation X is defined as those born from 1965 to 1980, Generation Y as those born from 1981 to 1996, and Generation Z as those

born from 1997 to 2001 (Dimock 2019). Convenience sampling was used to gather data over the internet via a Google Forms questionnaire. The data obtained was from social media users, and when distributing the survey questionnaire via email, WhatsApp, and Viber, the instructions explicitly stated that respondents must be individuals who use social media, thereby establishing a criterion for participation. Data were collected from June to September 2021. During this period, Malaysia experienced various levels of MCO, ranging from stricter measures to more relaxed restrictions. This timeframe encompassed phases from full MCO conditions to a gradual easing of constraints, including the allowance of dining out, reflecting changes in consumer food consumption patterns both at home and outside. It was ensured that the minimum required sample size was achieved for each generation, with at least 114 respondents from each generational cohort. A total of 433 respondents completed the survey questionnaire. Out of the 433 responses received, seven were removed due to concerns about straightlining and 39 due to outliers. This resulted in 387 valid responses for the final analysis.

4.3.2 Descriptive Analysis of Respondents

An overview of the respondents' profile presented in Table 4.3 indicates that the sample was dominated by female participants (69.8%). Nonetheless, this was not a concern as studies have reported that gender does not have a significant effect on food waste generation (Principato et al. 2015). A vast majority of the respondents comprised of Malays (80.4%). Sample representation for Generation X, Y, and Z were quite balanced, with 32.3 percent, 33.3 percent, and 34.4 percent, respectively. In terms of education, most respondents had obtained a bachelor's degree or higher (57.1%). The majority of the respondents were employed in private or governmental organisations, accounting for 53.2%, while a significant proportion, i.e., 36.7% of this study, were students. Almost a quarter of the respondents earned RM 10,000 or above (22%), while 19.9% earned an income between RM 4,000 and RM 5,999 monthly. Also, the descriptive statistic demonstrated that 31.3% of respondents spent RM 200 – RM 400, followed by 29.2% of respondents that spent RM 401 – RM 600 on groceries each month. In addition, 33.3% and 27.6% of the respondents spent less than RM 200 and RM 200 – RM 400, respectively, to buy outside food every month.

Table 4.3 Respondents' profile

Demographic	Categories	Frequencies	Percentage (%)
Gender	Male	117	30.2
	Female	270	69.8
Ethnicity	Malay	311	80.4
	Chinese	36	9.3
	Indian	33	8.5
	Others	7	1.8
Generation	Generation Z	133	34.4
	Generation Y	129	33.3
	Generation X	125	32.3
Education	SPM/SPMV/MCE	35	9.0
	STPM/HSC	14	3.6
	Certificate/Diploma	107	27.6
	Professional	10	2.6
	Bachelor's Degree	152	39.3
	Master's Degree	59	15.2
	Doctor of Philosophy (PhD)	10	2.6
Occupation	Private	119	30.7
	Government/Semi-government	87	22.5
	Own business	26	6.7
	Student	142	36.7
	Unemployed	10	2.6
	Others	3	0.8
Income	Less than RM 1,000	57	14.7
	RM 1,000 – RM 1,999	33	8.5
	RM 4,000 – RM 5,999	77	19.9
	RM 4,000 – RM 5,999	47	12.1
	RM 6,000 – RM 7,999	48	12.4
	RM 8,000 – RM 9,999	40	10.3
	RM 10,000 and above	85	22.0
Spending on grocery	Less than RM 200	59	15.2
	RM 200 – RM 400	121	31.3
	RM 401 – RM 600	113	29.2
	RM 601 – RM 800	34	8.8
	RM 801 and above	60	15.5
Spending on outside food	Less than RM 200	129	33.3
	RM 200 – RM 400	107	27.6
	RM 401 – RM 600	58	15.0
	RM 601 – RM 800	52	13.4
	RM 801 and above	41	10.6

4.3.3 Descriptive Analysis of Study Constructs

The descriptive analysis of the study constructs includes values for the minimum, maximum, mean, and standard deviation, as shown in Table 4.4. The minimum and maximum values for all constructs are shown as 1 and 7, respectively, in accordance with the seven-point Likert scale (from 1 as strongly disagree to 7 as strongly agree)

used to collect information on the question items. Among all the constructs, frugality recorded the highest mean of 5.603. This was followed by agreeableness (5.317), conscientiousness (4.940), openness (4.913), social media usage (4.519), and extraversion (4.247). While impulse buying behaviour and neuroticism had mean values of 3.830 and 3.777, respectively, food waste recorded the lowest mean value of 2.773.

Table 4.4 Descriptive analysis of study constructs

Constructs	Minimum	Maximum	Mean	Std. Deviation
Social Media Usage	1	7	4.519	1.611
Impulse Buying Behaviour	1	7	3.830	1.820
Frugality	1	7	5.603	1.289
Neuroticism	1	7	3.777	1.655
Conscientiousness	1	7	4.940	1.344
Agreeableness	1	7	5.317	1.381
Extraversion	1	7	4.247	1.568
Openness	1	7	4.913	1.361
Food Waste	1	7	2.773	1.696

4.4 MEASUREMENT MODEL

To test the research model, this study used Smart PLS 3.0 (Ringle et al. 2015). The measurement model, which involves the relationship between constructs and their indicators, was examined before assessing the structural model or testing the hypotheses (Anderson & Gerbing 1988). All constructs tested in the model are multi-item except for the two dummy variables (i.e., Generation Y and Generation Z) used to test Generation as a moderator. The constructs are conceptualised as reflective measures. To assess the measurement model, tests to measure reliability and convergent validity were performed.

4.4.1 Indicator Reliability (Outer Loadings)

Since all constructs in this study were conceptualised as reflective, the outer loadings were assessed using a cut-off value of 0.5 (Hair et al. 2010). Loading values equal to and greater than 0.5 are acceptable if the summation of loadings in high loading scores contributes to AVE scores greater than 0.5 (Byrne 2016). Indicators (SMU7, PT_CN1, PT_CN3, PT_CN4, PT_AG1, PT_AG2, PT_AG3, PT_AG4, PT_EX3, PT_EX5, PT_EX6, PT_EX7, PT_OP7, and FR2) that had loadings below 0.5 were deleted to

achieve the satisfactory outer loadings scores. This resulted in 51 indicators that showed loadings above the cut-off value of 0.5, ranging from 0.545 to 0.910 (Table 4.5).

4.4.2 Internal Consistency Reliability

This study assessed the internal consistency and reliability using Cronbach's alpha and Composite Reliability Index. As shown in Table 4.5, Cronbach's alpha values range from 0.737 to 0.939, exceeding the recommended value of 0.7 (Hair et al. 2010). Similarly, the composite reliability meets the threshold of 0.7 (Hair et al. 2011), as Table 4.5 shows that the values range from 0.856 to 0.949. Therefore, it was concluded that the measurement model has acceptable reliability.

4.4.3 Convergent Validity

This study tested for convergent validity by assessing the Average Variance Extracted (AVE). Table 4.5 shows that all constructs surpass the 0.5 level threshold (Hair et al. 2019). The lowest value reported was for Frugality (0.552), followed by Openness (0.555), Social Media Usage (0.589), Food waste (0.633), Neuroticism (0.643), Agreeableness (0.668), Impulse Buying Behaviour (0.674), Extraversion (0.690), and Conscientiousness (0.790). The results indicate that the measurement model has demonstrated adequate convergent validity.

Table 4.5 Results of measurement model assessment

Constructs	Items	Indicator Reliability	Convergent Validity	Internal Consistency Reliability	
		Outer Loadings	AVE	Composite Reliability	Cronbach's Alpha
		>0.5	>0.5	>0.7	>0.7
Frugality	FR1	0.545	0.552	0.894	0.870
	FR3	0.560			
	FR4	0.736			
	FR5	0.841			
	FR6	0.824			
	FR7	0.821			
	FR8	0.804			
	Food Waste	FW1			
FW2		0.621			
FW3		0.700			
FW4		0.783			
FW5		0.881			
FW6		0.835			
FW7		0.868			
FW8		0.841			
Impulse Buying Behaviour	IBB1	0.757	0.674	0.949	0.939
	IBB2	0.866			
	IBB3	0.876			
	IBB4	0.841			
	IBB5	0.868			
	IBB6	0.840			
	IBB7	0.721			
	IBB8	0.845			
	IBB9	0.756			
Agreeableness	PT_AG5	0.674	0.668	0.856	0.753
	PT_AG6	0.903			
	PT_AG7	0.857			
Conscientiousness	PT_CN2	0.910	0.790	0.883	0.737
	PT_CN5	0.868			
Extraversion	PT_EX1	0.834	0.690	0.869	0.776
	PT_EX2	0.880			
	PT_EX4	0.774			
Neuroticism	PT_NR1	0.797	0.643	0.926	0.907
	PT_NR2	0.808			
	PT_NR3	0.850			
	PT_NR4	0.865			

to be continued...

...continuation

	PT_NR5	0.822			
	PT_NR6	0.757			
	PT_NR7	0.705			
Openness	PT_OP1	0.690	0.555	0.882	0.843
	PT_OP2	0.696			
	PT_OP3	0.728			
	PT_OP4	0.821			
	PT_OP5	0.765			
	PT_OP6	0.761			
Social Media Usage	SMU1	0.733	0.589	0.895	0.860
	SMU2	0.775			
	SMU3	0.828			
	SMU4	0.707			
	SMU5	0.836			
	SMU6	0.713			

Note: AVE = Average Variance Extracted

4.4.4 Discriminant Validity

Finally, the discriminant validity of the model was tested. This study utilised the HTMT technique by Henseler et al. (2015). The HTMT.85 criterion was applied, and as Table 4.6 shows, all constructs were below 0.85, thus achieving construct validity in the measurement model.

Table 4.6 Discriminant validity

	FR	FW	IBB	PT_AG	PT_CN	PT_EX	PT_NR	PT_OP	SMU
FR									
FW	0.199								
IBB	0.109	0.414							
PT_AG	0.163	0.586	0.327						
PT_CN	0.132	0.567	0.437	0.707					
PT_EX	0.088	0.369	0.286	0.579	0.503				
PT_NR	0.108	0.481	0.489	0.654	0.640	0.599			
PT_OP	0.449	0.079	0.197	0.099	0.086	0.147	0.116		
SMU	0.327	0.216	0.536	0.166	0.273	0.127	0.352	0.335	

Note: FR = Frugality, FW = Food waste, IBB = Impulse buying behaviour, PT_AG = Agreeableness, PT_CN = Conscientiousness, PT_EX = Extraversion, PT_NR = Neuroticism, PT_OP = Openness, SMU = Social media usage

4.5 STRUCTURAL MODEL

Once the measurement model was analysed, further tests, including hypotheses testing, were conducted to assess the structural model.

4.5.1 Assessment of Structural Model for Collinearity Issues

The first step in the structural model is the assessment of collinearity issues. To test for collinearity, the VIF values were assessed. Table 4.7 revealed that the VIF values ranged between 1.220 and 3.383, below the threshold of 5 (Hair et al. 2011). Thus, it was concluded that collinearity was not a concern in this study.

Table 4.7 Assessment for collinearity issues

Relationships	VIF
SMU → IBB	3.383
PT_NR → IBB	1.950
PT_CN → IBB	1.723
PT_AG → IBB	1.834
PT_EX → IBB	1.555
PT_OP → IBB	1.235
FR → IBB	1.268
SMU → FW	1.526
PT_NR → FW	2.035
PT_CN → FW	1.655
PT_AG → FW	1.714
PT_EX → FW	1.479
PT_OP → FW	1.220
FR → FW	1.275
IBB → FW	1.620

Note: FR = Frugality, FW = Food waste, IBB = Impulse buying behaviour, PT_AG = Agreeableness, PT_CN = Conscientiousness, PT_EX = Extraversion, PT_NR = Neuroticism, PT_OP = Openness, SMU = Social media usage

4.5.2 Result of Hypothesis Testing

a. Direct Hypotheses

Next, this study examined the significance of the model's structural path. The 15 direct hypotheses developed in the research framework in Chapter 2 were tested. To test the hypotheses, bootstrapping procedure was employed ($n=387$, sample=5000) as proposed by Hair et al. (2017). The bootstrapping was set to a 0.05 significance level as a one-tailed test. The critical values for a significance level of 1 percent ($\alpha=0.01$), 5 percent ($\alpha=0.05$) and 10 percent ($\alpha=0.1$) are 2.33, 1.645 and 1.28, respectively, for the one-tailed test (Ramayah et al. 2018). The result of the proposed structural model with path coefficient, standard error, and t-statistics are presented in Table 4.8. The table indicates if the hypotheses were supported or not supported. The value of path coefficients shown in Table 4.8 were from -0.270 to 0.379. The estimated path coefficients close to +1 show strong positive relationships, and the closer the value to 0, the weaker the relationships (Hair et al. 2017).

Hypotheses: H1, H2a, H2e and H3 predicting impulse buying behaviour were found to have t-values ≥ 2.33 , thus significant at 0.01 level of significance. These were Social Media Usage ($\beta=0.379$, $t=6.006$, $p<0.01$), Neuroticism ($\beta=0.236$, $t\text{-value}=3.955$, $p<0.01$), Openness ($\beta=0.118$, $t\text{-value}=2.462$, $p<0.01$) and Frugality ($\beta=-0.191$, $t\text{-value}=3.592$, $p<0.01$).

Hypotheses H5a, H5b, H5c, H6 and H7 determined food waste. Hypothesis H5a was found to have a t-value ≥ 1.645 , thus significant at 0.05 level of significance, i.e., Neuroticism ($\beta=0.094$, $t\text{-value}=1.733$, $p<0.05$). On the other hand, H5b, H5c, H6 and H7 were found to have t-values ≥ 2.33 , thus significant at 0.01 level of significance. These were Conscientiousness ($\beta=-0.168$, $t=2.716$, $p<0.01$), Agreeableness ($\beta=-0.270$, $t=4.108$, $p<0.01$), Frugality ($\beta=-0.174$, $t=3.409$, $p<0.01$), and Impulse Buying Behaviour ($\beta=0.156$, $t=2.521$, $p<0.01$). This study found hypotheses: H2b, H2c, H2d, H4, H5d, H5e to be not significant.

Table 4.8 Direct hypotheses assessment

	Relationship	Path Coefficient (β)	Std. Error	BCI (LL)	BCI (UL)	t-value	p-value	Decision
H1	SMU -> IBB	0.379	0.063	0.272	0.480	6.006	0.000**	Supported
H2a	PT_NR -> IBB	0.236	0.060	0.141	0.339	3.955	0.000**	Supported
H2b	PT_CN -> IBB	-0.076	0.062	-0.183	0.022	1.216	0.112	Not supported
H2c	PT_AG -> IBB	0.029	0.054	-0.061	0.113	0.550	0.291	Not supported
H2d	PT_EX -> IBB	-0.075	0.055	-0.167	0.012	1.373	0.085	Not supported
H2e	PT_OP -> IBB	0.118	0.048	0.032	0.189	2.462	0.007**	Supported
H3	FR -> IBB	-0.191	0.053	-0.263	-0.096	3.592	0.000**	Supported
H4	SMU -> FW	0.049	0.048	-0.033	0.125	1.016	0.155	Not supported
H5a	PT_NR -> FW	0.094	0.054	0.004	0.184	1.733	0.042*	Supported
H5b	PT_CN -> FW	-0.168	0.062	-0.274	-0.072	2.716	0.003**	Supported
H5c	PT_AG -> FW	-0.270	0.066	-0.383	-0.169	4.108	0.000**	Supported
H5d	PT_EX -> FW	-0.056	0.046	-0.131	0.021	1.211	0.113	Not supported
H5e	PT_OP -> FW	0.031	0.051	-0.057	0.112	0.610	0.271	Not supported
H6	FR -> FW	-0.174	0.051	-0.249	-0.084	3.409	0.000**	Supported
H7	IBB -> FW	0.156	0.062	0.058	0.260	2.521	0.006**	Supported

Note: **P<0.01, *P<0.05, FR = Frugality, FW = Food waste, IBB = Impulse buying behaviour, PT_AG = Agreeableness, PT_CN = Conscientiousness, PT_EX = Extraversion, PT_NR = Neuroticism, PT_OP = Openness, SMU = Social media usage, Std. Error = Standard Error, BCI (LL) = Biased corrected interval lower limit, BCI (UL) = Biased corrected interval upper limit

b. Testing mediator effects

The seven mediating hypotheses (H8, H9a-e and H10) were tested to examine the mediating role of Impulse Buying Behaviour between Social Media Usage, Neuroticism, Conscientiousness, Agreeableness, Extraversion, Openness and Frugality and Food Waste. To test the mediating hypothesis, this study ran bootstrapping procedure (n=387, sample=5000) on the full model to estimate the structural path coefficients and statistical significance for indirect relationships (Hair et al. 2014). The bootstrapping was set to a 0.05 significance level as a two-tailed test. The critical values for a significance level of 1 percent ($\alpha=0.01$), 5 percent ($\alpha=0.05$) and 10 percent ($\alpha=0.1$) are 2.58, 1.96 and 1.645, respectively, for the two-tailed test (Hair et al. 2017). Also, in mediation hypotheses, for the indirect effect to be significant, the confidence interval

must not include zero (Preacher & Hayes 2008). The results of the bootstrapping procedure for mediation hypotheses are shown in Table 4.9.

Impulse Buying Behaviour was found to mediate the relationship between Social Media Usage and Food Waste, Neuroticism and Food Waste, and Frugality and Food Waste. The relationship of H8 for Social Media Usage towards Food Waste via Impulse Buying Behaviour had the largest path coefficient at ($\beta=0.059$, $t=2.404$, $p<0.05$), followed by H9a on Neuroticism towards Food Waste via Impulse Buying Behaviour at ($\beta=0.037$, $t=2.077$, $p<0.05$), and H10 in the relationship of Frugality towards Food Waste via Impulse Buying Behaviour at ($\beta=-0.030$, $t=2.024$, $p<0.05$). It was noted that the confidence interval for these relationships did not straddle a zero, and these mediating effects were significant. Therefore, hypotheses H8, H9a, and H10 were supported. On the contrary, hypotheses H9b-e were found to be not significant.

Table 4.9 Mediation assessment

Relationship	Path Coefficient (β)	Std. Error	t-value	p-value	BCI (LL)	BCI (UL)	Decision
H8 SMU -> IBB -> FW	0.059	0.025	2.404	0.016	0.016	0.116	Supported
H9 a PT_NR -> IBB -> FW	0.037	0.018	2.077	0.038	0.010	0.083	Supported
H9 b PT_CN -> IBB -> FW	-0.012	0.012	1.008	0.314	-0.047	0.003	Not supported
H9 c PT_AG -> IBB -> FW	0.005	0.009	0.502	0.615	-0.010	0.028	Not supported
H9 d PT_EX -> IBB -> FW	-0.012	0.010	1.140	0.254	-0.040	0.002	Not supported
H9 e PT_OP -> IBB -> FW	0.018	0.011	1.688	0.091	0.002	0.045	Not supported
H10 FR -> IBB -> FW	-0.030	0.015	2.024	0.043	-0.064	-0.006	Supported

Note: FR = Frugality, FW = Food waste, IBB = Impulse buying behaviour, PT_AG = Agreeableness, PT_CN = Conscientiousness, PT_EX = Extraversion, PT_NR = Neuroticism, PT_OP = Openness, SMU = Social media usage, Std. Error = Standard Error, BCI (LL) = Biased corrected interval lower limit, BCI (UL) = Biased corrected interval upper limit

c. Testing moderator effects

Finally, in hypotheses testing, the moderation effect was tested. A moderator is characterised as a third construct that can change or affect the relationship between the

independent and dependent variables (Dawson 2014). This study used categorical data of Generation X, Y, and Z for moderation analysis conducted using SmartPLS 3.

This study hypothesised that:

H11: Generation X, Y, and Z moderates the relationship between social media usage and impulse buying behaviour, such that the relationship will be stronger among Generation Z than among Generation Y and Generation X social media users.

The moderation assessment followed the two-stage approach (Chin et al. 2003). As the name suggests, this approach has two stages: Stage 1 and Stage 2. In the first stage, the main effect PLS path model is run to obtain estimates for the latent variable scores. In stage 2, the latent variable scores from stage 1 will become indicators for the exogenous variable (Social Media Usage, i.e., SMU), endogenous variable (Impulse Buying Behaviour, i.e., IBB), and moderator (Generation X, Y, and Z, i.e., two dummy variables representing Generation Y (Gen_Y) and Generation Z (Gen_Z)). In this analysis, Generation X serves as the benchmark, and the effects of Generation Y and Generation Z are interpreted relative to this benchmark (Generation X).

Although the beta coefficients for the interaction effects of SMU*Gen_Y and SMU*Gen_Z were -0.109 and 0.166, respectively (as shown in Table 4.10), there is no confirmation whether Generation X, Y, and Z as a moderator is statistically significant or not. Therefore, to test for significance, bootstrapping procedure was applied. The cut-off value for the test is 1.28 ($\alpha=0.10$) (Hair et al. 2017). The significance of individual interaction terms (SMU*Gen_Y and SMU*Gen_Z) indicates whether that specific generation's relationship between SMU and the dependent variable (IBB) differs significantly from Generation X's. The overall moderating effect of Generation X, Y, and Z is significant if at least one interaction term is significant. As per Table 4.10, the interaction term of SMU*Gen_Z is significant ($t=1.597$) for the one-tailed test with a significant level of 10% (Park 2008; Shelley 2016). Therefore, it can be concluded that generation is a statistically significant moderator. Following the guideline by Kenny (2016), values of 0.005, 0.01, and 0.025 represent small, medium, and large effect sizes,

respectively. Hence, the f^2 of 0.006 for the interaction term of SMU*Gen_Z indicates a small effect size (Kenny 2016).

Table 4.10 Moderation model assessment

	Path coefficient	Standard error	t-value	f²	p-value
SMU*Gen_Y -> IBB	-0.109	0.100	1.094	0.003	0.137
SMU*Gen_Z -> IBB	0.166	0.104	1.597	0.006	0.055

Note: Gen_Y = Generation Y, Gen_Z = Generation Z, IBB = Impulse buying behaviour, SMU = Social media usage

Next, as suggested by Dawson (2014), to further elaborate the moderating effect of Generation X, Y, and Z, the pattern of the interaction effects of each generation is plotted to see how the moderator changes the relationship between Social Media Usage and Impulse Buying Behaviour. As seen in Figure 4.1, the line labelled Generation Z has the steepest gradient (strongest relationship), followed by Generation X and Generation Y, respectively. This indicates that the positive relationship between Social Media Usage and Impulse Buying Behaviour is stronger among Generation Z compared to Generation X and Generation Y (i.e., Generation Y exerts the least strength). Therefore, it can be concluded that Social Media Usage towards Impulse Buying Behaviour is stronger among Generation Z than Generation Y and Generation X social media users. Thus, hypothesis H11 is supported.

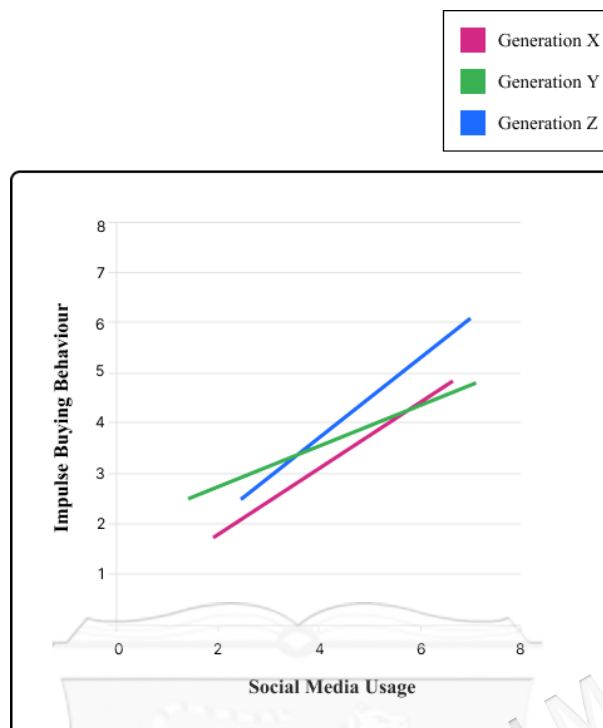


Figure 4.1 Interaction plot

4.5.3 Explanatory Power of the Model (R^2)

Next, the study evaluated the R^2 value to determine the coefficient of determination of the direct relationships in the structural model. The R^2 computes the model's predictive power, and the value ranges from 0 to 1, with a higher value indicating a higher level of predictive accuracy (Hair et al. 2017). Table 4.11 shows that the values of R^2 for Impulse Buying Behaviour and Food Waste were 0.404 and 0.382, respectively. According to Cohen (1988), R^2 values at 0.26, 0.13 and 0.02 are respectively considered substantial, moderate, and weak. Based on this criterion, the R^2 values for Impulse Buying Behaviour and Food Waste were substantial. Therefore, it can be deduced that Social Media Usage, Neuroticism, Conscientiousness, Agreeableness, Extraversion, Openness, and Frugality explained 40.4% of the variance in Impulse Buying Behaviour, whereas Social Media Usage, Neuroticism, Conscientiousness, Agreeableness, Extraversion, Openness, Frugality, and Impulse Buying Behaviour explained 38.2% of the variance in Food Waste.

4.5.4 Assessment of the Effect Size (f^2)

The changes in R^2 values were calculated to determine the effect size of f^2 of the predictors. To measure the effect size, a guideline by Cohen (1988) is followed. Based on Cohen (1988), the values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. Table 4.11 shows that Impulse Buying Behaviour (IBB) had a small effect size on Social Media Usage (SMU) ($f^2 = 0.071$), Neuroticism (PT_NR) ($f^2 = 0.048$), Openness (PT_OP) ($f^2 = 0.020$), and Frugality (FR) ($f^2 = 0.048$). On the other hand, Impulse Buying Behaviour (IBB) had no effect on Conscientiousness (PT_CN), Agreeableness (PT_AG), and Extraversion (PT_EX). Besides, Food Waste (FW) had a small effect size on Conscientiousness (PT_CN) ($f^2 = 0.027$), Agreeableness (PT_AG) ($f^2 = 0.069$), Frugality (FR) ($f^2 = 0.038$), and Impulse Buying Behaviour (IBB) ($f^2 = 0.024$). Also, Food Waste had no effect on Social Media Usage (SMU), Neuroticism (PT_NR), Extraversion (PT_EX), and Openness (PT_OP).

Table 4.11 Assessment of structural model

Relationships	R^2	f^2	Effect Size Interpretation
SMU → IBB	0.404	0.071	Small
PT_NR → IBB		0.048	Small
PT_CN → IBB		0.006	None
PT_AG → IBB		0.001	None
PT_EX → IBB		0.006	None
PT_OP → IBB		0.020	Small
FR → IBB	0.382	0.048	Small
SMU → FW		0.003	None
PT_NR → FW		0.007	None
PT_CN → FW		0.027	Small
PT_AG → FW		0.069	Small
PT_EX → FW		0.003	None
PT_OP → FW		0.001	None
FR → FW		0.038	Small
IBB → FW		0.024	Small

Note: FR = Frugality, FW = Food waste, IBB = Impulse buying behaviour, PT_AG = Agreeableness, PT_CN = Conscientiousness, PT_EX = Extraversion, PT_NR = Neuroticism, PT_OP = Openness, SMU = Social media usage

4.5.5 Assessment of Predictive Relevance

Finally, the predictive relevance of the model was assessed through the PLSpredict procedure (Shmueli et al. 2019). The PLSpredict procedure is a holdout sample-based method that generates case-level predictions at the item or construct level using a repeated holdout approach (typically with 10 repetitions) to assess predictive relevance. Shmueli et al. (2019) suggested comparing the item differences (PLS-LM) with the item values in LM. If the item differences (PLS-LM) are smaller than the item values in LM, it indicates strong predictive power, and vice versa for no predictive power. Meanwhile, if the majority of item differences (PLS-LM) are lower, then there is moderate predictive power; if only a minority are lower, it indicates low predictive power. Based on Table 4.12, all the item differences (PLS-LM) were negative (i.e., PLS prediction errors were lower than LM prediction errors). Thus, it can be concluded that the study model had strong predictive power.

In addition, Q^2 obtained from PLSpredict establishes the predictive relevance of the endogenous constructs. Q^2 values above zero indicate that the values are well reconstructed and the model has predictive relevance (Hair et al. 2017). The predictive relevance Q^2 values for the endogenous constructs, Food Waste and Impulse Buying Behaviour, were 0.330 and 0.309, respectively, further indicating that the model has predictive relevance as these Q^2 values are considerably above zero.

Table 4.12 PLS Predictive relevance

Items	PLS	LM	PLS-LM
	RMSE	RMSE	RMSE
FW1	1.638	1.690	-0.052
FW2	1.681	1.709	-0.028
FW3	1.653	1.733	-0.080
FW4	1.489	1.568	-0.079
FW5	1.482	1.533	-0.051
FW6	1.466	1.497	-0.031
FW7	1.272	1.277	-0.005
FW8	1.436	1.469	-0.033

Note: FW = Food waste, LM = Linear regression model, PLS = Partial Least Squares, RMSE = Root mean squared error

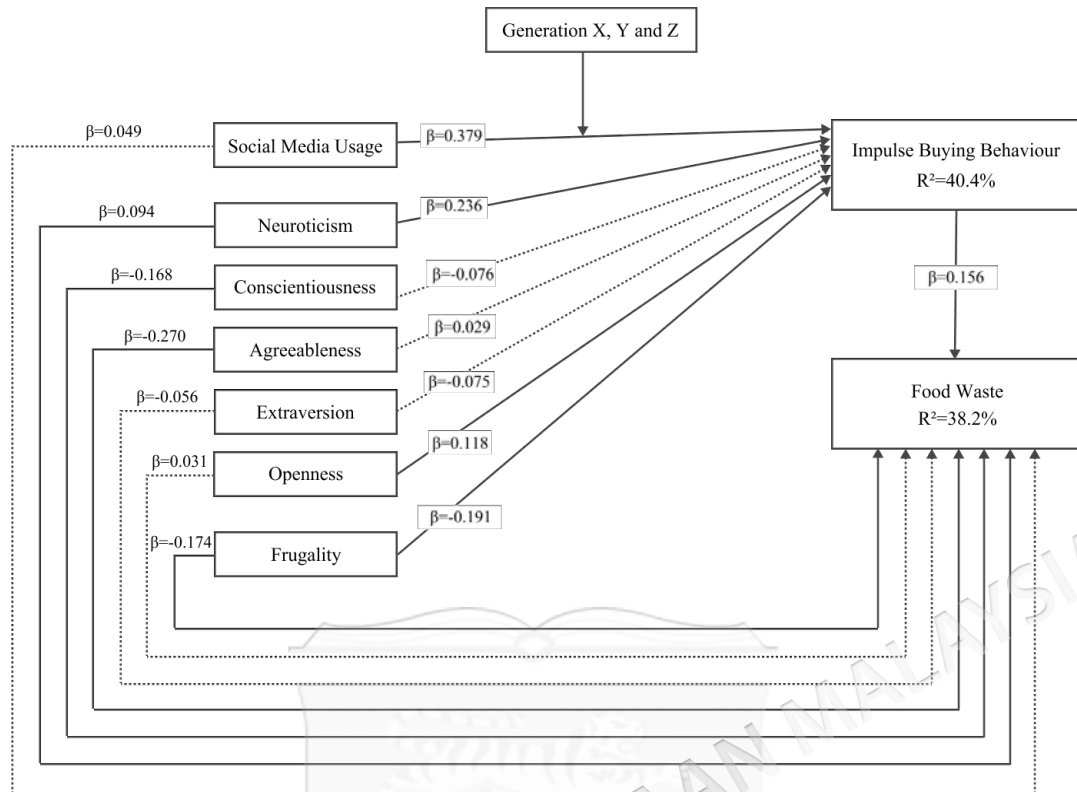
4.5.6 Summary of Hypotheses Testing

A summary of the results of the hypotheses tested is presented in Table 4.13.

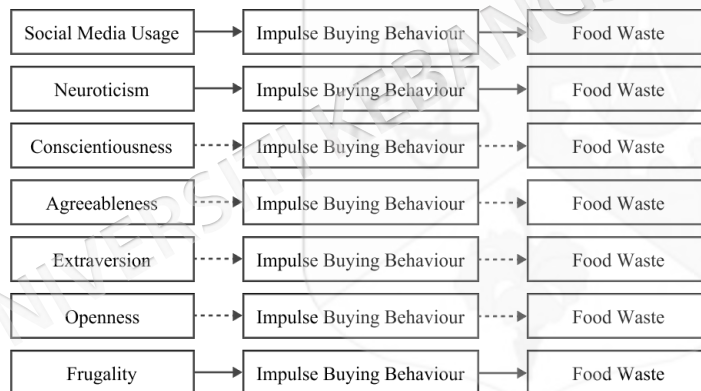
Table 4.13 Summary of hypothesis testing

Hypothesis No	Statement of the Hypothesis	Decision
H1	Social media usage is positively related to impulse buying behaviour.	Supported
H2a	Neuroticism is positively related to impulse buying behaviour.	Supported
H2b	Conscientiousness is negatively related to impulse buying behaviour.	Not supported
H2c	Agreeableness is negatively related to impulse buying behaviour.	Not supported
H2d	Extraversion is positively related to impulse buying behaviour.	Not supported
H2e	Openness is positively related to impulse buying behaviour.	Supported
H3	Frugality is negatively related to impulse buying behaviour.	Supported
H4	Social media usage is positively related to food waste.	Not supported
H5a	Neuroticism is positively related to food waste.	Supported
H5b	Conscientiousness is negatively related to food waste.	Supported
H5c	Agreeableness is negatively related to food waste.	Supported
H5d	Extraversion is negatively related to food waste.	Not supported
H5e	Openness is negatively related to food waste.	Not supported
H6	Frugality is negatively related to food waste.	Supported
H7	Impulse buying is positively related to food waste.	Supported
H8	Impulse buying behaviour mediates the relationship between social media usage and food waste.	Supported
H9a	Impulse buying behaviour mediates the relationship between Neuroticism and food waste.	Supported
H9b	Impulse buying behaviour mediates the relationship between Conscientiousness and food waste.	Not supported
H9c	Impulse buying behaviour mediates the relationship between Agreeableness and food waste.	Not supported
H9d	Impulse buying behaviour mediates the relationship between Extraversion and food waste.	Not supported
H9e	Impulse buying behaviour mediates the relationship between Openness and food waste.	Not supported
H10	Impulse buying behaviour mediates the relationship between frugality and food waste.	Supported
H11	Generation X, Y, and Z moderates the relationship between social media usage and impulse buying behaviour, such that the relationship will be stronger among Generation Z than among Generation Y and Generation X social media users.	Supported

Moreover, Figure 4.2 depicts the result of the structural model assessment. The measurement and structural model generated from SmartPLS 3 are enclosed in Appendix I and Appendix J, respectively.



Mediation



Note: Dotted lines indicate non-significant relationships

Figure 4.2 Result of structural model assessment

4.6 SUMMARY

This chapter reports the results of the data analysis performed using the techniques detailed in Chapter 3. This chapter consists of two major parts: (a) the preliminary analysis of data preparation that included assessment of missing values, testing for outliers, response bias check and testing for common method variance using SPSS version 28 and (b) structural model evaluation conducted using SmartPLS 3. A total of

39 outliers were removed, leaving 387 responses, comprising 125 responses, 129 responses, and 133 responses from Generation X, Y and Z, respectively, for further tests. Additionally, the normality assumption was assessed based on Mardia's multivariate kurtosis. Also, the respondents' profile was described. Utilising the two-stage method, the measurement model was first analysed, followed by the structural model. The results indicated that the measurement model confirmed the validity and reliability of the constructs. The assessment of the structural model involved testing the hypothesised relationships pertaining to the direct, mediating, and moderating effects. Based on the findings, 13 hypotheses were supported. The next chapter discusses the findings, implications, limitations, and directions for future research.



CHAPTER V

DISCUSSION AND CONCLUSION

5.1 INTRODUCTION

This chapter interprets the empirical results reported in Chapter 4. Following the introduction, section 5.2 discusses the results based on the research questions. This is followed by theoretical and practical implications in section 5.3. Section 5.4 outlines the limitations of the study, while section 5.5 provides recommendations for future research. Finally, section 5.6 presents a comprehensive conclusion of the research.

5.2 DISCUSSION OF THE FINDINGS

In order to provide insights on the factors that influence consumer food waste, this study dealt with four main research questions (RQ) outlined in Chapter 1: (1) What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness and frugality on impulse buying behaviour? (2) What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, frugality and impulse buying behaviour on food waste? (3) Does impulse buying behaviour mediate the relationship between social media usage and food waste; neuroticism and food waste; conscientiousness and food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste? (4) Does consumer Generation X, Y, and Z moderate the relationship between social media usage and impulse buying behaviour?

To provide answers to the above-stated research questions, this study examined the effect of social media usage and the big five personality traits: neuroticism,

conscientiousness, agreeableness, extraversion, openness, and frugality on impulse buying behaviour. Furthermore, the impact of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, frugality, and impulse buying behaviour on food waste were evaluated. Next, the mediating role of impulse buying behaviour on the relationship between social media usage and food waste; neuroticism and food waste; conscientiousness and food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste tested. Finally, the moderating effect of Generation X, Y, and Z on social media usage and impulse buying behaviour was assessed.

The empirical findings of this study have mostly supported the hypothesised relationships in the proposed research framework discussed in Chapter 2. Specifically, social media usage, neuroticism, openness, and frugality significantly influenced impulse buying behaviour. Also, neuroticism, conscientiousness, agreeableness, frugality, and impulse buying behaviour predicted food waste. In addition, impulse buying behaviour mediated the relationship between social media usage and food waste; neuroticism and food waste; and frugality and food waste. Finally, the results demonstrated a moderating effect of Generation X, Y, and Z on social media usage towards impulse buying behaviour. The discussions on how the empirical findings provide answers to each of the research questions are detailed in the following subsections.

5.2.1 RQ1 What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, and frugality on impulse buying behaviour?

In response to this research question, seven hypotheses were formulated.

- H1 Social media usage is positively related to impulse buying behaviour.
- H2a Neuroticism is positively related to impulse buying behaviour.
- H2b Conscientiousness is negatively related to impulse buying behaviour.
- H2c Agreeableness is negatively related to impulse buying behaviour.
- H2d Extraversion is positively related to impulse buying behaviour.
- H2e Openness is positively related to impulse buying behaviour.
- H3 Frugality is negatively related to impulse buying behaviour.

The findings of this study support the hypothesis (H1) that social media usage significantly predicts impulse buying behaviour during the COVID-19 pandemic. This relationship can be attributed to several factors unique to the pandemic context.

First, the pandemic caused a substantial increase in social media usage. Taha et al. (2021) highlight that social media platforms saw increased user engagement during this period, with users potentially exposed to a higher volume of content, including advertisements and promotions. The surge in social media usage, coupled with restrictions on physical movement and social interactions, created a unique environment for online consumer behaviour. Notably, Naeem (2020) found that this increased social media engagement facilitated the spread of both information and misinformation about the pandemic, contributing to impulse buying behaviour driven by panic. Second, the pandemic accelerated the shift towards online shopping, particularly through social media platforms, a phenomenon known as social commerce. Islam et al. (2021) demonstrate that this increased online engagement exposed users to marketing strategies such as limited quantity and time-bound offers, effectively triggering impulse buying behaviour by creating a sense of urgency. This aligns with Renming and Kian's (2021) findings, which indicated that social commerce significantly influenced impulse buying during COVID-19.

The present study's findings contribute to the existing literature by providing empirical evidence of the direct relationship between overall social media usage and impulse buying behaviour during the COVID-19 pandemic. This broader approach complements more targeted studies like Islam et al. (2021), offering a comprehensive view of how increased social media engagement during the pandemic relates to impulse buying behaviour. Moreover, the study findings extend the understanding of social commerce's impact on impulse buying, as Renming and Kian (2021) highlighted, by contextualising it within the broader framework of overall social media usage.

This study demonstrated a positive relationship between neuroticism and impulse buying behaviour, as specified in H2a. The findings suggest that neurotic individuals tend to exhibit impulse buying behaviour, a relationship that was particularly evident during the COVID-19 pandemic.

During the pandemic, there was a high prevalence of negative emotions often associated with neuroticism, such as depression, stress, and fear of the health crisis. Naeem (2020) found that the fear spread about the pandemic drove impulse buying behaviour. This finding is relevant to the present study, as neuroticism is characterised by a tendency towards negative emotional states. Furthermore, Febrilia and Warokka (2021) demonstrated that consumer mood significantly influenced online impulse buying during the pandemic. These studies, along with the current research, indicate a clear link between neuroticism-related emotional states and purchase behaviour.

Neurotic individuals appear to engage in impulse buying as a coping mechanism to relieve stress and improve their emotional state. This tendency is particularly relevant in the context of the pandemic, where neurotic individuals likely experienced heightened levels of stress and negative emotions. Chiu et al. (2022) highlight that during the pandemic, individuals resorted to impulse buying as a means to alleviate their emotional distress. This aligns with earlier studies, such as Fenton-O’Creevy et al. (2018), that indicate impulse buying often serves as an emotional regulation strategy in contexts outside of crises.

The pandemic also altered consumption patterns that may have exacerbated impulse buying behaviour, especially among neurotic individuals. Leal Filho et al. (2021) noted that people experiencing negative emotions, which are characteristics of neuroticism, were more likely to engage in overeating or ‘emotional eating’, particularly junk food, during COVID-19. Concurrently, Neo (2021) reported increased marketing promotions for junk food during this period. Such promotional activities have been identified as a source of impulse buying behaviour by past studies such as Miao et al. (2020). The convergence of heightened negative emotions, increased promotional activities, and changes in consumption patterns during the pandemic likely contributed to the observed relationship between neuroticism and impulse buying behaviour.

The findings of this study underscore the significant role of neuroticism in consumer behaviour during times of crisis. The positive relationship between neuroticism and impulse buying behaviour established in this research highlights the complexity of consumer psychology, particularly in unprecedented situations like the

COVID-19 pandemic. This insight contributes to a more nuanced understanding of how neuroticism influences consumption patterns in challenging times. The heightened tendency for neurotic individuals to engage in impulse buying during the pandemic suggests that neuroticism may serve as a key predictor of consumer responses to stressful situations.

In contrast to expectations, this study did not reveal any significant association between conscientiousness (Hypothesis H2b), agreeableness (Hypothesis H2c), extraversion (Hypothesis H2d), and impulse buying behaviour. These unexpected findings may be attributable to the extraordinary circumstances of the pandemic.

The insignificant relationship between conscientiousness and impulse buying behaviour, contrary to Hypothesis H2b, may be linked to the characteristics associated with conscientiousness. Conscientious individuals' responsible and disciplined nature likely led them to adapt their behaviours in response to COVID-19, prioritising preparedness actions over typical consumer behaviours such as impulse buying. Such a focus on preparedness rather than consumption aligns with the broader behavioural adaptations observed in conscientious individuals during the pandemic. This interpretation is supported by Abdelrahman (2022) and Aschwanden et al. (2021), who found that conscientiousness predicted stronger COVID-19-evoked adaptations in behaviour, such as adherence to precautionary measures. Additionally, Blagov (2021) found that conscientiousness was associated with responsiveness to messages emphasising responsible behaviour during the pandemic, which may have led to more balanced and considered purchasing decisions rather than impulsive ones.

Furthermore, this interpretation aligns with other studies conducted during the pandemic. Di Crosta et al. (2021) found no significant association between conscientiousness and consumer behaviour during the COVID-19 crisis. These findings, along with the present study, suggest that the relationship between conscientiousness and consumer behaviour during crises may be more complex than initially hypothesised, warranting further investigation. The collective evidence, including the present study's findings, indicates that the pandemic's unique psychological and situational factors may have altered the typical relationship between

conscientiousness and impulse buying behaviour. It is plausible that conscientious individuals channelled their self-discipline and responsibility into strict adherence to preparedness actions, thus overriding their usual consumer behaviour patterns.

The lack of a substantial connection between agreeableness and impulse buying behaviour is an intriguing finding that challenges the initial hypothesis (H2c) and suggests a more complex relationship than anticipated. Agreeableness, characterised by cooperativeness, empathy, and consideration for others, was expected to reduce impulse buying behaviour, but this study did not find evidence to support this hypothesis.

This result might be influenced by moderating factors not accounted for in the current study. For instance, Huang et al. (2024) found that time pressure moderated the relationship between agreeableness and impulse buying behaviour, which could be particularly relevant in the context of the COVID-19 pandemic. During the pandemic, shopping patterns changed dramatically. The movement restrictions resulted in less frequent but more intense shopping trips, potentially creating time pressure as people sought to minimise the risk of infection (Berjan et al. 2022). The shift to online shopping also introduced new forms of time pressure, such as limited-time offers or concerns about stock availability (Kong et al. 2023). These unique circumstances might have altered the typical relationship between agreeableness and impulse buying, though further research would be needed to confirm this.

Furthermore, Rammstedt et al. (2022) noted that agreeable individuals were more likely to adapt their behaviours in response to the crisis. However, this adaptability might have manifested differently across various aspects of life, not necessarily translating to reduced impulse buying. The present study highlights the importance of considering contextual factors and potential moderating variables when examining the relationship between personality traits and consumer behaviour. It suggests that the influence of agreeableness on consumer behaviour may vary depending on the specific circumstances and environmental factors at play. Indeed, the relationship between personality traits and consumer behaviour is often complex and highly dependent on the broader context in which the behaviour occurs. While agreeableness might lead to more

considerate behaviour in some domains, its influence on spontaneous purchasing decisions might be less direct or consistent.

The insignificant connection between extraversion and impulse buying behaviour (Hypothesis H2d) suggests that an individual's level of extraversion did not significantly influence their impulse buying behaviour during the COVID-19 health crisis. While this result might seem counterintuitive, it aligns with some recent research on extraversion during the pandemic. For instance, Balling et al. (2021) found that contrary to pre-pandemic research, extraversion was not consistently associated with lower distress levels during lockdowns and social restrictions.

The unique circumstances of COVID-19 could explain the lack of association between extraversion and impulse buying. Extraverts, typically energised by social interactions and external stimuli, faced an unprecedented situation with the enforcement of MCO. Rather than turning to impulse buying as a substitute for social stimulation, it is possible that extraverts found other ways to engage with the pandemic situation. Balling et al. (2021) observed that extraverts were likelier to consume COVID-related information and discuss the pandemic with others. This increased engagement with pandemic-related activities might have occupied the time and mental space that could have led to impulse buying behaviours.

This study found that openness positively affects impulse buying behaviour, as hypothesised in H2e. This finding aligns with recent research on personality traits during the COVID-19 pandemic. Airaksinen et al. (2021) found that highly open individuals demonstrated greater flexibility in responding to pandemic-related challenges, suggesting a heightened capacity to adapt to new circumstances. In the context of the pandemic, this adaptability may have extended to embracing online shopping, which became more prevalent due to MCO measures. The shift to online retail environments and open individuals' curiosity and novelty-seeking tendencies could explain the increased impulse buying behaviour observed in this study. Individuals with high openness may have been more willing to explore new products or take advantage of online promotions, leading to more spontaneous purchases. This relationship between

openness and impulse buying during the pandemic highlights how personality traits can influence consumer behaviour in response to significant societal changes.

While this study's openness and impulse buying finding contrasts with Sharma's (2021) study, which found a negative relationship among Indian consumers aged 19-35, several factors may contribute to this discrepancy. First, this study employed the 33-item personality measure from Sun et al. (2004), whereas Sharma (2021) used the Ten Item Personality Inventory. These different personality measures may assess slightly different aspects of the openness trait, potentially leading to divergent results. Additionally, potential differences in cultural context, sample demographics, or the specific phase of the pandemic during which each study was conducted could account for the contrasting results. Although both studies were carried out during the COVID-19 pandemic, variations in local pandemic conditions and responses between Malaysia and India may have influenced consumer behaviour differently. The difference in findings underscores the complexity of the relationship between openness and impulse buying behaviour.

The findings of this study reveal a complex interplay between the Big Five personality traits and impulse buying behaviour during the COVID-19 pandemic. While neuroticism and openness demonstrated significant positive relationships with impulse buying behaviour, conscientiousness, agreeableness, and extraversion showed no significant associations. These results suggest that the unprecedented nature of the pandemic may have altered the typical expression of personality traits in consumer behaviour. The significant relationship between neuroticism and impulse buying aligns with the heightened emotional distress during the crisis, while the positive association between openness and impulse buying behaviour may reflect adaptability to new shopping environments. Conversely, the absence of significant relationships for conscientiousness, agreeableness, and extraversion contrary to expectations highlights the potential disruption of normal behavioural patterns. These findings underscore the importance of considering contextual factors in personality-behaviour relationships, particularly during extraordinary circumstances like a global pandemic.

This study found frugality to have an inverse relationship with impulse buying, as hypothesised in H3. Frugal characteristics, such as restraint from consumption, become particularly evident during times of crisis, as the findings suggest. The COVID-19 pandemic caused widespread economic instability, leading many Malaysians to adopt more frugal behaviours. This increased frugality likely reduced impulse purchases, as Rayburn et al. (2021) reported that impulse buying was avoided as part of the frugal behaviour exhibited during the pandemic. Consequently, more intentional and planned shopping behaviour was practised to better manage finances in response to the pandemic's economic uncertainties.

Purnamasari and Ahmad (2021) highlighted that many Malaysian households, especially those affected by the pandemic, reduced their food consumption during COVID-19. This trend towards frugality aligns with the negative relationship observed in this study between frugality and impulse buying, suggesting that the reduction in food spending may also extend to a decrease in impulse purchases.

Moreover, Malaysia's multi-religious society, comprising Islam, Buddhism, Christianity, and Hinduism, generally emphasises the importance of frugal behaviour and discourages excessive buying (DOSM 2010; Goldsmith & Flynn 2015). While rooted in religious teachings, these values often manifest through spiritual practices, especially during times of crisis. This connection is highlighted by the spiritual aspects associated with frugality during the COVID-19 pandemic, as demonstrated by Cucato et al. (2022). This spiritual dimension could further reinforce frugal tendencies and potentially discourage behaviours associated with excessive consumption, such as impulse buying. This aligns with the study's inverse relationship between frugality and impulse buying behaviour.

The pandemic has created a unique context where the effects of frugality on consumer behaviour are more pronounced. The combination of economic uncertainty and cultural values during this challenging period can help explain the negative relationship between frugality and impulse buying behaviour found in this study. This finding underscores the importance of understanding frugality as a key factor

influencing consumer behaviour during times of crisis, particularly in culturally diverse contexts like Malaysia.

5.2.2 RQ2 What is the effect of social media usage, neuroticism, conscientiousness, agreeableness, extraversion, openness, frugality, and impulse buying behaviour on food waste?

Eight hypotheses were put forward to address the research question.

- H4 Social media usage is positively related to food waste.
- H5a Neuroticism is positively related to food waste.
- H5b Conscientiousness is negatively related to food waste.
- H5c Agreeableness is negatively related to food waste.
- H5d Extraversion is negatively related to food waste.
- H5e Openness is negatively related to food waste.
- H6 Frugality is negatively related to food waste.
- H7 Impulse buying is positively related to food waste.

The relationship between social media usage and food waste (Hypothesis H4) was found to be non-significant. This result is unexpected, given the anticipation that increased social media usage during the COVID-19 pandemic would correlate with changes in food consumption and waste patterns. Several factors may account for this finding.

The nature of social media engagement during the pandemic appears to have been concentrated on specific areas. Saud et al. (2020) and Wang and Deng (2022) reported that users primarily sought entertainment, social connection, and pandemic-related news. Khan et al. (2022) supported this, identifying informativeness, education, entertainment, shopping, socialisation, and social causes as the main drivers of social media usage during this period. In these studies, food and waste management were not explicitly highlighted as primary uses of social media. However, it is possible that such content was present to some degree within broader categories like informativeness or social causes. Additionally, Liu et al. (2021) revealed that during the pandemic, social media was dominated by COVID-19 information, leading to information overload for

many users. This overwhelming focus on pandemic-related content may have overshadowed other topics, including food waste management.

The insignificant relationship between social media usage and food waste found in this study highlights the complex nature of these behaviours during the COVID-19 pandemic. While social media usage increased during this period, its impact on food waste was not as straightforward as initially hypothesised. This finding suggests that the factors influencing food waste behaviours in extraordinary circumstances like a global pandemic may be more multifaceted than anticipated. The predominant focus of social media on pandemic-related information, entertainment, and social connection, rather than on food management specifically, may have contributed to this unexpected result.

This study revealed a positive relationship between neuroticism and food waste, as hypothesised in H5a. This finding suggests that neurotic individuals were likelier to engage in behaviours leading to increased food waste during the COVID-19 pandemic. Interestingly, this result contrasts with pre-pandemic waste-related studies, which found neuroticism associated with better waste management practices. For instance, Opayemi et al. (2020), Karbalaeei et al. (2014) and Lange et al. (2014) observed a positive relationship between neuroticism and waste management behaviours. The deviation in this study's finding can be primarily attributed to the unique circumstances of the COVID-19 pandemic. Several factors may explain this relationship within the context of the pandemic. Neurotic individuals tend to experience higher levels of anxiety and emotional instability, which were likely exacerbated by the uncertainty surrounding COVID-19. The pandemic introduced unprecedented challenges, including fear of infection and concerns about supply shortages, which may have significantly influenced behaviour patterns, particularly among those prone to anxiety.

Studies conducted during the pandemic support this interpretation. Dammeyer (2020) reported that higher levels of neuroticism correlated with food stockpiling, while Brizi and Biraglia (2021) found evidence linking stockpiling behaviours to increased food waste during the global health crisis. Horne and Furnham (2023) noted that heightened anxiety from COVID-19 was coupled with less frequent shopping trips.

Complementing this, Berjan et al. (2022) observed that although people shopped less often, they bought larger quantities, potentially due to anxiety-driven stockpiling, which ultimately led to more food waste. Gao et al. (2022) further supported this line of research, demonstrating that neuroticism influenced emotional eating during this period. According to Elmacıoğlu et al. (2021), the significant increase in emotional eating during the pandemic potentially contributed to disruptive consumption patterns, raising concerns over food waste.

In the context of the COVID-19 pandemic, the typically beneficial traits associated with neuroticism in waste management – such as heightened environmental awareness and caution about resource use – may have been overshadowed by pandemic-induced anxiety and altered consumption patterns. The fear of food shortages and virus exposure (Horne & Furnham 2023) likely led neurotic individuals to overbuy, potentially increasing food spoilage and waste (Brizi & Biraglia 2021). Moreover, the rise in emotional eating associated with neuroticism during this period likely contributed to disruptive consumption patterns, further exacerbating food waste. This finding does not negate previous research but highlights the significant impact of context on behavioural outcomes. The pandemic created unique circumstances that altered typical behaviour patterns, particularly for neurotic individuals. This underscores the importance of considering contextual factors when examining the relationship between neuroticism and waste-related behaviours, suggesting that its impact may vary depending on environmental stressors and societal conditions.

This study demonstrated that conscientiousness is negatively associated with food waste (Hypothesis H5b). This finding suggests conscientious individuals were likelier to engage in behaviours that reduced food waste during the pandemic. This result aligns with previous research (Abdelradi 2018; Swami et al. 2011) and offers interesting insights, particularly given the unique context of the COVID-19 pandemic during which the study was conducted.

The negative association between conscientiousness and food waste suggests that highly conscientious individuals may be more likely to engage in carefully planned behaviours that reduce food waste. This relationship persisted even amidst the

disruptions caused by the pandemic, which is noteworthy. Several factors may explain this finding. Conscientious individuals often tend to be more organised and planful. Aschwanden et al. (2021) observed that conscientious individuals were more cautious and prepared to respond to the COVID-19 pandemic. These effects might have extended to consumption practices such as careful meal preparation, leading to a reduction in food waste. Moreover, in their COVID-19 study, Balling et al. (2021) reported a positive connection between conscientiousness and maintaining daily activities. This may reflect such individuals' discipline to continue routines like consumption habits that could have helped prevent food waste during this period of disruption.

Those high in conscientiousness often display a sense of duty and responsibility. During the COVID-19 crisis, this could have manifested as a heightened awareness of resource conservation, including efforts to minimise food waste. This heightened focus on conserving resources aligns with Hong et al. (2023), who found conscientiousness linked to sustainable behaviour during the pandemic. Additionally, while not typically associated with conscientiousness, the ability to adapt to new circumstances efficiently might have allowed conscientious individuals to adjust their food management strategies during the pandemic. This relationship between conscientiousness and food waste behaviour, as observed in the present study, contributes to the growing body of research on personality traits and sustainable behaviours during crisis periods.

It is important to note that while this finding supports the hypothesis, the strength and nature of the relationship may have been influenced by the context of the pandemic. For instance, the association might have been stronger or manifested differently compared to non-pandemic times. This result contributes to understanding the role of personality factors in food waste behaviour and suggests that conscientiousness could be a valuable consideration in developing food waste reduction strategies.

The analysis revealed a negative significant relationship between agreeableness and food waste, supporting hypothesis H5c. This finding suggests that individuals scoring higher in agreeableness may be more likely to engage in behaviours that reduce food waste. This aligns with past studies such as Jamaludin et al. (2020). During the

COVID-19 pandemic, this relationship could be particularly relevant due to the unique circumstances surrounding food acquisition and consumption.

A plausible explanation for this association is that agreeable individuals tend to be more considerate of others, potentially extending this mindset to their food consumption habits. They might be more inclined to use leftovers efficiently or share excess food, thus minimising waste. This aligns with broader findings on personality traits and behavioural adaptations during the COVID-19 pandemic. Kohút et al. (2021) found that agreeableness was positively associated with helping others during the pandemic, a behaviour that could extend to more thoughtful food use. Rammstedt et al. (2022) observed that agreeable individuals were more likely to adapt their behaviours in response to the crisis, which may have included adjusting their food consumption patterns to reduce waste. Furthermore, Aschwanden et al. (2021) reported that individuals high in agreeableness demonstrated more precautionary and preparatory behaviours during this period, potentially translating to more careful food management.

Moreover, the trait of agreeableness often encompasses a sense of social responsibility, which can manifest as environmental consciousness. Myhrer et al. (2024) identified a consumer segment characterised by high agreeableness that showed greater environmental awareness, particularly about food waste. It is plausible that people high in agreeableness were more conscious of the broader implications of food waste during the pandemic, such as potential strain on food supply chains or the environmental impact of discarded food. This awareness, coupled with the tendency to adapt behaviours noted by Rammstedt et al. (2022), might have motivated them to adopt more sustainable food practices.

These findings collectively suggest that agreeable individuals' considerate nature, adaptability, and environmental consciousness may have contributed to more efficient food use and waste reduction, particularly during challenging times like the COVID-19 pandemic. While this study indicates that agreeableness is a significant predictor of reduced food waste behaviour, it is important to note that the complex nature of human behaviour, especially during extraordinary circumstances, means that other factors may also play a role in this relationship. For instance, the pandemic-

induced lifestyle changes, such as increased time at home for meal preparation, could have influenced the strength and nature of the relationship. The interplay between personality traits, situational factors, and food waste behaviours is intricate, particularly in extraordinary circumstances like a global pandemic.

This study did not find significant relationships between food waste and two personality traits: extraversion (Hypothesis H5d) and openness (Hypothesis H5e). These findings contradict previous research conducted outside the pandemic and warrant further examination. For instance, Jamaludin et al. (2020) found that extraversion led to a higher intention to reduce food waste. Likewise, Myhrer et al. (2024), in a study conducted after pandemic restrictions had been lifted in Norway, observed that openness to experience was associated with higher levels of perceived dinner waste. The absence of significant links between extraversion and openness with food waste during the COVID-19 crisis suggests that the unique circumstances may have influenced behaviour unexpectedly.

Given the circumstances of MCO measures, a negative relationship between extraversion and food waste was hypothesised. However, the findings suggest that extraversion did not significantly affect food waste behaviours during this period. Interestingly, Asselmann et al. (2020) found that more extraverted individuals often expected financial losses amid the health crisis. This expectation of financial insecurity might have led to more careful resource management, including food, potentially offsetting any tendencies towards waste. Additionally, Clark et al. (2020) reported that higher extraversion predicted higher tendencies to give health recommendations to others during the pandemic. This indicates that extraverts might have redirected their characteristic energy and sociability towards alternative activities to cope with COVID-19 rather than engaging in behaviours that could potentially influence food waste. It is worth noting that Liu et al. (2020) found that higher extraversion was associated with higher stress levels during the pandemic and a greater increase in stress levels compared to pre-pandemic. This heightened stress response in extraverts during the unique circumstances of the pandemic may have influenced their behaviour in ways that are not typically observed, potentially explaining the lack of association with food waste.

The absence of a significant relationship between openness and food waste is an unexpected finding, as the initial hypothesis (Hypothesis H5e) suggested a negative relationship. This hypothesis was based on the characteristic traits of open individuals, such as creativity and willingness to try new approaches, which could potentially lead to more efficient food management and less waste.

Drawing from Hölscher's (2021) work, which found openness positively related to well-being during the COVID-19 pandemic, it is possible to speculate on explanations for the current study's finding. The heightened focus on maintaining emotional well-being during the pandemic might have influenced open individuals' food-related behaviours in complex ways. While open individuals might have engaged in diverse coping strategies, including exploring new recipes, trying international cuisines at home, or finding creative ways to use available ingredients, these varied approaches could have had mixed effects on food waste. Although these potentially adaptive strategies might have contributed to well-being, their impact on food waste remains inconclusive.

Furthermore, the general stress of the pandemic could have affected open individuals' food management behaviours in multifaceted ways. Ikizer et al. (2022) evidenced that highly open individuals perceived higher stress levels during the pandemic. These elevated stress levels might have influenced their food-related decisions and behaviours in ways that counteracted their typical innovative approaches to food management.

The relationship between openness and food waste appears more nuanced than initially hypothesised. While open individuals may be more willing to try new approaches to food management, this same trait might lead them to experiment with unfamiliar ingredients or recipes. Such experimentation could potentially result in occasional waste if unsuccessful but might also lead to more efficient food use in other instances. This dual nature of openness with food behaviours could have resulted in a net-zero effect on food waste, offering a possible explanation for the non-significant relationship observed in this study.

The pandemic's extraordinary circumstances have influenced the relationship between personality traits and behaviour in unexpected ways. While extraversion and openness have not shown significant relationships with food waste, other Big Five personality traits have influenced food waste behaviours. These findings suggest that the impact of personality on food waste during the pandemic is more complex than initially anticipated, even when considering the unique circumstances of the global health crisis. This complexity highlights the intricate interplay between personality traits and unprecedented situations in shaping behaviours such as food waste.

This study observed that frugality negatively influenced food waste, as hypothesised in H6. Frugal individuals tend to be more careful and self-disciplined, which makes them more responsible with behaviours such as food consumption practices. Frugal individuals are likely to engage in meticulous meal planning, which naturally leads to lower levels of food waste, as planned meals reduce the likelihood of food items being left unused and eventually discarded. Özbük et al. (2022) note that the increased levels of frugality observed during COVID-19 were accompanied by improved food management practices, including meal planning. Additionally, the mindful consumption practices typical of frugal individuals, such as repurposing leftovers and proper food storage, further contribute to minimising waste. This is supported by the findings of Rishi et al. (2023), who observed that mindfulness practised during the pandemic was related to frugality-linked sustainable behaviours.

Furthermore, the religious practices in Malaysia place a strong emphasis on prudent consumption and avoiding waste. For example, Islam, the predominant religion in Malaysia, forbids wasting food and instructs: "... and eat and drink be not extravagant; surely [Allah] does not love the extravagant "(Al-Quran, Al-A'raf 7, 31). These teachings promote frugality and discourage wasteful behaviour. Although these values are rooted in religious teachings, they are often expressed through spiritual practices, particularly during times of crisis. This connection between spirituality and frugality during the COVID-19 pandemic is supported by Cucato et al. (2022).

The findings suggest that the frugal behaviour observed during the pandemic was crucial in reducing food waste. This relationship reflects careful planning and

mindful consumption and is reinforced by cultural and religious values promoting responsible resource use. These insights underscore the importance of fostering frugality to encourage sustainable consumption practices.

As hypothesised in H7, a positive relationship was revealed between impulse buying behaviour and food waste. This finding suggests that individuals who engage more in impulse buying are more likely to generate higher levels of food waste. Several factors can explain this connection.

First, impulse shoppers tend to make unplanned purchases based on momentary desires rather than actual needs. This behaviour often results in acquiring excess food items that are not immediately required. The pandemic may have exacerbated this issue due to fears about the crisis and concerns over potential food shortages, leading to increased impulse buying. This study's findings align with previous research on buying behaviours and food waste during the COVID-19 pandemic. Berjan et al. (2022) found that changes in shopping patterns, including heightened stockpiling due to impulse buying out of panic, led to more food waste. Similarly, Aldaco et al. (2020) and Leal Filho et al. (2021) reported elevated levels of food waste during the pandemic, attributing this to panic-induced impulse buying. When food items are bought impulsively and in larger quantities than usual, they are more likely to expire or spoil before consumption, thus contributing to food waste.

Additionally, impulse buying can lead to a lack of proper meal planning, further increasing the likelihood of food waste. According to Roe et al. (2021), large or excessive purchases, whether driven by panic or impulsivity, can significantly contribute to the food waste problem, especially if better meal planning is not ensured. Without a clear plan for using the purchased items, consumers may forget or neglect certain food products, resulting in their expiration or spoilage. This underscores the importance of mindful consumption and the need for strategies to curb impulse buying behaviour, particularly during crises, to reduce food waste.

5.2.3 RQ3 Does impulse buying behaviour mediate the relationship between social media usage and food waste; neuroticism and food waste; conscientiousness and

food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste?

Seven hypotheses were formulated to answer the research question. Hypotheses H8 to H10 were developed to explore the mediating effect of impulse buying behaviour between social media usage and food waste; neuroticism and food waste; conscientiousness and food waste; agreeableness and food waste; extraversion and food waste; openness and food waste; and frugality and food waste.

- H8 Impulse buying behaviour mediates the relationship between social media usage and food waste.
- H9a Impulse buying behaviour mediates the relationship between Neuroticism and food waste.
- H9b Impulse buying behaviour mediates the relationship between Conscientiousness and food waste.
- H9c Impulse buying behaviour mediates the relationship between Agreeableness and food waste.
- H9d Impulse buying behaviour mediates the relationship between Extraversion and food waste.
- H9e Impulse buying behaviour mediates the relationship between Openness and food waste.
- H10 Impulse buying behaviour mediates the relationship between frugality and food waste.

While the direct relationship between social media usage and food waste was found to be non-significant (H4), the study revealed significant positive relationships between social media usage and impulse buying behaviour (H1) and between impulse buying behaviour and food waste (H7). Further analysis confirmed a significant indirect effect of social media usage on food waste through impulse buying behaviour (H8).

The finding of this mediation draws on research showing that online marketing stimuli and social commerce opportunities lead to increased impulse buying behaviour (Islam et al. 2021; Renming & Kian 2021). During the COVID-19 pandemic, increased social media usage likely amplified exposure to these factors, potentially intensifying their effect on impulse buying in the unique circumstances of the pandemic. Subsequently, these impulse buys, often made without proper planning or consideration of actual needs, contributed to increased food waste. Research by Aldaco et al. (2020) and Leal Filho et al. (2021) documented a significant rise in food waste levels during

the pandemic, linking this trend to impulse buying driven by widespread panic. Their studies note that such buying behaviours led to the acquisition of excess food items, which, without proper food management, resulted in increased waste.

As hypothesised in H8, this study elucidated impulse buying behaviour as a mediator in the relationship between social media usage and food waste during COVID-19. The overall findings suggest that while social media usage may not directly influence food waste, it may do so indirectly by promoting impulse buying behaviour, thereby contributing to increased food waste.

Moreover, impulse buying behaviour was found to mediate the relationship between neuroticism and food waste, as hypothesised in H9a. This mediating role of impulse buying behaviour helps explain the positive relationship between neuroticism and food waste (H5a). The finding is particularly intriguing as it contrasts with pre-pandemic studies, such as Opayemi et al. (2020), Karbalaeei et al. (2014) and Lange et al. (2014), which found neuroticism associated with better waste management practices. However, it is important to note that research in this area has been limited, and findings may vary across different contexts and types of waste. The extraordinary circumstances of the COVID-19 pandemic in this study, marked by heightened distress and emotional volatility, appear to have significantly altered the food waste behaviour of neurotic individuals.

The mediation effect can be understood as follows: Neurotic individuals, characterised by their tendency towards anxiety and emotional instability, experienced heightened distress during the pandemic (Asselmann et al. 2020). This emotional state led to increased impulse buying behaviour, often manifesting as stockpiling or emotional eating (Dammeyer 2020; Gao et al. 2022; Miao et al. 2020). The impulse buys, driven by anxiety and the desire to mitigate perceived risks, resulted in the acquisition of excess food items. Consequently, this oversupply and irregular consumption led to increased food waste.

This mediating relationship sheds light on the seemingly contradictory findings regarding neuroticism and waste management. While neurotic individuals may typically

exhibit better waste management practices due to their heightened awareness of potential negative outcomes, the pandemic created a unique context where their anxiety-driven impulse buying overshadowed these tendencies. The fear of food shortages and the fear of contracting the virus (Naeem 2020) likely compelled neurotic individuals to excessive impulse buying, leading to increased food spoilage and waste (Brizi & Biraglia 2021).

The mediating role of impulse buying behaviour in the relationship between neuroticism and food waste during the COVID-19 pandemic underscores the complex interplay between this personality trait, consumer behaviour, and environmental outcomes. This finding contributes to a more comprehensive understanding of how neuroticism influences waste generation in times of crisis, highlighting the importance of considering personality factors in consumer behaviour research during emergency situations.

Contrary to the hypotheses (H9b to H9e), this study found no significant mediating role of impulse buying behaviour with conscientiousness, agreeableness, extraversion, and openness concerning food waste. The non-significant findings shed light on the nuanced relationship between personality traits, consumer behaviour, and food waste amidst the distinctive conditions of the COVID-19 pandemic.

The study demonstrated a direct negative association between conscientiousness and food waste (H5b), suggesting that conscientious individuals were more likely to engage in behaviours that reduced food waste during the pandemic. However, this relationship was not mediated by impulse buying behaviour (H9b). This finding implies that the influence of conscientiousness on food waste may operate through alternative mechanisms or direct pathways rather than via impulse buying behaviour.

The absence of a significant mediating effect could be attributed to the extraordinary circumstances of the COVID-19 pandemic. Conscientious individuals, known for their responsible and disciplined nature, may have adapted their behaviours in response to the crisis in ways that transcended typical consumer patterns. This aligns

with research by Aschwanden et al. (2021) and Abdelrahman (2022), who found conscientiousness predicted stronger COVID-19-evoked behavioural adaptations.

The direct negative relationship between conscientiousness and food waste, coupled with the non-significant mediation of impulse buying behaviour, suggests that conscientious individuals may have focused more on efficient resource management and waste reduction strategies rather than altering their purchasing behaviours. This interpretation is supported by Hong et al. (2023), who found conscientiousness linked to sustainable behaviour during the pandemic. The findings of this study suggest that conscientious individuals' food waste behaviours during the pandemic were not primarily influenced by changes in their impulse buying behaviour.

Contrary to the initial expectations, the results did not support a significant mediating role of impulse buying behaviour in the relationship between agreeableness and food waste (H9c). This non-significant mediation suggests a more intricate relationship between these variables than initially hypothesised.

This study found a direct negative relationship between agreeableness and food waste (H5c), indicating that individuals higher in agreeableness tend to generate less food waste. However, this relationship does not appear to be substantially explained by impulse buying behaviour. This finding challenges the assumption that agreeable individuals' tendency to waste less food is primarily due to more controlled impulse buying behaviour.

Several factors may contribute to this non-significant mediation. First, food waste is a multifaceted issue influenced by various factors beyond impulse buying behaviour. Principato et al. (2021) emphasised that food-related routines, such as meal planning, general shopping practices, and reusing leftovers, collectively impact food waste. The relationship between agreeableness and food waste might be more strongly mediated by these routines rather than impulse buying behaviour. The findings suggest that impulse buying does not play a significant role in this relationship, indicating that other factors are likely more important in explaining how agreeableness relates to reduced food waste.

Second, the unique circumstances of the COVID-19 pandemic may have altered typical behavioural patterns. Berjan et al. (2022) noted significant changes in shopping behaviours during this period, including less frequent but more extensive shopping trips. These shifts might have disrupted the relationship between agreeableness, impulse buying behaviour, and food waste.

Third, while agreeableness may lead to more considerate food management (as evidenced by the direct negative relationship with food waste), it might not necessarily translate to less impulse buying behaviour. Rammstedt et al. (2022) found that agreeable individuals were more adaptable during the crisis, but this adaptability might manifest differently across various behaviours.

The findings of this study suggest that the link between agreeableness and reduced food waste is likely explained by factors other than impulse buying behaviour, pointing to the need for a broader examination of food management practices and other mediating psychological processes.

The present study found no significant mediating effect of impulse buying behaviour on the relationship between extraversion and food waste (H9d) during the COVID-19 pandemic. This unexpected result warrants careful consideration, as it diverges from pre-existing theoretical frameworks and empirical findings.

Prior research has suggested links between extraversion and impulse buying (e.g., Lu and Su 2018), as well as between impulse buying and food waste (e.g., Porpino 2016). However, the present study findings indicate that while the relationship between impulse buying behaviour and food waste (H7) persisted during the pandemic, extraversion did not significantly influence this pathway.

Various factors could explain this lack of significant mediation. First, the unprecedented nature of the COVID-19 crisis likely disrupted typical behavioural patterns. Extraverts, who typically thrive on social interactions, appear to have adopted different coping mechanisms. Balling et al. (2021) observed that extraverts were more likely to engage with pandemic-related information and discussions and less likely to

maintain their usual daily activities. This shift in behaviour might explain why the expected relationship between extraversion, impulse buying, and food waste did not materialise.

Second, Liu et al. (2020) reported that individuals high in extraversion experienced higher stress levels during the pandemic compared to pre-pandemic times. This heightened stress could have altered their behaviour in ways that deviate from typical patterns, potentially disrupting the hypothesised mediation pathway.

Third, Clark et al. (2020) found that higher extraversion predicted a greater tendency to give health recommendations to others during the pandemic. This suggests that extraverts might have channelled their characteristic energy and sociability into prosocial activities rather than engaging in impulse buying or behaviours that could influence food waste. The findings of this study suggest the critical role of crisis that may have influenced extraversion's effect on consumer behaviour in ways that differ from expectations.

The findings of this study revealed an unforeseen outcome regarding the mediating role of impulse buying behaviour in the relationship between openness and food waste (H9e). Contrary to the initial expectations, impulse buying behaviour did not significantly mediate this relationship, despite the observed positive association between openness and impulse buying behaviour (H2e) and between impulse buying behaviour and food waste (H7).

While open individuals may indeed engage in more impulse buying behaviours and impulse buying is associated with increased food waste, these relationships do not appear to form a straightforward causal chain leading from openness to food waste. Also, this study did not show any significant direct relationship between openness and food waste (H5e). These can be explained by considering the multifaceted nature of openness. For instance, the creativity and adaptability associated with openness might lead to increased impulse buying but simultaneously foster more innovative food management strategies. These contrasting tendencies could potentially offset each other, resulting in a non-significant overall effect on food waste. This balancing effect

could also explain why impulse buying behaviour does not significantly mediate the relationship between openness and food waste, as the increased impulse purchases might be counteracted by more effective management of the bought items.

Besides, the extraordinary circumstances of the COVID-19 pandemic may have altered typical behaviour patterns in complex ways. Ikizer et al. (2022) noted that open individuals experienced higher stress levels during the pandemic. This heightened stress might have led to increased impulse buying of food items but also to a greater awareness of resource scarcity and the importance of avoiding waste. These conflicting influences could have resulted in a net neutral effect on food waste for open individuals.

Moreover, the relationship between food-related impulse buying and food waste for open individuals might be more nuanced than initially thought. While open individuals may engage in more impulse food purchases, their willingness to experiment with new ingredients or recipes could mean they are more likely to use these impulsively bought items creatively rather than letting them go to waste. This adaptability in food usage could potentially counterbalance the increased tendency towards impulse buying, explaining the lack of a significant indirect effect on food waste.

The study's examination of impulse buying behaviour as a mediator between the Big Five personality traits and food waste yielded mixed results. Notably, impulse buying behaviour significantly mediated the relationship between neuroticism and food waste, with neurotic individuals engaging in more impulse buying during the pandemic, leading to increased food waste. However, contrary to expectations, impulse buying did not mediate the relationships between the other four Big Five personality traits (conscientiousness, agreeableness, extraversion, and openness) and food waste. Conscientiousness and agreeableness demonstrated direct negative relationships with food waste, while extraversion and openness showed no significant direct or indirect effects. These findings highlight the complex interplay between personality traits, consumer behaviour, and food waste, particularly in the context of the COVID-19 pandemic, suggesting that the influence of Big Five personality traits on food waste is not uniformly mediated by impulse buying behaviour, especially during an unprecedented global health crisis.

The findings of this study support Hypothesis H10, which posited a mediating effect of impulse buying behaviour on the relationship between frugality and food waste. This mediation reveals an intricate connection between these variables, providing valuable insights into consumer behaviour during the COVID-19 pandemic in Malaysia.

The study established a direct negative relationship between frugality and food waste (H6), indicating that frugal individuals tend to generate less food waste. Simultaneously, frugality was found to have an inverse relationship with impulse buying behaviour (H3), suggesting that frugal consumers are less likely to engage in impulse purchases. Furthermore, impulse buying behaviour showed a positive relationship with food waste (H7), implying that those who make impulse purchases are more prone to wasting food. These findings collectively support the mediating role of impulse buying behaviour in the frugality-food waste relationship. Specifically, frugality reduces impulse buying behaviour, which in turn leads to decreased food waste. Thus, while impulse buying is positively related to food waste, frugality's negative effect on impulse buying contributes to an overall reduction in food waste.

The COVID-19 pandemic created a unique environment for examining these relationships. Economic uncertainties led many Malaysian consumers to reduce their consumption, as observed by Purnamasari and Ahmad (2021). This increased frugality likely contributed to a reduction in impulse buying, aligning with the findings of Rayburn et al. (2021), who observed that impulse purchases were avoided as part of frugal behaviour during the pandemic.

Moreover, Malaysia's cultural and religious context, emphasising prudent consumption across various faiths, may have reinforced frugal practices and discouraged impulse buying. As Cucato et al. (2022) highlighted, the spiritual aspects of consumer behaviour, often associated with frugality and manifested in religious teachings and practices, were strengthened during the pandemic. This aligns with the findings of this study on the negative relationship between frugality and food waste, suggesting that the heightened spiritual and frugal tendencies observed during the pandemic may have contributed to more mindful consumption practices and reduced food waste.

The findings of this study underscore the importance of promoting frugality during crises like COVID-19. This could have a cascading effect on reducing impulse buying and food waste, contributing to more sustainable consumption patterns. The relationship uncovered between frugality, impulse buying behaviour, and food waste demonstrates the interlinked nature of consumption decisions and their consequent waste outcomes, particularly in challenging times such as the COVID-19 pandemic. The study suggests that frugality not only directly reduces food waste but also indirectly influences it by lowering impulse buying behaviour. This dual pathway highlights the nuanced aspects of consumer behaviour and its impact on food waste. The mediating effect of impulse buying behaviour on the relationship between frugality and food waste emphasises the interconnected dynamics of consumer behaviours and illuminates a key pathway through which food waste can be reduced.

5.2.4 RQ4 Does consumer Generation X, Y, and Z moderate the relationship between social media usage and impulse buying behaviour?

In response to the research question, the following hypothesis was proposed.

H11: Generation X, Y, and Z moderates the relationship between social media usage and impulse buying behaviour, such that the relationship will be stronger among Generation Z than among Generation Y and Generation X social media users.

As hypothesised in H11, this study explored the role of Generation X, Y, and Z in elucidating the relationship between social media usage and impulse buying behaviour. The findings supported the hypothesis, demonstrating that Generation Z strengthened the relationship between social media usage and impulse buying behaviour more than Generation Y and Generation X. Interestingly, Generation X showed a stronger moderating effect than Generation Y. These outcomes offer valuable insights into the distinctive characteristics of each generation's social media engagement and purchasing habits within the context of this study.

The COVID-19 pandemic context of this study is particularly relevant to these findings. Taha et al. (2021) found significant differences in social media usage among

generations during the pandemic. Their research highlighted that Generation Z utilises social media more extensively than previous generations. Notably, their findings indicated that Generation Z's engagement with social media is distinctly higher compared to Generation Y and Generation X. This aligns with this study's findings, which show a stronger relationship between social media usage and impulse buying behaviour for Generation Z. The heightened social media engagement of Generation Z observed by Taha et al. (2021) could potentially explain the strengthened relationship found in this study.

Moreover, the strongest moderating effect of Generation Z aligns with previous research. Šimić and Pap (2021) observed that pandemic-induced movement restrictions prompted Generation Z to increasingly move towards online shopping. Similarly, Cavazos-Arroyo and Máñez-Guaderrama (2022) found that Generation Z's immersion in digital technologies frequently translates immediate impulses into actual purchases more readily than Generation Y.

The finding that Generation X has a stronger moderating effect than Generation Y can be explained by several factors. The COVID-19 pandemic has altered behaviours in response to coping with the crisis, including a spike in social media usage and a trigger for impulse buying behaviour. Mylona et al. (2024) found that Generation X was less happy than Generation Y while browsing social media during the pandemic. Additionally, Eger et al. (2021) demonstrated that pandemic-induced fears, such as worrying about the health of loved ones, were more pronounced for Generation X than for Generation Y. These factors might have resulted in more impulse buying behaviour among Generation X compared to Generation Y, as Naeem (2020) and Gazali (2020) argue that fears and anxiety, which can lower emotional well-being, drove impulse buying during the health crisis.

Overall, this study reveals that the interaction between generational cohorts, social media usage, and impulse buying behaviour varies significantly. Generation Z exerts a stronger influence on the relationship between social media usage and impulse buying behaviour compared to Generation Y and X. These findings, contextualised within the COVID-19 pandemic, provide valuable insights into how different

generations engage with social media and how this engagement translates into purchasing behaviours, particularly impulse buying.

5.3 IMPLICATIONS

5.3.1 Theoretical Implications

This research makes important theoretical contributions by addressing gaps in the literature on the factors that influence food waste from a consumer behaviour perspective.

First, this study develops and tests an integrated model that examines consumer food waste from a quantifiable consumer buying behaviour perspective using validated measurement scales during the COVID-19 pandemic. It highlights how pandemic-induced factors, such as increased social media usage, contributed to impulse buying and, consequently, food waste. This approach enhances understanding of food waste phenomena during these unprecedented circumstances, shedding light on underlying factors limited in previous literature (Kutlu 2022; Porpino 2016; Simeone & Scarpato 2020). The study extends existing food waste-related research by investigating the mediating role of impulse buying behaviour and the moderating effect of Generations X, Y, and Z. Given the significant amounts of food waste reported, understanding these factors is crucial for advancing theoretical frameworks in consumer behaviour and food waste studies. This integrated approach contributes to a more comprehensive conceptual model of food waste. It enhances theoretical understanding of the complex interplay between psychological, social, and generational factors in consumer food-related decisions during a global crisis.

Second, this study integrates the S-O-R, Five-Factor Model (FFM), and generational cohort theory into a single research framework. This study aims to investigate the factors that affect food waste, and the results confirm that integrating these theories is effective in understanding food waste behaviour, particularly in a developing country like Malaysia during the COVID-19 pandemic. Notably, this research contributes to efforts aligned with UN SDG 12.3, which aims to halve global

food waste by 2030 by providing insights into consumer behaviour in a country committed to this goal. The S-O-R model has been instrumental in comprehending food waste by illustrating the impact of social media usage, Big Five personality traits, frugality, and impulse buying behaviour on food waste. Specifically, this study employs the reconceptualised S-O-R model proposed by Jacoby (2002), which provides a more nuanced framework for understanding consumer behaviour.

Furthermore, the Big Five factors—Neuroticism, Conscientiousness, Agreeableness, Extraversion, and Openness—drawn from the FFM have provided valuable insights into how personality traits influence food consumption and waste behaviour. The generational cohort theory has enabled the incorporation of generational differences as a moderating variable in this study by dividing consumers into three segments: Generation X, Y, and Z, based on their ages. This approach has facilitated clear distinctions between generational cohorts in terms of their social media usage and its impact on impulse buying behaviour.

Third, this study revealed an R^2 value of 38.2% for the key dependent variable, which is food waste. Given that food waste behaviour is influenced by a myriad of factors, both observable and unobservable, capturing 38.2% of the variance is substantial considering the complexity and multifaceted nature of the behaviour. This suggests that the model contributes significantly to explaining factors associated with consumer food waste, particularly during the unique circumstances of the COVID-19 pandemic. While the S-O-R model has been frequently employed to explain consumer behaviour, it has rarely been utilised to predict food waste behaviour (Talwar et al. 2021; Talwar et al. 2022). The literature review indicates that past studies have largely overlooked examining food waste from a psychological environmental perspective using the S-O-R model. Instead, most research has focused on food waste from a psychological cognitive perspective, primarily using the Theory of Planned Behaviour. The Theory of Planned Behaviour examines an individual's attitude and behavioural intention, which do not necessarily translate into action, thus highlighting the attitude-behaviour gap.

Additionally, the specific limitations of the Theory of Planned Behaviour include its primary focus on cognitive aspects, which may not adequately address the influence of environmental and internal processes on food waste behaviour. While this theory considers some external influences through subjective norms, it may not fully capture the complex interplay between environmental stimuli, internal characteristics, and behaviour in the context of food waste. Therefore, this study contributes to the existing body of knowledge on consumer food waste behaviour through a psychological environmental lens. It expands upon previous research by acknowledging the impact of an environmental factor (i.e., social media usage) and psychological factors (i.e., the Big Five personality traits and frugality). As reconceptualised by Jacoby (2002), these factors can act as both Stimulus (S) and Organism (O) influencing the resultant behavioural Response (R), such as impulse buying and food waste behaviours. By incorporating these factors, the S-O-R model provides a more holistic understanding of food waste behaviour during a global crisis. This approach offers new insights that address some limitations of the Theory of Planned Behaviour in explaining consumer behaviour under extraordinary circumstances.

Fourth, this study significantly contributes to the literature on food consumption and waste by examining environmental and psychological factors. The model includes social media usage as an environmental factor, alongside psychological factors such as the Big Five personality traits and frugality. This combination offers a fresh perspective on factors influencing food impulse buying and food waste behaviours, particularly during the COVID-19 pandemic. By examining social media usage and impulse buying behaviour as general constructs using validated scales, this study provides a broader methodological framework for future research. This approach is not confined to specific social media platforms, shopping environments, or food categories. Notably, this study measures frugality at a behavioural level, moving beyond attitudinal assessments used in some previous research. This approach provides a more concrete understanding of how frugal behaviour, rather than just attitudes, interacts with impulse buying and food waste behaviour. Moreover, this study's measurement of food waste is wide-ranging, encompassing waste generated both at home and outside the home, thus providing a more holistic view of consumer food waste behaviour. Consequently, this study offers

a more comprehensive perspective that can inform future theoretical developments and enable meaningful comparisons across diverse consumer groups and cultural contexts.

Moreover, this research advances theoretical understanding of the complex relationship between social media usage and food waste. While a direct significant relationship between these variables was not established, the study reveals important indirect effects. The study shows that impulse buying behaviour mediates the relationship between social media usage and food waste. This provides a novel theoretical insight. It suggests that social media's influence on food waste operates through changes in purchasing behaviour. This finding contributes to a more nuanced theoretical framework for understanding how digital environments impact consumer behaviour and subsequent waste generation. The positive relationship between social media usage and impulse buying behaviour, particularly during the COVID-19 pandemic, provides vital theoretical insights into how digital platforms shape consumer buying decisions during extraordinary circumstances. This finding contributes to the evolving body of knowledge on consumer behaviour in crises and the role of digital media in influencing these behaviours.

The inclusion of a traits-based approach in this study offers valuable insights into individual personality and its potential impact on food impulse buying and food waste, areas that have received limited attention in previous research. This perspective is particularly relevant in the context of the COVID-19 pandemic, which has significantly altered consumption patterns and behaviours. The relationship between the Big Five personality traits and food-related behaviours is complex, with impacts varying across specific consumption contexts and sustainability outcomes. For instance, this study revealed that openness positively influenced food impulse buying behaviour, differing from Lu and Su (2018), who did not establish a significant relationship between openness and impulse buying of restaurant food. Similarly, this study found that agreeableness was significantly related to food waste, contrasting with Swami et al. (2011), who found no meaningful relationship between agreeableness and waste management. These nuanced findings enhance understanding of how the Big Five personality traits influence food-related behaviours, particularly during the unprecedented circumstances of a global pandemic. This study provides empirical

evidence on the association between these five traits and both food impulse buying and food waste behaviour—areas with limited research. This research, conducted during a global crisis, offers unique insights into how personality traits influence food-related behaviours in extraordinary circumstances. It adds a new dimension to understanding the relationship between personality and food consumption behaviour.

Furthermore, the integration of frugality into the study model positions it as an important factor in promoting sustainable consumption, thereby enriching theoretical frameworks that aim to understand and encourage sustainable practices. This study highlights the significance of frugality during economic hardships, such as those experienced during the COVID-19 pandemic. These findings shed light on how frugality influences impulse buying and food waste behaviours, especially during times of economic uncertainty. This study provides insights into the direct impact of frugality on food waste at a behavioural level, offering a nuanced perspective on their interconnection. The findings contribute to the body of knowledge on how external economic conditions shape consumer psychology and behaviour. They suggest that the specific impact of economic downturns on frugality warrants more explicit attention. Incorporating these findings can enhance theoretical models related to impulse buying and food waste, ensuring they more accurately reflect the dynamics of these behaviours under varying economic conditions.

In addition, this study advances research on factors influencing consumer food waste by introducing a novel approach to examining impulse buying behaviour. While previous studies have considered impulse buying concerning food waste, this research distinguishes itself by employing a validated measurement scale to quantify impulse buying behaviour, specifically in the context of food waste. Some past studies in food waste research have examined impulse buying without specific validated scales, as part of broader in-store behaviour, or as a general tendency rather than focusing on impulse buying behaviour itself (Bravi et al. 2020; Brook Lyndhurst 2007; Scacchi et al. 2021; Stancu and Lähteenmäki 2022). Consequently, the direct link between impulse buying and food waste behaviour, measured with validated scales, has been under-explored. While other studies have employed scales to measure impulse buying or food waste independently, this study uniquely integrates these two constructs. It utilises a scale to

measure impulse buying behaviour with a direct focus on its impact on food waste. Therefore, this study represents a methodological advancement in investigating food waste by employing a validated scale to evaluate impulse buying behaviour, filling a significant gap in the current literature.

By integrating environmental and psychological predictors: social media usage, Big Five personality traits, and frugality along with impulse buying behaviour within the context of food waste during the COVID-19 pandemic, this study presents a comprehensive theoretical framework. This study advances theoretical understanding of the complex relationship between social media usage and food waste, revealing important indirect effects mediated by impulse buying behaviour. This study also offers valuable insights into how personality traits influence food-related behaviours and positions frugality as an important factor in promoting sustainable consumption. The study's novel approach to examining impulse buying behaviour, using validated scales specifically in the context of food waste, demonstrates a methodological advancement. By integrating these diverse variables, this research offers a comprehensive theoretical framework that enhances understanding of the complex interplay between digital engagement, consumer psychology, and food consumption and waste behaviour in contemporary society.

Fifth, expanding on the mediating role of impulse buying, this study provides a more in-depth examination of how impulse buying behaviour functions within the research model. The incorporation of impulse buying behaviour not only offers useful insights from a quantifiable consumer buying behaviour perspective but also enhances understanding of the specific mechanisms through which it influences food waste. The reconceptualised S-O-R model elucidates how stimuli such as social media usage, the Big Five personality traits, and frugality influence impulse buying behaviour, which, in turn, mediates the occurrence of food waste as a response. This study explains impulse buying behaviour not only as a mediating variable but also as the initial response behaviour, leading to the final response, food waste, in the S-O-R model. Furthermore, this mediation process creates a continuous loop, where the consequences of impulse buying generate new internal stimuli, perpetuating the cycle of consumer behaviour and potentially influencing future food waste. This approach, while explored to some extent

in existing literature (Talwar et al. 2021), is extended in this study by applying the reconceptualised S-O-R model to consumer behaviour research in the broader context of consumer food waste. By delineating this two-step response process, the study offers a more nuanced understanding of how consumer behaviour unfolds, contributing to the advancement of consumer behaviour models and providing a richer conceptual framework for future research on food waste behaviour. Thus, this study enhances understanding of the dynamics of consumer behaviour and sheds light on the underlying mechanisms linking impulse buying to the pressing issue of food waste.

Finally, building on generational cohort theory, this study provides valuable insights into how Generations X, Y, and Z interact with social media and engage in impulse buying, ultimately leading to food waste. By integrating the moderating effects of generational cohorts, this research extends the application of the S-O-R model. This approach enhances the S-O-R framework by incorporating a moderating variable, a technique rarely implemented in food waste-related studies using this model (Talwar et al. 2022; Zhang et al. 2022). The inclusion of generational factors introduces variability into the S-O-R model, acknowledging their influence on how external stimuli are perceived, processed, and translated into behavioural responses. This study offers a nuanced understanding of how social media shapes impulse buying across three generations within the extraordinary context of the COVID-19 pandemic. These findings are significant for two main reasons. Firstly, they allow for direct comparisons among these cohorts—a perspective limited in the existing literature. Secondly, they provide insights into a period that significantly altered behavioural patterns across all demographics, with each generation potentially responding differently to induced stressors and lifestyle changes.

Notably, Generation Z, characterised by their high level of tech-savviness, demonstrates a more pronounced influence of social media usage on impulse buying behaviour compared to preceding generations. This observation contributes to generational cohort theory by providing empirical evidence of varied interactions between social media usage and impulse buying across different age groups. By examining these dynamics in food consumption among Malaysians during a global crisis, this research extends the application of generational cohort theory to the specific

context of food impulse buying behaviour under extraordinary circumstances. This approach offers a more dynamic and generationally sensitive model of consumer behaviour, enhancing understanding across different generations in unique settings and providing valuable insights for both theory and practice.

In conclusion, this study illuminates multiple aspects of consumer food waste behaviour through a comprehensive framework. This research offers an integrated approach to examining food waste by combining the reconceptualised S-O-R model, FFM, and generational cohort theory. It focuses on the unique context of the COVID-19 pandemic in Malaysia, a period characterised by unprecedented changes in consumer behaviour and digital engagement. This study elucidates the complex interplay among social media usage, personality traits, frugality, impulse buying behaviour, and food waste. It builds upon existing models by applying a two-step response process in the S-O-R framework to the context of impulse buying and food waste, utilising validated scales to measure these constructs. This process establishes impulse buying behaviour as a crucial mediator in the framework. Moreover, it provides vital insights into the factors linking consumer impulse buying behaviour and food waste. As a result, the study offers a more nuanced understanding of the causal chain leading to food waste. Furthermore, this study's examination of Generation X, Y, and Z's moderating effect offers valuable perspectives on how different age cohorts interact with social media and engage in food impulse buying behaviour.

Conducting this research during the COVID-19 pandemic provides a unique understanding of consumer behaviour under extraordinary circumstances. These theoretical insights contribute to addressing gaps in the current literature and provide a foundation for future research in consumer behaviour, food consumption, and waste management studies. Ultimately, this comprehensive approach deepens insights into the intricate dynamics underlying food consumption and waste behaviour, paving the way for more nuanced theoretical models in consumer psychology, digital media influence, and economic behaviour.

5.3.2 Practical Implications

The findings of this study have important implications for a range of stakeholders, including marketers, civic groups, and policymakers.

a. Marketers

This study has uncovered a significant relationship between impulse buying behaviour and food waste, highlighting marketers' crucial role in shaping consumer purchasing decisions. The marketing industry can adopt more socially responsible practices without sacrificing profitability. Instead of incentivising customers to buy more than needed through impulse buys, marketers could offer special deals on smaller packages or bundle different items to reduce waste from overconsumption. Companies like Duncan Hines exemplify this approach with their Perfect Size Cakes, providing smaller portions and eliminating the need for an entire cake (Pakeltis 2022). By offering smaller options, marketers can lessen the temptation for excess purchases. This enables consumers to buy only what they need, reduce food spoilage, and still enjoy product variety without overcommitting to large quantities. Additionally, pricing strategies for sales promotions, such as BOGOF offers, could be carefully calibrated to discourage excessive impulse buying while still driving sales.

Adopting a purpose-driven marketing approach can help marketers align their business goals with reducing food waste and promoting sustainable consumption. This strategy communicates that the brand is focused on making a positive societal impact alongside profits (Hobbs 2017). It can enhance brand reputation, build customer loyalty, and create emotional connections with consumers. As people become more socially conscious, they are likelier to choose brands that align with their values. By focusing on meeting consumers' actual needs, marketers can improve satisfaction and encourage repeated purchases and positive word-of-mouth. These strategies are particularly relevant during economic uncertainty or crises, when consumers may be more mindful of their spending and waste.

The significant relationship between social media and food impulse buying found in this study indicates the strong influence social media has on consumer behaviour. This offers an opportunity for marketers to collaborate with social media influencers and food bloggers to create content that promotes food preservation and sustainable food practices. By leveraging the reach and influence of these individuals, marketers can reach a wider audience and educate them on the benefits of reducing food waste.

The study reveals that Generations X, Y, and Z moderate the relationship between social media usage and impulse buying behaviour. For Generation Z, who showed the strongest moderating effect, marketers should leverage this generation's high social media engagement with interactive, visually appealing content. This could include limited-time offers on sustainable products or augmented reality experiences, capitalising on their impulse buying tendency while promoting food waste-reducing product options. Moreover, the heightened impact of social media on Generation Z's impulse buying behaviour underscores the importance of ethical marketing practices, particularly during times of crisis such as the pandemic, when consumers may be more vulnerable to impulsive decisions.

To capture Generation Y, social media usage must be balanced with their desire for convenience and value. Social media campaigns highlighting time-saving, waste-reducing products or services, such as meal-planning apps, could appeal to their practical nature. For Generation X, who demonstrated a stronger moderating effect than Generation Y, emphasis can be placed on quality and health benefits in social media content. Educational posts about sustainable food practices or influencer partnerships focusing on health and value could be effective.

By tailoring social media strategies to each generation's specific relationship with social media and impulse buying, marketers can drive sales while promoting sustainable consumption. This approach can increase engagement, target impulse buys more effectively, and potentially reduce food waste through informed buying decisions.

The study's findings on personality traits offer valuable insights for marketing strategies. While conscientiousness, agreeableness, and extraversion did not significantly influence food impulse buying, neuroticism and openness demonstrated significant relationships with impulse buying behaviour. Given these findings, marketers should reconsider strategies targeting conscientiousness, agreeableness, and extraversion for impulse buys. Instead, they may, for example, create shopping environments that encourage impulse buys across personality types. Additionally, they could emphasise product features that appeal to a wider range of consumers, such as convenience, novelty, or perceived value.

Furthermore, marketers may focus on traits like neuroticism and openness that drive impulse buying behaviour. For individuals high in neuroticism, campaigns could address anxiety through comfort foods or stress-relieving products. For those high in openness, highlighting innovative or unique food items could appeal to their curiosity. While these strategies can drive impulse buying, marketers must balance this with promoting sustainable consumption. This could involve offering impulse buy options for waste-reducing products, providing information about sustainable choices at purchase points, or creating campaigns that make sustainable choices feel spontaneous and exciting. By focusing on personality traits that significantly influence impulse buying and balancing these tactics with efforts to promote sustainable consumption, marketers can develop more effective and responsible strategies. This approach can encourage both impulse buys and informed, sustainable consumption decisions.

Additionally, marketers can promote food preservation techniques, educate customers on proper food storage practices, and provide recipes for using leftover ingredients. Collaborating with food banks or charities to donate unsold products can also reduce waste while supporting local communities.

In conclusion, marketers can play a pivotal role in reducing food waste by adopting a range of strategies: from purpose-driven marketing to tailored generational approaches and promoting sustainable practices. These approaches not only contribute to sustainability but also have the potential to improve customer satisfaction, build brand loyalty, and ultimately enhance profitability. As the food industry evolves, marketers

who prioritise these responsible practices will be well-positioned to meet consumers' changing demands and contribute to a more sustainable future.

b. Civic Groups

Civic groups, including non-profit organisations and community-based organisations, can play a crucial role in educating consumers on factors that contribute to food waste. Providing information and resources on sustainable food consumption practices can help consumers make informed decisions and take action to reduce food waste. The awareness campaigns can be conducted to address several aspects; for example, this study found that social media usage can lead to food impulse buying, which in turn generates food waste. Therefore, educating social media users on how the content they are exposed to can cause impulse buying and eventually lead to food waste can help them be more mindful of their actions. Additionally, advising consumers to follow social media accounts that promote sustainable food practices may also help reduce impulse buying behaviour related to food. Further awareness can be made on meal planning, food storage, and other strategies that can help to reduce waste at home. This education is particularly important during times of crisis, such as health emergencies, when misinformation on social media can lead to impulse buying out of panic, resulting in excessive purchases.

To maximise the effectiveness of awareness programs, it may be beneficial to segment consumers based on generational cohorts. As this study's findings suggest, Generation X, Y, and Z exhibit varying levels of social media usage and impulse buying behaviour. By tailoring education and resources to each generation's characteristics, the awareness programs can be more focused and better suited to meet their specific needs, ultimately leading to more impactful outcomes.

It is crucial for consumers to understand how their personality traits can impact their buying habits and contribute to food waste. To address this issue, consumers should be informed of their traits and provided with practical measures they can take to reduce food waste (Campbell & Feldpausch 2022). For example, neurotic individuals can reduce food waste by being mindful of their emotions and avoiding impulse

purchases, especially of foods likely to be wasted if not consumed quickly. They can also try to manage their stress and anxiety through activities such as exercise, mindfulness, or psychological therapy. These practices can help mitigate food waste by addressing neurotic tendencies to overestimate food needs.

In addition, consumers who possess conscientious and agreeable personality traits could prevent food waste through careful planning and mindful consumption. Conscientious individuals might be more likely to keep track of their food inventory and use items before they expire. They may also be more diligent in properly storing food to extend its shelf life. Agreeable individuals may be particularly motivated to reduce waste out of consideration for environmental and social impacts, potentially leading them to find creative ways to use leftover ingredients or share excess food with others. By acknowledging and comprehending their personality traits, consumers can establish patterns and routines that enable them to avoid unnecessary food purchases and minimise waste. These practices can promote more sustainable and thoughtful food choices, ultimately reducing their environmental footprint.

This study revealed that frugality is negatively associated with both impulse buying behaviour and food waste. Thus, promoting frugal values, including the financial benefits of reducing food waste, can be an effective approach to encourage more mindful consumption habits and reduce food waste. For example, by minimising food waste, individuals can save money by not having to purchase as much food. This approach can be particularly beneficial during economic hardships, such as those experienced during crises, when consumers are more conscious of their spending. Furthermore, religious beliefs that promote frugal practices can also be highlighted to encourage individuals to adopt more sustainable food consumption habits. Providing practical tips and guidance, such as advice on food shopping, meal planning, and proper food storage techniques, can also be effective in helping frugal consumers reduce food waste. Collaborating with frugal living bloggers and influencers may also be useful in reaching this audience. These practices and other sustainable food consumption strategies can help consumers make more mindful decisions about their food buying and consumption habits, ultimately reducing the amount of food waste generated.

Overall, civic groups play a vital role in empowering consumers to make positive changes and contribute to a more sustainable food consumption pattern. By providing education and awareness campaigns, these groups can help consumers adopt more mindful food buying and consumption habits, reducing waste and the impact on the environment. These efforts are valuable not only during times of crisis but also in fostering long-term sustainable practices.

c. Policymakers

Policymakers play a crucial role in reducing food waste, particularly in meeting Malaysia's commitment to halve food waste by 2030 as per the UN's SDG 12.3. Efforts are underway to review Act 672, the Solid Waste and Public Cleansing Management Act 2007, which currently addresses food waste (Yunus & Harun 2022). However, this act is limited to seven states and does not encompass all food manufacturing sectors. Given that impulse buying behaviour significantly influences food waste, as demonstrated by this study, policymakers' role is critical. To effectively address the issue, policymakers should engage with food businesses and encourage action to reduce food waste.

Effective measures involve using insights from this study to inform legislation or agreements with food businesses. Given the significant relationship found between impulse buying behaviour and food waste, policymakers can incentivise retailers to adopt strategies that discourage excessive impulse buying, particularly for perishable items. Policymakers could encourage retailers to explore and implement evidence-based approaches to reduce impulse buys. Moreover, they can also require the integration of personalised recommendation systems into the platforms of supermarkets and food retailers. Utilising data analytics and machine learning algorithms, products can be suggested to consumers based on their previous purchases and dietary preferences. This would help to reduce impulse buying and subsequent food waste while promoting healthier food choices.

By collaborating with food businesses on initiatives to curb impulse buying, policymakers can promote sustainable practices and create a more comprehensive

framework to address food waste challenges in Malaysia. Such measures would not only help reduce food waste associated with impulse buying behaviour but also contribute to a broader cultural shift towards more mindful consumption habits.

To promote consumer food waste reduction, policymakers could implement targeted initiatives based on this study's findings. They could provide funding for comprehensive educational and awareness campaigns aimed at promoting long-term food waste reduction among individuals. These initiatives could take into account the impact of social media usage, generational differences, personality traits, and frugality on impulse buying and food waste behaviours, as identified in this research. For instance, educational programmes might highlight the link between impulse buying and food waste, encouraging more responsible purchasing behaviour.

Policymakers could also explore the potential for community-based incentive programs that reward neighbourhoods or districts for collective reductions in food waste, possibly through community improvement grants or similar benefits. While The Food Bank Malaysia programme (Perimbanayagam 2019) is a promising initiative, policymakers could expand it to include a consumer education component about responsible buying and consumption. These efforts could be implemented across all regions of the country, focusing on changing consumer behaviour to reduce food waste.

The escalating amount of food waste in Malaysia has raised concerns about the effectiveness of policymakers' efforts in addressing this issue (Yunus & Harun 2022). The country is experiencing unparalleled economic growth and shifts in consumer behaviour and consumption patterns, influenced in part by the recent COVID-19 pandemic. These changes, coupled with the need for policies to adapt to sudden market disruptions, diminish the generalisability of existing studies conducted primarily in Western contexts. Based on these context-specific findings, this study offers valuable insights for policymakers by illuminating the factors that influence consumer impulse buying behaviour and contribute to food waste in Malaysia. These insights can inform the planning and development of flexible guidelines aimed at addressing consumer food waste, particularly during times of rapid change, with potential applications for more stable periods.

5.4 LIMITATIONS

While this study has made significant contributions to the existing body of knowledge on consumer food waste, it is not without limitations. First, the use of the convenience sampling method to collect data for the study raises concerns about self-selection bias and generalisation. Due to the MCO implemented in Malaysia to control the spread of COVID-19, this study relied exclusively on online data collection methods. Google Forms was used to create the survey questionnaire and distributed through various social and digital media platforms. This approach, necessitated by the pandemic restrictions, introduces several limitations:

1. Limited reach: The online-only distribution may have excluded segments of the population with limited internet access or low digital literacy, potentially skewing the sample towards more tech-savvy respondents.
2. Self-selection bias: Participants were asked to fill out the questionnaire and to invite their friends and family to participate, which may have resulted in a sample not necessarily representative of the entire population of Malaysian consumers. People who are more interested in the topic or more active on social and digital media may have been overrepresented in the sample.
3. Pandemic-induced behaviour changes: The MCO and broader pandemic context likely influenced consumer behaviour, potentially affecting responses related to food waste practices. This unique circumstance may limit the applicability of findings to non-pandemic periods.

Consequently, convenience sampling under these conditions may not provide a fully representative sample of the Malaysian consumer population. The study's findings should be interpreted with caution, recognising that they may not be generalisable to all Malaysian consumers. While the results offer valuable insights into consumer behaviour during the pandemic, care should be taken when applying these findings to non-pandemic contexts. Nevertheless, the study's outcomes can still inform flexible

guidelines that are adaptable to both rapidly changing and more stable economic conditions.

Second, the data were collected using self-reported measures, which may be influenced by various biases that could affect the validity of the results. Social desirability bias may have led respondents to under-report food waste, which is generally considered undesirable. Memory bias may have affected the accuracy of responses about past behaviours, such as the perceived frequency and patterns of food waste. Furthermore, as all data were collected through a single questionnaire, there is a risk of common method bias, where variance is attributable to the measurement method rather than the constructs of interest. To address these potential biases, this study employed several strategies. Validated instruments were used, which can help reduce bias by providing consistent and reliable measurements across different contexts. The study also ensured anonymity and emphasised the importance of honest responses. Furthermore, statistical techniques such as Harman's single-factor test and full collinearity test were conducted to assess and mitigate common method bias (Kock and Lynn 2012; Podsakoff et al. 2003). Despite these measures, some level of self-reporting bias is unavoidable when using self-reported measures and hence remains a limitation of the study.

Next, the study's findings may have limited generalisability to populations outside Malaysia due to cultural and social differences. These differences could influence social media usage patterns, the characteristics of consumer generations, the expression and impact of personality traits, and behaviours related to frugality, impulse buying, and food waste. While some constructs, like basic personality structures, may be relatively universal, their manifestation and effects on consumer behaviour can vary across cultures. Similarly, while generational cohorts exist globally, the specific experiences shaping these generations and their resulting characteristics may differ between Malaysia and other countries. These differences may be shaped by unique cultural norms, values, and beliefs that vary across different populations, which could impact the study results. Therefore, the findings of the study may not apply to other populations outside of Malaysia, as these populations may have different cultural and social contexts that impact these characteristics and behaviours differently.

Other factors such as economic status, level of education, and geographic location may also impact the relationships between the variables of interest, which may differ between populations. Furthermore, the pandemic's effects may likely have varied across countries and cultures. This variability in pandemic impact further limits the generalisability of the findings to other contexts. As a result, the study's findings may not be generalisable to populations with different demographic or socioeconomic characteristics or to contexts significantly different from those under which the data were collected in Malaysia.

In addition, as with any study that uses a cross-sectional design, this study is limited in its ability to explain food consumption behaviour over time, as it captures only a single point in time. While this cross-sectional study offers a crucial understanding of consumer behaviour during the COVID-19 pandemic, it is limited in explaining behaviour changes over different phases of the pandemic or in comparison to pre-pandemic behaviour.

Despite the limitations of the study, this research provides valuable insights into the factors influencing consumer food waste behaviour. By examining the relationships between social media usage, generational cohorts (Generation X, Y, and Z), Big Five personality traits, frugality, impulse buying behaviour, and food waste, this study sheds light on the complex interplay of individual, social, and environmental factors that influence food waste among Malaysian consumers during the COVID-19 pandemic.

5.5 FUTURE RESEARCH

Drawing from the findings and limitations of this study, several recommendations for future research are proposed.

To improve the generalisability of the findings, future research could employ more robust sampling methods, particularly random sampling techniques. This approach ensures equal selection chances for all target population members, mitigating self-selection bias and increasing the likelihood of obtaining a representative sample that accurately reflects the Malaysian population. Researchers could utilise various

probability sampling methods such as simple random, stratified, or cluster sampling. For instance, stratified sampling could ensure representation across regions or urban/rural areas. Alternatively, cluster sampling might be used to select specific neighbourhoods or communities. This approach would allow a more comprehensive understanding of consumer behaviour across different contexts. Furthermore, conducting comparative studies across countries would help test the generalisability of findings and explore cultural variations in food waste behaviour.

While online surveys offer convenience and cost-effectiveness, future research could explore diverse data collection methods to enhance and validate findings. Incorporating face-to-face interviews, telephone surveys, or intercept surveys at locations such as grocery stores could help reach individuals who might be under-represented in online platforms. This combination of online and offline methods would provide a more comprehensive view of the target population, potentially reducing the coverage bias associated with purely online surveys and improving the overall representativeness of the sample.

To address self-reporting biases, future studies could consider adopting a multi-method quantitative approach. This could combine traditional surveys with observational studies and waste audits. For instance, researchers might conduct household waste audits to corroborate self-reported data from surveys. Additionally, structured observational studies in natural settings, such as restaurants or cafeterias, could offer valuable insights into actual food waste behaviours, such as frequency and amount of food discarded. By triangulating data from these multiple sources, particularly those that do not rely on self-reporting, researchers can aim to obtain a more accurate and comprehensive measure of food waste behaviour.

This study followed a cross-sectional design, providing a snapshot of the food waste phenomenon at a given time. To gain a more comprehensive understanding of the dynamics of food waste and consumption behaviour, future research could consider conducting longitudinal studies that follow participants over an extended period. These studies could track changes in consumer food waste behaviour over time, focusing on post-pandemic periods. This approach would allow researchers to examine how food-

related behaviours have evolved since the pandemic, potentially comparing their findings with existing cross-sectional studies conducted during the crisis. While not a perfect comparison, this could provide insight into long-term changes in food consumption and waste patterns. Researchers could also retrospectively collect data about pandemic-era food behaviours, though this would be subject to recall biases. Longitudinal studies could further explore the complex relationships between various personality traits and consumer behaviour, including food consumption and waste, particularly during crises. The present study and previous research suggest that these relationships may be more nuanced than initially hypothesised. Longitudinal investigations could provide deeper insights into how personality traits interact with changing circumstances over extended periods, especially in response to crisis situations. Such longitudinal studies are essential to monitor the evolution of food consumption and waste habits and assess their responses to major global events.

Future research could benefit from replicating this study across diverse populations in the aftermath of the pandemic. Such replications could provide valuable insights into food waste behaviours in different cultures following the global health crisis. By examining the relationships between social media usage, generational differences, personality traits, frugality, impulse buying, and food waste behaviours in various sociocultural contexts, researchers can identify universal and culture-specific patterns. This approach would foster a more nuanced understanding of food consumption behaviours across diverse demographic groups and societies.

Finally, future studies could expand the study model to include additional variables, building upon the current model, which explains 40.4% and 38.2% of the variance in impulse buying behaviour and food waste, respectively. This expansion could encompass other psychological factors, such as mindfulness, variables related to sustainability, and possible mediating and moderating factors, potentially yielding valuable findings. By broadening the scope, researchers may gain deeper insights into factors influencing food consumption behaviours and their potential impact on overall sustainable consumption practices.

5.6 CONCLUSION

This research has significantly advanced understanding of food waste behaviour during the COVID-19 pandemic in Malaysia, offering crucial insights for sustainable consumption practices. By investigating the intricate relationships between social media usage, Generation X, Y, and Z, Big Five personality traits, frugality, and impulse buying, this study provides a comprehensive framework for addressing consumer food waste in times of crisis and beyond.

Integrating the reconceptualised S-O-R model, FFM, and generational cohort theory, this study examined the effects of social media usage, the Big Five personality traits (drawn from FFM), and frugality on food waste, with impulse buying behaviour serving as a mediator. Additionally, Generation X, Y, and Z, grounded in generational cohort theory, acted as a moderator in the relationship between social media usage and impulse buying behaviour. This integrated approach allowed for a nuanced examination of the complex interplay between digital engagement, consumer psychology, generational differences, and food impulse buying and waste behaviour during unprecedented circumstances.

This study addressed several important gaps in the current food waste literature. First, unlike many previous food waste studies that focused on intentions, this research examined actual behaviour, utilising the under-explored S-O-R model to provide actionable insights. Second, it contributed to the limited understanding of digital and consumer behaviour during a crisis by investigating how pandemic-influenced social media usage and psychological factors (Big Five personality traits and frugality) impact food impulse buying and waste. Third, it addressed a theoretical gap by studying impulse buying behaviour as a potential mediator in the causal chain of food buying and waste, using the reconceptualised S-O-R model. Finally, it investigated the under-researched area of generational differences in food waste-related behaviour by examining how Generation X, Y, and Z interact with social media and engage in food impulse buying.

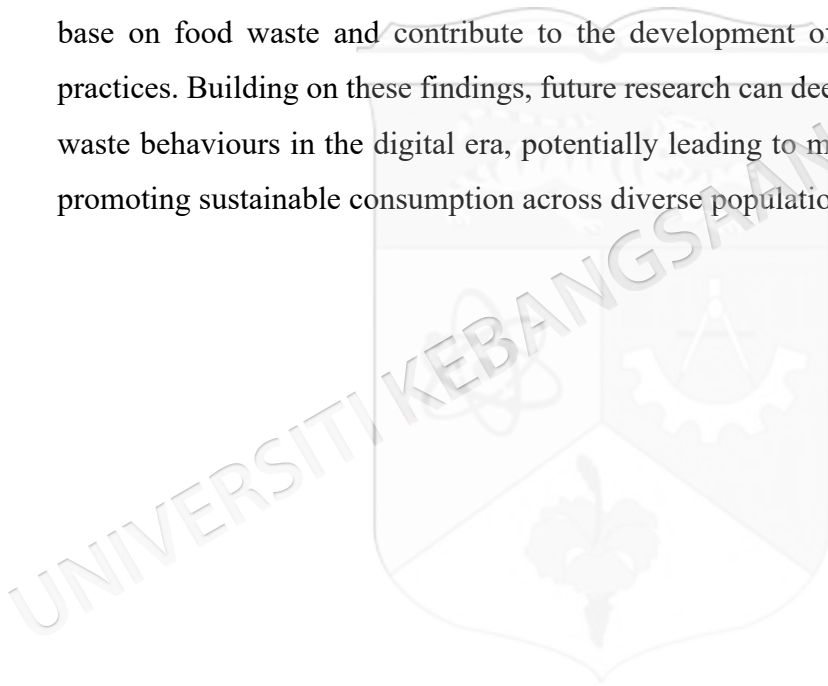
Structural equation modeling using Smart PLS tested 23 hypotheses on a convenience sample of 387 Malaysian consumers across Generations X, Y, and Z. The results revealed that social media usage, neuroticism, openness, and frugality significantly predict impulse buying behaviour. Furthermore, neuroticism, conscientiousness, agreeableness, frugality, and impulse buying behaviour were found to have significant influences on food waste. Notably, impulse buying behaviour mediated the relationships between social media usage and food waste, neuroticism and food waste, as well as frugality and food waste. The study also found a moderating effect of Generation X, Y, and Z on the relationship between social media usage and impulse buying behaviour, indicating that social media's impact on impulse buying varies across age groups.

This study offers valuable insights into how social media usage and psychological factors, including the Big Five personality traits and frugality, influence impulse buying and food waste behaviour during a global health crisis. The identification of impulse buying behaviour as a mediator in several key relationships elucidates the complex pathways through which social media usage, neuroticism, and frugality impact food waste. This mediation analysis provides a nuanced understanding of the causal chain in food buying and waste behaviour during extraordinary circumstances. The incorporation of Generations X, Y, and Z as a moderator further enhances the theoretical framework, allowing for a more comprehensive understanding of how different generational cohorts interact with social media and engage in impulse buying behaviour.

The findings of this study hold practical significance for marketers, civic groups, and policymakers. For marketers, the results offer valuable insights that can guide the design of effective promotional strategies centred around reducing food waste while maintaining profitability. Civic groups can leverage these findings to develop targeted educational initiatives that raise awareness among consumers about wasteful practices and promote sustainable consumption habits. Policymakers can utilise the research outcomes to shape regulations and policies that incentivise waste reduction and encourage responsible consumer behaviour. These insights are particularly relevant to Malaysia's commitment to achieving the UN's SDG 12.3 on halving per-capita global

food waste by 2030. Moreover, as the study was conducted during the COVID-19 pandemic, its findings can inform strategies adaptable to both rapidly changing and more stable economic conditions.

This study has advanced the understanding of food waste behaviour, particularly regarding social media usage, Generation X, Y, and Z, Big Five personality traits, frugality, and impulse buying behaviour. However, it also opens several avenues for further exploration. Future research could benefit from conducting rigorous studies across different settings and contexts, incorporating additional constructs, and employing more robust sampling methods and diverse data collection techniques. Longitudinal studies and cross-cultural replications could further expand the knowledge base on food waste and contribute to the development of sustainable consumption practices. Building on these findings, future research can deepen understanding of food waste behaviours in the digital era, potentially leading to more effective strategies for promoting sustainable consumption across diverse populations and economic contexts.



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APPENDIX A
QUESTIONNAIRE



June 2021

Dear valued respondent,

A survey on factors affecting food waste

This survey is being conducted as part of my PhD research on factors influencing food waste, with the aim of collecting information from food consumers.

Your participation will involve completion of this questionnaire that will take no longer than 20 minutes of your time. All comments and responses will remain confidential and anonymous. The names of individual persons are not required in any of the responses. Every effort will be made to ensure that no information regarding an individual be disclosed in the report. It is assured that the information collected will only be used for academic purposes.

Your participation in this survey is voluntary and should you require to withdraw your participation you may do so at any time without facing any unfavourable consequences. Please respond as accurately and honestly as possible so that the maximum benefit from this research would be gained.

Your help in furthering this research endeavour is greatly appreciated. Thank you very much for your time and cooperation.

Best Regards,

AISHATH LAHATH

Post-graduate student (Matric no: P99000)

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SECTION A: COSUMER INFORMATION	
INSTRUCTIONS:	
The purpose of this set of questions is to obtain some general information about consumers. Please tick (✓) or select the appropriate answer.	
1. How many people live in your household?	<input type="checkbox"/> 1 person <input type="checkbox"/> 4 persons <input type="checkbox"/> 2 persons <input type="checkbox"/> 5 and more persons <input type="checkbox"/> 3 persons
2. How often do you eat outside/ takeaway food/ readymade meals in a month?	<input type="checkbox"/> None <input type="checkbox"/> 3 – 4 times <input type="checkbox"/> Once <input type="checkbox"/> More than 4 times <input type="checkbox"/> 2 times
3. How frequently do you buy grocery in a month?	<input type="checkbox"/> None <input type="checkbox"/> 3 – 4 times <input type="checkbox"/> Once <input type="checkbox"/> More than 4 times <input type="checkbox"/> 2 times
4. How much do you spend on eating outside/ takeaway food/ readymade meals in a month?	<input type="checkbox"/> Less than RM 200 <input type="checkbox"/> RM 601 – RM 800 <input type="checkbox"/> RM 200 – RM 400 <input type="checkbox"/> RM 801 and above <input type="checkbox"/> RM 401 – RM 600
5. How much do you spend on grocery in a month?	<input type="checkbox"/> Less than RM 200 <input type="checkbox"/> RM 601 – RM 800 <input type="checkbox"/> RM 200 – RM 400 <input type="checkbox"/> RM 801 and above <input type="checkbox"/> RM 401 – RM 600
6. Reason(s) for eating outside food:	<input type="checkbox"/> Convenience <input type="checkbox"/> Better taste <input type="checkbox"/> To try different food items <input type="checkbox"/> To try different cuisines (Korean, Thai, Arab etc) <input type="checkbox"/> To experience different environment <input type="checkbox"/> To socialise <input type="checkbox"/> Others, please specify:

SECTION B: SOCIAL MEDIA USAGE								
INSTRUCTIONS:								
Please indicate the extent to which you agree or disagree with the statement by selecting the appropriate number on the seven-point scale provided.								
(1= Strongly disagree, 2= Disagree, 3= Somewhat disagree, 4= Neutral, 5= Somewhat agree, 6= Agree, 7= Strongly agree)								
Statements		Strongly Disagree			Strongly Agree			
1.	On average, each week I use social media often	1	2	3	4	5	6	7
2.	For each log session, I use social media long	1	2	3	4	5	6	7
3.	On social media, I often post something	1	2	3	4	5	6	7
4.	On social media, I often view something	1	2	3	4	5	6	7
5.	On social media, I often share something	1	2	3	4	5	6	7
6.	On social media, I often reply to others	1	2	3	4	5	6	7
7.	On social media, I often play website games	1	2	3	4	5	6	7

SECTION C: IMPULSE BUYING BEHAVIOUR								
INSTRUCTIONS:								
For this survey, impulse buying behaviour has been defined as a sudden and compelling urge to buy food immediately, without much consideration of consequences . Please indicate the extent to which you agree or disagree with the statement by selecting the appropriate number on the seven-point scale provided.								
(1= Strongly disagree, 2= Disagree, 3= Somewhat disagree, 4= Neutral, 5= Somewhat agree, 6= Agree, 7= Strongly agree)								
Statements		Strongly Disagree			Strongly Agree			
1.	I often buy food spontaneously	1	2	3	4	5	6	7
2.	'Just do it' describes the way I buy food	1	2	3	4	5	6	7
3.	I often buy food without thinking	1	2	3	4	5	6	7
4.	'I see it, I buy it' describes my food shopping behaviour	1	2	3	4	5	6	7
5.	'Buy now, think about it later' describes my food shopping behaviour	1	2	3	4	5	6	7

6.	Most of the time I buy food without planning in advance	1	2	3	4	5	6	7
7.	I buy food according to how I feel at the moment	1	2	3	4	5	6	7
8.	I do not plan most of my food purchases	1	2	3	4	5	6	7
9.	Sometimes I am a bit reckless about the food I buy	1	2	3	4	5	6	7

SECTION D: FRUGALITY

INSTRUCTIONS:

Please indicate the extent to which you agree or disagree with the statement by selecting the appropriate number on the seven-point scale provided.

(1= Strongly disagree, 2= Disagree, 3= Somewhat disagree, 4= Neutral, 5= Somewhat agree, 6= Agree, 7= Strongly agree)

Statements		Strongly Disagree					Strongly Agree	
		1	2	3	4	5	6	7
1.	If you take good care of your possessions, you will definitely save money in the long run	1	2	3	4	5	6	7
2.	There are many things that are normally thrown away that are still quite useful	1	2	3	4	5	6	7
3.	Making better use of my resources makes me feel good	1	2	3	4	5	6	7
4.	If you can re-use an item you already have, there's no sense in buying something new	1	2	3	4	5	6	7
5.	I believe in being careful in how I spend my money	1	2	3	4	5	6	7
6.	I discipline myself to get the most from my money	1	2	3	4	5	6	7
7.	I am willing to wait on a purchase I want so that I can save money	1	2	3	4	5	6	7
8.	There are things I resist buying today so I can save for tomorrow	1	2	3	4	5	6	7

SECTION E: PERSONALITY TRAITS

INSTRUCTIONS:

Please indicate the extent to which you agree or disagree with the statement 'I see myself as someone who is' followed by the descriptions below by selecting the appropriate number on the seven-point scale provided.								
(1= Strongly disagree, 2= Disagree, 3= Somewhat disagree, 4= Neutral, 5= Somewhat agree, 6= Agree, 7= Strongly agree)								
Statements		Strongly Disagree			Strongly Agree			
1.	Neuroticism/Emotional Responsiveness							
	a. Moody than others	1	2	3	4	5	6	7
	b. Emotions go way up and down	1	2	3	4	5	6	7
	c. Testy/bad-tempered more than others	1	2	3	4	5	6	7
	d. Temperamental/Cranky	1	2	3	4	5	6	7
	e. Fretful/Uneasy	1	2	3	4	5	6	7
	f. Jealous	1	2	3	4	5	6	7
	g. Touchy/Sensitive	1	2	3	4	5	6	7
2.	Conscientiousness/Task-Orientation							
	a. Organised	1	2	3	4	5	6	7
	b. Disorganised	1	2	3	4	5	6	7
	c. Orderly	1	2	3	4	5	6	7
	d. Efficient	1	2	3	4	5	6	7
	e. Sloppy/Careless	1	2	3	4	5	6	7
3.	Agreeableness/Interpersonal Warmth							
	a. Sympathetic/Understanding	1	2	3	4	5	6	7
	b. Kind to others	1	2	3	4	5	6	7
	c. Warm	1	2	3	4	5	6	7
	d. Tenderhearted with others/Caring	1	2	3	4	5	6	7
	e. Cold to others	1	2	3	4	5	6	7
	f. Unsympathetic	1	2	3	4	5	6	7
	g. Rude with others	1	2	3	4	5	6	7
4.	Extraversion/Social Engagement							

	a. Quiet when with people	1	2	3	4	5	6	7
	b. Shy	1	2	3	4	5	6	7
	c. Talkative when with others	1	2	3	4	5	6	7
	d. Withdrawn from others	1	2	3	4	5	6	7
	e. Feel comfortable in a group of people	1	2	3	4	5	6	7
	f. Feel confident more than others	1	2	3	4	5	6	7
	g. Extroverted/Outgoing when with people	1	2	3	4	5	6	7
5.	Openness/Cognitive Flexibility							
	a. More original than others	1	2	3	4	5	6	7
	b. Frequently feel highly creative	1	2	3	4	5	6	7
	c. Appreciate art	1	2	3	4	5	6	7
	d. Enjoy beauty more than others	1	2	3	4	5	6	7
	e. Find novel/Unique solutions	1	2	3	4	5	6	7
	f. Imaginative	1	2	3	4	5	6	7
	g. Uncreative	1	2	3	4	5	6	7

SECTION F: FOOD WASTE

INSTRUCTIONS:

Please indicate the extent to which you agree or disagree with the statement by selecting the appropriate number on the seven-point scale provided.

(1= Strongly disagree, 2= Disagree, 3= Somewhat disagree, 4= Neutral, 5= Somewhat agree, 6= Agree, 7= Strongly agree)

Statements		Strongly Disagree			Strongly Agree			
		1	2	3	4	5	6	7
1.	I always have food leftover on my plate after a meal	1	2	3	4	5	6	7
2.	I cook food more than what is needed	1	2	3	4	5	6	7
3.	I often save food but eventually not use them	1	2	3	4	5	6	7
4.	I often open products (cans, sauces, etc..) but eventually not use them	1	2	3	4	5	6	7
5.	I waste food whenever I go out with friends/family	1	2	3	4	5	6	7

6.	I waste food whenever I have guests at home	1	2	3	4	5	6	7
7.	I waste food at work/school	1	2	3	4	5	6	7
8.	I waste food at home whenever I am due to travel	1	2	3	4	5	6	7

SECTION G: DEMOGRAPHIC PROFILE	
INSTRUCTIONS:	
The purpose of this set of questions is to obtain some general demographic information. Any information you provide will NOT be shared with any individual or organisation. Please select the appropriate answer.	
1. Gender:	<input type="checkbox"/> Male <input type="checkbox"/> Female
2. Ethnicity:	<input type="checkbox"/> Malay <input type="checkbox"/> Indian <input type="checkbox"/> Chinese <input type="checkbox"/> Others, please specify:
3. Nationality	<input type="checkbox"/> Malaysian <input type="checkbox"/> Non-Malaysian
4. Birth year:	<input type="checkbox"/> Before 1946 <input type="checkbox"/> 1981-1996 <input type="checkbox"/> 1946-1964 <input type="checkbox"/> 1997-2001 <input type="checkbox"/> 1965-1980 <input type="checkbox"/> After 2001
5. Marital status:	<input type="checkbox"/> Single <input type="checkbox"/> Married without children <input type="checkbox"/> Married with children <input type="checkbox"/> Widowed/divorced/separated
6. Monthly gross family income:	<input type="checkbox"/> Less than RM 1,000 <input type="checkbox"/> RM 6,000 – RM 7,999 <input type="checkbox"/> RM 1,000 – RM 1,999 <input type="checkbox"/> RM 8,000 – RM 9,999 <input type="checkbox"/> RM 2,000 – RM 3,999 <input type="checkbox"/> RM 10,000 and above <input type="checkbox"/> RM 4,000 – RM 5,999
7. Occupation:	<input type="checkbox"/> Private sector <input type="checkbox"/> Government/Semi-government <input type="checkbox"/> Own business <input type="checkbox"/> Student

	<input type="checkbox"/> Unemployed <input type="checkbox"/> Others, please specify:
8. Highest educational qualification:	<input type="checkbox"/> Primary School <input type="checkbox"/> PMR/SRP/LCE <input type="checkbox"/> SPM/SPMV/MCE <input type="checkbox"/> STPM/HSC <input type="checkbox"/> Certificate/Diploma
	<input type="checkbox"/> Professional <input type="checkbox"/> Bachelors' Degree <input type="checkbox"/> Master's Degree <input type="checkbox"/> Doctor of Philosophy (PhD)

Thank you very much for your time and cooperation.



LAMPIRAN A**BORANG****KAJI SELIDIK**

BAHAGIAN B: PENGGUNAAN MEDIA SOSIAL								
<p style="text-align: center;">ARAHAN:</p> <p>Tandakan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan yang diberi dengan memilih angka yang sesuai pada skala tujuh-mata yang disediakan.</p> <p>(1= Amat tidak bersetuju, 2= Tidak bersetuju, 3= Agak tidak bersetuju, 4= Neutral, 5= Agak bersetuju, 6=Bersetuju, 7= Amat bersetuju)</p>								
Pernyataan		Amat Tidak Bersetuju			Amat Bersetuju			
		1	2	3	4	5	6	7
1.	Secara purata, setiap minggu saya kerap menggunakan media sosial	1	2	3	4	5	6	7
2.	Setiap sesi saya log masuk, saya menggunakan media sosial dengan lama	1	2	3	4	5	6	7
3.	Dalam media sosial, saya kerap memuat naik hantaran	1	2	3	4	5	6	7
4.	Dalam media sosial, saya kerap melihat sesuatu	1	2	3	4	5	6	7
5.	Dalam media sosial, saya kerap berkongsi sesuatu	1	2	3	4	5	6	7
6.	Dalam media sosial, saya kerap menjawab komen orang lain	1	2	3	4	5	6	7
7.	Dalam media sosial, saya kerap bermain permainan laman web	1	2	3	4	5	6	7

BAHAGIAN C: TINGKAH LAKU BELIAN GERAK HATI								
<p style="text-align: center;">ARAHAN:</p> <p>Untuk tinjauan ini, tingkah laku belian gerak hati ditakrifkan sebagai tingkah laku membeli makanan secara tiba-tiba, mendadak dan dengan pantas tanpa pertimbangan lanjut. Tandakan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan yang diberi dengan memilih angka yang sesuai pada skala tujuh-mata yang disediakan.</p> <p>(1= Amat tidak bersetuju, 2= Tidak bersetuju, 3= Agak tidak bersetuju, 4= Neutral, 5= Agak bersetuju, 6=Bersetuju, 7= Amat bersetuju)</p>								
Pernyataan		Amat Tidak Bersetuju			Amat Bersetuju			
		1	2	3	4	5	6	7
1.	I kerap membeli makanan secara tiba-tiba.	1	2	3	4	5	6	7
2.	'Lakukan saja' menerangkan cara saya membeli makanan	1	2	3	4	5	6	7
3.	Saya kerap membeli makanan tanpa berfikir	1	2	3	4	5	6	7
4.	'Saya nampak, saya beli' menerangkan tingkah laku saya apabila membeli makanan	1	2	3	4	5	6	7
5.	'Beli sekarang, fikir kemudian' menerangkan tingkah laku saya apabila membeli makanan	1	2	3	4	5	6	7

6.	Pada kebanyakan masa, saya membeli makanan tanpa sebarang perancangan awal	1	2	3	4	5	6	7
7.	Saya membeli makanan mengikut apa yang saya rasakan pada ketika itu	1	2	3	4	5	6	7
8.	Saya tidak merancang kebanyakan daripada pembelian makanan	1	2	3	4	5	6	7
9.	Kadang-kadang saya membuat tindakan melulu apabila membeli makanan	1	2	3	4	5	6	7

BAHAGIAN D: SIKAP BERJIMAT CERMAT

ARAHAN:

Tandakan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan yang diberi dengan memilih angka yang sesuai pada skala tujuh-mata yang disediakan.

(1= Amat tidak bersetuju, 2= Tidak bersetuju, 3= Agak tidak bersetuju, 4= Neutral, 5= Agak bersetuju, 6=Bersetuju, 7= Amat bersetuju)

Pernyataan	Amat Tidak Bersetuju				Amat Bersetuju			
	1	2	3	4	5	6	7	
1. Sekiranya anda menjaga barangan milik anda dengan baik, anda pasti akan menjimatkan wang dalam jangka masa panjang	1	2	3	4	5	6	7	
2. Ada banyak benda yang biasanya dibuang walaupun masih berguna	1	2	3	4	5	6	7	
3. Menggunakan sumber yang saya ada dengan lebih baik membuatkan saya berasa puas	1	2	3	4	5	6	7	
4. Jika anda boleh menggunakan semula sesuatu barang yang sedia ada, tiada keperluan untuk membeli sesuatu yang baharu	1	2	3	4	5	6	7	
5. Saya percaya saya harus berhati-hati dalam membelanjakan wang saya	1	2	3	4	5	6	7	
6. Saya mendisiplinkan diri untuk mendapatkan manfaat maksimum daripada wang saya	1	2	3	4	5	6	7	
7. Saya sanggup menunggu untuk membeli sesuatu supaya dapat menjimatkan wang	1	2	3	4	5	6	7	
8. Ada benda-benda yang saya elakkan daripada membeli hari ini supaya saya dapat berjimat untuk hari esok	1	2	3	4	5	6	7	

Tandakan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan '**Saya melihat diri saya sebagai seorang yang**' diikuti dengan penerangan di bawah dengan memilih angka yang sesuai pada skala tujuh-mata yang disediakan.

(1= Amat tidak bersetuju, 2= Tidak bersetuju, 3= Agak tidak bersetuju, 4= Neutral, 5= Agak bersetuju, 6=Bersetuju, 7= Amat bersetuju)

Pernyataan	Amat Tidak Bersetuju				Amat Bersetuju			
	1	2	3	4	5	6	7	
1. Neurotisme/Keresponsifan Emosi								
a. Mempunyai angin tidak baik berbanding orang lain	1	2	3	4	5	6	7	
b. Emosinya turun naik	1	2	3	4	5	6	7	
c. Lebih cepat hilang sabar/panas baran daripada orang lain	1	2	3	4	5	6	7	
d. Cepat naik angin/Pemarah	1	2	3	4	5	6	7	
e. Perengus/Cepat risau	1	2	3	4	5	6	7	
f. Cemburu	1	2	3	4	5	6	7	
g. Cepat kecil hati/Sensitif	1	2	3	4	5	6	7	
2. Kehematan/Berorientasikan Tugas								
a. Tersusun	1	2	3	4	5	6	7	
b. Tidak tersusun	1	2	3	4	5	6	7	
c. Teratur	1	2	3	4	5	6	7	
d. Efisien	1	2	3	4	5	6	7	
e. Sambalewa/Cuai	1	2	3	4	5	6	7	
3. Sikap Menyenangkan/Kemesraan Hubungan Interpersonal								
a. Bersimpati/Memahami	1	2	3	4	5	6	7	
b. Baik hati terhadap orang lain	1	2	3	4	5	6	7	
c. Mesra	1	2	3	4	5	6	7	
d. Penyayang terhadap orang lain/Mengambil berat	1	2	3	4	5	6	7	
e. Dingin terhadap orang lain	1	2	3	4	5	6	7	
f. Tidak bersimpati	1	2	3	4	5	6	7	
g. Kurang ajar terhadap orang lain	1	2	3	4	5	6	7	
4. Ekstraversi/Keterlibatan Sosial								

	a. Pendiam apabila bersama orang lain	1	2	3	4	5	6	7
	b. Pemalu	1	2	3	4	5	6	7
	c. Banyak bercakap apabila bersama orang lain	1	2	3	4	5	6	7
	d. Suka menjauhkan diri daripada orang lain	1	2	3	4	5	6	7
	e. Berasa selesa bersama sekumpulan orang lain	1	2	3	4	5	6	7
	f. Berasa lebih yakin daripada orang lain	1	2	3	4	5	6	7
	g. Bersifat ekstrovert/Suka bergaul apabila bersama orang lain	1	2	3	4	5	6	7
5.	Keterbukaan/Keanjalan Kognitif							
	a. Lebih original daripada orang lain	1	2	3	4	5	6	7
	b. Sering berasa amat kreatif	1	2	3	4	5	6	7
	c. Menghargai seni	1	2	3	4	5	6	7
	d. Menikmati keindahan lebih daripada orang lain	1	2	3	4	5	6	7
	e. Menjumpai penyelesaian yang novel/unik	1	2	3	4	5	6	7
	f. Mempunyai imaginasi	1	2	3	4	5	6	7
	g. Tidak kreatif	1	2	3	4	5	6	7

BAHAGIAN F: PEMBAZIRAN MAKANAN

ARAHAN:

Tandakan sejauh mana anda bersetuju atau tidak bersetuju dengan pernyataan yang diberi dengan memilih angka yang sesuai pada skala tujuh-mata yang disediakan.

(1= Amat tidak bersetuju, 2= Tidak bersetuju, 3= Agak tidak bersetuju, 4= Neutral, 5= Agak bersetuju, 6=Bersetuju, 7= Amat bersetuju)

	Pernyataan	Amat						
		Tidak Bersetuju			Amat Bersetuju			
1.	Saya sering meninggalkan makanan yang tidak habis dalam pinggan selepas makan	1	2	3	4	5	6	7
2.	Saya memasak makanan lebih banyak daripada yang diperlukan	1	2	3	4	5	6	7
3.	Saya kerap menyimpan makanan tetapi akhirnya tidak menggunakannya	1	2	3	4	5	6	7
4.	Saya kerap membuka produk makanan (dalam tin, sos, dll.) tetapi akhirnya tidak menggunakannya	1	2	3	4	5	6	7
5.	Saya membazirkan makanan apabila saya keluar makan dengan rakan-rakan/keluarga	1	2	3	4	5	6	7

6.	Saya membazirkan makanan apabila saya menerima kehadiran tetamu di rumah	1	2	3	4	5	6	7
7.	Saya membazirkan makanan di tempat kerja/sekolah	1	2	3	4	5	6	7
8.	Saya membazirkan makanan di rumah apabila saya keluar bermusafir	1	2	3	4	5	6	7

BAHAGIAN G: PROFIL DEMOGRAFI	
ARAHAN:	
Tujuan soalan-soalan dalam bahagian ini adalah untuk mendapatkan maklumat demografi umum. Sebarang maklumat yang diberikan oleh anda TIDAK akan dikongsikan dengan mana-mana individu atau organisasi. Pilih jawapan yang bersesuaian.	
1. Jantina:	<input type="checkbox"/> Lelaki <input type="checkbox"/> Perempuan
2. Etnik:	<input type="checkbox"/> Melayu <input type="checkbox"/> India <input type="checkbox"/> Cina <input type="checkbox"/> Lain-lain, sila nyatakan:
3. Kewarganegaraan	<input type="checkbox"/> Malaysia <input type="checkbox"/> Bukan Malaysia
4. Tahun lahir:	<input type="checkbox"/> Sebelum 1946 <input type="checkbox"/> 1981-1996 <input type="checkbox"/> 1946-1964 <input type="checkbox"/> 1997-2001 <input type="checkbox"/> 1965-1980 <input type="checkbox"/> Selepas 2001
5. Status perkahwinan:	<input type="checkbox"/> Bujang <input type="checkbox"/> Berkahwin dan tiada anak <input type="checkbox"/> Berkahwin dan ada anak <input type="checkbox"/> Balu/janda/duda
6. Pendapatan kasar isi rumah bulanan:	<input type="checkbox"/> Kurang daripada RM 1,000 <input type="checkbox"/> RM 6,000 – RM 7,999 <input type="checkbox"/> RM 1,000 – RM 1,999 <input type="checkbox"/> RM 8,000 – RM 9,999 <input type="checkbox"/> RM 2,000 – RM 3,999 <input type="checkbox"/> RM 10,000 dan ke atas <input type="checkbox"/> RM 4,000 – RM 5,999
7. Pekerjaan:	<input type="checkbox"/> Sektor swasta <input type="checkbox"/> Kerajaan/Separa kerajaan <input type="checkbox"/> Perniagaan sendiri <input type="checkbox"/> Pelajar

	<input type="checkbox"/> Tidak bekerja <input type="checkbox"/> Lain-lain, sila nyatakan:	
8. Kelayakan pendidikan tertinggi:	<input type="checkbox"/> Sekolah rendah <input type="checkbox"/> PMR/SRP/LCE <input type="checkbox"/> SPM/SPMV/MCE <input type="checkbox"/> STPM/HSC <input type="checkbox"/> Sijil/Diploma	<input type="checkbox"/> Profesional <input type="checkbox"/> Ijazah Sarjana Muda <input type="checkbox"/> Ijazah Sarjana <input type="checkbox"/> Ijazah Doktor Falsafah (PhD)

Terima kasih atas masa dan kerjasama anda yang amat berharga!



APPENDIX B

CODE OF RESPONSES

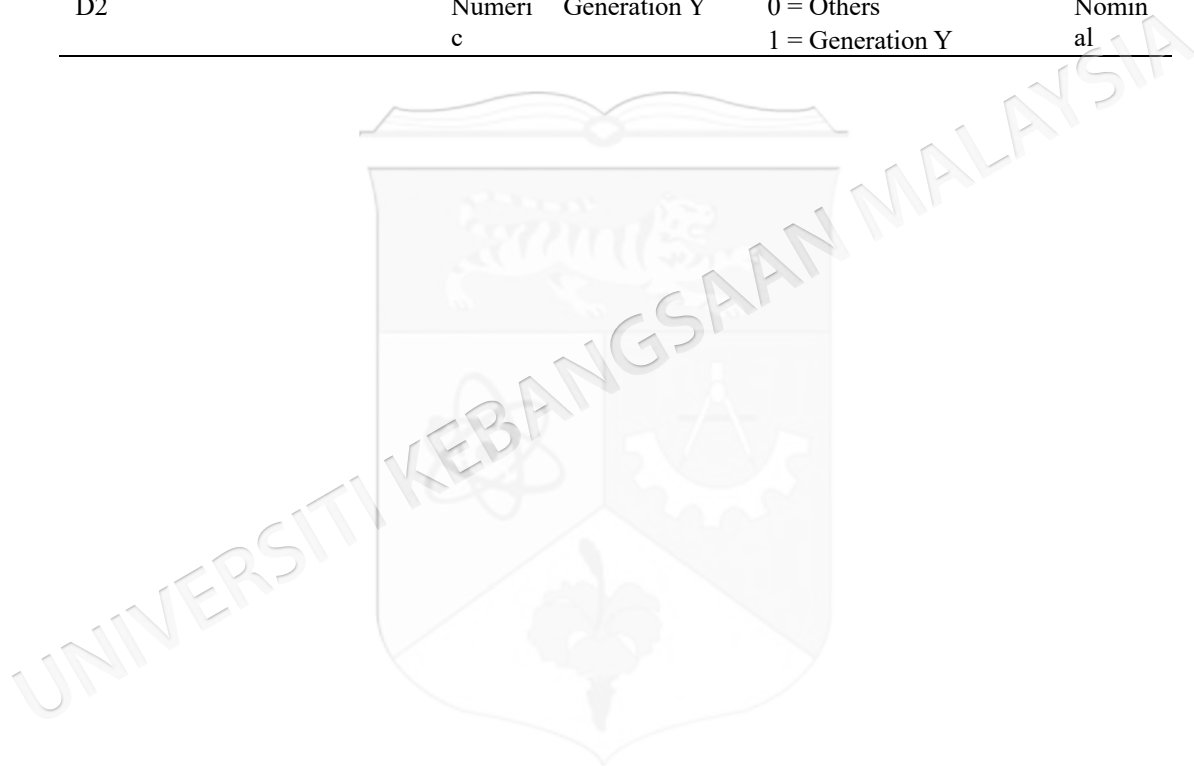
Variable Name	Type of Data	Variable Label	Variable Responses	Measure
Cases	Numeric	ID		
Household_Size	Numeric	Household size	1 = 1 person 2 = 2 persons 3 = 3 persons 4 = 4 persons 5 = 5 and more persons	Ordinal
Frequency_OutsideFood	Numeric	Frequency of eating outside food	1 = None 2 = Once 3 = 2 times 4 = 3-4 times 5 = More than 4 times	Ordinal
Frequency_Grocery_Purchase	Numeric	Frequency of grocery purchase	1 = None 2 = Once 3 = 2 times 4 = 3-4 times 5 = More than 4 times	Ordinal
Spending_OutsideFood	Numeric	Spending for outside food	1 = Less than RM 200 2 = RM 200 – RM 400 3 = RM 401 – RM 600 4 = RM 601 – RM 800 5 = RM 801 and above	Ordinal
Spending_Grocery	Numeric	Spending for grocery	1 = Less than RM 200 2 = RM 200 – RM 400 3 = RM 401 – RM 600 4 = RM 601 – RM 800 5 = RM 801 and above	Ordinal
Reasons_Convenience	Numeric	Reasons for outside food - Convenience	0 = Others 1 = Convenience	Nominal
Reasons_BetterTaste	Numeric	Reasons for outside food - Better taste	0 = Others 1 = Better taste	Nominal
Reasons_Try_Different_Food	Numeric	Reasons for outside food - To try different food items	0 = Others 1 = To try different food items	Nominal
Reasons_Try_Different_Cuisines	Numeric	Reasons for outside food - To try different cuisines	0 = Others 1 = To try different cuisines	Nominal
Reasons_Experience_Different_Env	Numeric	Reasons for outside food - To experience different environment	0 = Others 1 = To experience different environment	Nominal
Reasons_Socialise	Numeric	Reasons for outside food -	0 = Others 1 = To socialise	Nominal

Reasons_Others	Numeri c	To socialise Reasons for outside food - Other	0 = Others 1 = Other	Nomin al
SMU1	Numeri c	Social Media Usage 1	1 = Strongly Disagree 2 = Disagree	Scale
SMU2	Numeri c	Social Media Usage 2	3 = Somewhat Disagree 4 = Neutral	Scale
SMU3	Numeri c	Social Media Usage 3	5 = Somewhat Agree 6 = Agree	Scale
SMU4	Numeri c	Social Media Usage 4	7 = Strongly Agree	Scale
SMU5	Numeri c	Social Media Usage 5		Scale
SMU6	Numeri c	Social Media Usage 6		Scale
SMU7	Numeri c	Social Media Usage 7		Scale
IBB1	Numeri c	Impulse Buying Behaviour 1		Scale
IBB2	Numeri c	Impulse Buying Behaviour 2		Scale
IBB3	Numeri c	Impulse Buying Behaviour 3		Scale
IBB4	Numeri c	Impulse Buying Behaviour 4		Scale
IBB5	Numeri c	Impulse Buying Behaviour 5		Scale
IBB6	Numeri c	Impulse Buying Behaviour 6		Scale
IBB7	Numeri c	Impulse Buying Behaviour 7		Scale
IBB8	Numeri c	Impulse Buying Behaviour 8		Scale
IBB9	Numeri c	Impulse Buying Behaviour 9		Scale
FR1	Numeri c	Frugality 1		Scale
FR2	Numeri c	Frugality 2		Scale
FR3	Numeri c	Frugality 3		Scale
FR4	Numeri c	Frugality 4		Scale
FR5	Numeri c	Frugality 5		Scale
FR6	Numeri c	Frugality 6		Scale
FR7	Numeri c	Frugality 7		Scale
FR8	Numeri c	Frugality 8		Scale
PT_NR1	Numeri c	Neuroticism 1		Scale
PT_NR2	Numeri c	Neuroticism 2		Scale
PT_NR3	Numeri	Neuroticism 3		Scale

PT_NR4	c Numeri	Neuroticism 4	Scale
PT_NR5	c Numeri	Neuroticism 5	Scale
PT_NR6	c Numeri	Neuroticism 6	Scale
PT_NR7	c Numeri	Neuroticism 7	Scale
PT_CN1	c Numeri	Conscientiousness 1	Scale
PT_CN2	c Numeri	Conscientiousness 2	Scale
PT_CN3	c Numeri	Conscientiousness 3	Scale
PT_CN4	c Numeri	Conscientiousness 4	Scale
PT_CN5	c Numeri	Conscientiousness 5	Scale
PT_AG1	c Numeri	Agreeableness 1	Scale
PT_AG2	c Numeri	Agreeableness 2	Scale
PT_AG3	c Numeri	Agreeableness 3	Scale
PT_AG4	c Numeri	Agreeableness 4	Scale
PT_AG5	c Numeri	Agreeableness 5	Scale
PT_AG6	c Numeri	Agreeableness 6	Scale
PT_AG7	c Numeri	Agreeableness 7	Scale
PT_EX1	c Numeri	Extraversion 1	Scale
PT_EX2	c Numeri	Extraversion 2	Scale
PT_EX3	c Numeri	Extraversion 3	Scale
PT_EX4	c Numeri	Extraversion 4	Scale
PT_EX5	c Numeri	Extraversion 5	Scale
PT_EX6	c Numeri	Extraversion 6	Scale
PT_EX7	c Numeri	Extraversion 7	Scale
PT_OP1	c Numeri	Openness 1	Scale
PT_OP2	c Numeri	Openness 2	Scale
PT_OP3	c Numeri	Openness 3	Scale
PT_OP4	c Numeri	Openness 4	Scale
PT_OP5	c Numeri	Openness 5	Scale

PT_OP6	Numeri c	Openness 6		Scale
PT_OP7	Numeri c	Openness 7		Scale
FW1	Numeri c	Food Waste 1		Scale
FW2	Numeri c	Food Waste 2		Scale
FW3	Numeri c	Food Waste 3		Scale
FW4	Numeri c	Food Waste 4		Scale
FW5	Numeri c	Food Waste 5		Scale
FW6	Numeri c	Food Waste 6		Scale
FW7	Numeri c	Food Waste 7		Scale
FW8	Numeri c	Food Waste 8		Scale
Gender	Numeri c	Gender of respondents	1 = Male 2 = Female	Nomin al
Ethnicity	Numeri c	Ethnicity of respondents	1 = Malay 2 = Chinese 3 = Indian 4 = Others	Nomin al
Nationality	Numeri c	Nationality of respondents	1 = Malaysian 2 = Non-Malaysian	Nomin al
Birth_Year	Numeri c	Generation X,Y,Z	1 = Generation Z 2 = Generation Y 3 = Generation X	Ordinal
Marital_Status	Numeri c	Marital status of respondents	1 = Single 2 = Married without children 3 = Married with children 4 = Widowed/divorced/separated	Nomin al
Income	Numeri c	Income of respondents	1 = Less than RM 1,000 2 = RM 1,000 – RM 1,999 3 = RM 2,000 – RM 3,999 4 = RM 4,000 – RM 5,999 5 = RM 6,000 – RM 7,999 6 = RM 8,000 – RM 9,999 7 = RM 10,000 and above	Ordinal
Occupation	Numeri c	Occupation of respondents	1 = Private 2 = Government/Semi-government 3 = Own business 4 = Student	Nomin al

Education	Numerical	Education of respondents	5 = Unemployed 6 = Others 1 = Primary School 2 = PMR/SRP/LCE 3 = SPM/SPMV/MCE 4 = STPM/HSC 5 = Certificate/Diploma 6 = Professional 7 = Bachelor's Degree 8 = Master's Degree 9 = Doctor of Philosophy (PhD)	Ordinal
D1	Numerical	Generation Z	0 = Others 1 = Generation Z	Nominal
D2	Numerical	Generation Y	0 = Others 1 = Generation Y	Nominal



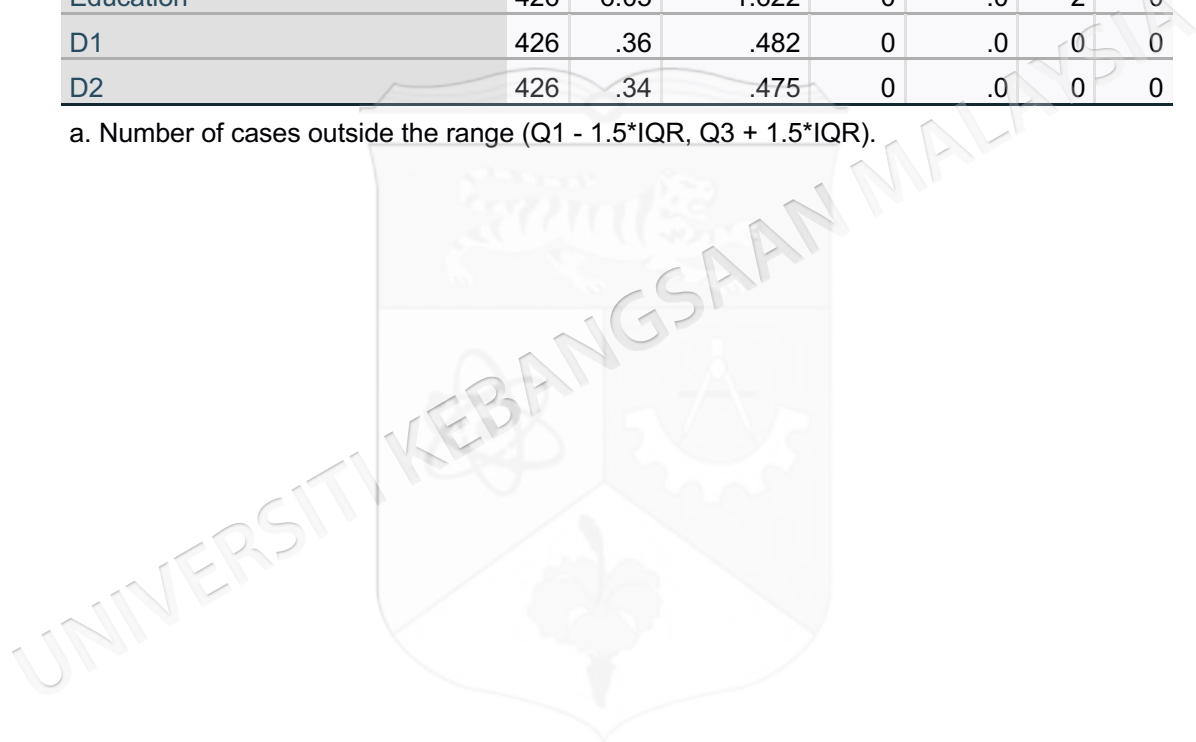
APPENDIX C
MISSING VALUE ANALYSIS

	N	Mean	Std. Deviation	Missing		No. of Extremes ^a	
				Count	Percent	Low	High
Household_Size	426	4.19	1.148	0	.0	52	0
Frequency_OutsideFood	426	4.29	1.026	0	.0	40	0
Frequency_Grocery_Purchase	426	3.76	.957	0	.0	7	0
Spending_OutsideFood	426	2.39	1.356	0	.0	0	0
Spending_Grocery	426	2.77	1.264	0	.0	0	66
Reasons_Convenience	426	.57	.496	0	.0	0	0
Reasons_BetterTaste	426	.20	.400	0	.0	.	.
Reasons_Try_Different_Food	426	.49	.500	0	.0	0	0
Reasons_Try_Different_Cuisines	426	.42	.494	0	.0	0	0
Reasons_Experience_Different_Env	426	.32	.467	0	.0	0	0
Reasons_Socialise	426	.24	.429	0	.0	.	.
Reasons_Others	426	.15	.362	0	.0	.	.
SMU1	426	6.07	1.339	0	.0	10	0
SMU2	426	5.46	1.503	0	.0	0	0
SMU3	426	3.57	1.807	0	.0	0	0
SMU4	426	5.81	1.401	0	.0	14	0
SMU5	426	3.84	1.860	0	.0	0	0
SMU6	426	4.16	1.778	0	.0	0	0
SMU7	426	2.64	1.854	0	.0	0	0
IBB1	426	4.42	1.687	0	.0	31	0
IBB2	426	3.97	1.815	0	.0	0	0
IBB3	426	3.31	1.835	0	.0	0	0
IBB4	426	3.41	1.926	0	.0	0	0
IBB5	426	3.24	1.898	0	.0	0	35
IBB6	426	3.49	1.912	0	.0	0	0
IBB7	426	4.87	1.827	0	.0	25	0
IBB8	426	3.77	1.941	0	.0	0	0
IBB9	426	3.93	1.788	0	.0	0	0
FR1	426	5.96	1.218	0	.0	5	0
FR2	426	5.00	1.707	0	.0	20	0
FR3	426	5.82	1.135	0	.0	1	0
FR4	426	5.73	1.347	0	.0	10	0
FR5	426	5.69	1.292	0	.0	9	0

FR6	426	5.50	1.331	0	.0	8	0
FR7	426	5.56	1.398	0	.0	11	0
FR8	426	5.58	1.314	0	.0	8	0
PT_NR1	426	3.80	1.740	0	.0	0	0
PT_NR2	426	4.28	1.753	0	.0	0	0
PT_NR3	426	3.72	1.688	0	.0	0	0
PT_NR4	426	3.63	1.608	0	.0	0	0
PT_NR5	426	3.64	1.632	0	.0	0	0
PT_NR6	426	3.45	1.783	0	.0	0	0
PT_NR7	426	4.14	1.764	0	.0	0	0
PT_CN1	426	5.20	1.301	0	.0	6	0
PT_CN2	426	4.86	1.615	0	.0	15	0
PT_CN3	426	4.93	1.367	0	.0	8	0
PT_CN4	426	5.20	1.189	0	.0	3	0
PT_CN5	426	4.38	1.664	0	.0	0	0
PT_AG1	426	5.71	1.245	0	.0	10	0
PT_AG2	426	5.68	1.222	0	.0	8	0
PT_AG3	426	5.32	1.359	0	.0	8	0
PT_AG4	426	5.47	1.320	0	.0	36	0
PT_AG5	426	4.25	1.708	0	.0	0	0
PT_AG6	426	5.17	1.569	0	.0	12	0
PT_AG7	426	5.59	1.556	0	.0	25	0
PT_EX1	426	3.78	1.818	0	.0	0	0
PT_EX2	426	3.80	1.821	0	.0	0	0
PT_EX3	426	4.53	1.599	0	.0	0	0
PT_EX4	426	4.26	1.528	0	.0	0	0
PT_EX5	426	4.65	1.524	0	.0	12	0
PT_EX6	426	4.35	1.530	0	.0	0	0
PT_EX7	426	4.27	1.630	0	.0	0	0
PT_OP1	426	5.04	1.301	0	.0	3	0
PT_OP2	426	4.50	1.367	0	.0	26	34
PT_OP3	426	5.08	1.490	0	.0	8	0
PT_OP4	426	5.19	1.419	0	.0	8	0
PT_OP5	426	4.63	1.469	0	.0	11	0
PT_OP6	426	5.33	1.423	0	.0	9	0
PT_OP7	426	4.63	1.589	0	.0	17	0
FW1	426	2.79	1.886	0	.0	0	0
FW2	426	3.39	1.908	0	.0	0	0
FW3	426	3.58	1.821	0	.0	0	0
FW4	426	2.69	1.730	0	.0	0	0

FW5	426	2.53	1.733	0	.0	0	40
FW6	426	2.58	1.743	0	.0	0	0
FW7	426	2.28	1.551	0	.0	0	23
FW8	426	2.52	1.697	0	.0	0	0
Gender	426	1.70	.459	0	.0	0	0
Ethnicity	426	1.32	.711	0	.0	.	.
Nationality	426	1.00	.000	0	.0	.	.
Birth_Year	426	1.93	.809	0	.0	0	0
Marital_Status	426	1.72	.950	0	.0	0	0
Income	426	4.10	2.097	0	.0	0	0
Occupation	426	2.62	1.364	0	.0	0	0
Education	426	6.05	1.622	0	.0	2	0
D1	426	.36	.482	0	.0	0	0
D2	426	.34	.475	0	.0	0	0

a. Number of cases outside the range ($Q1 - 1.5 \cdot IQR$, $Q3 + 1.5 \cdot IQR$).



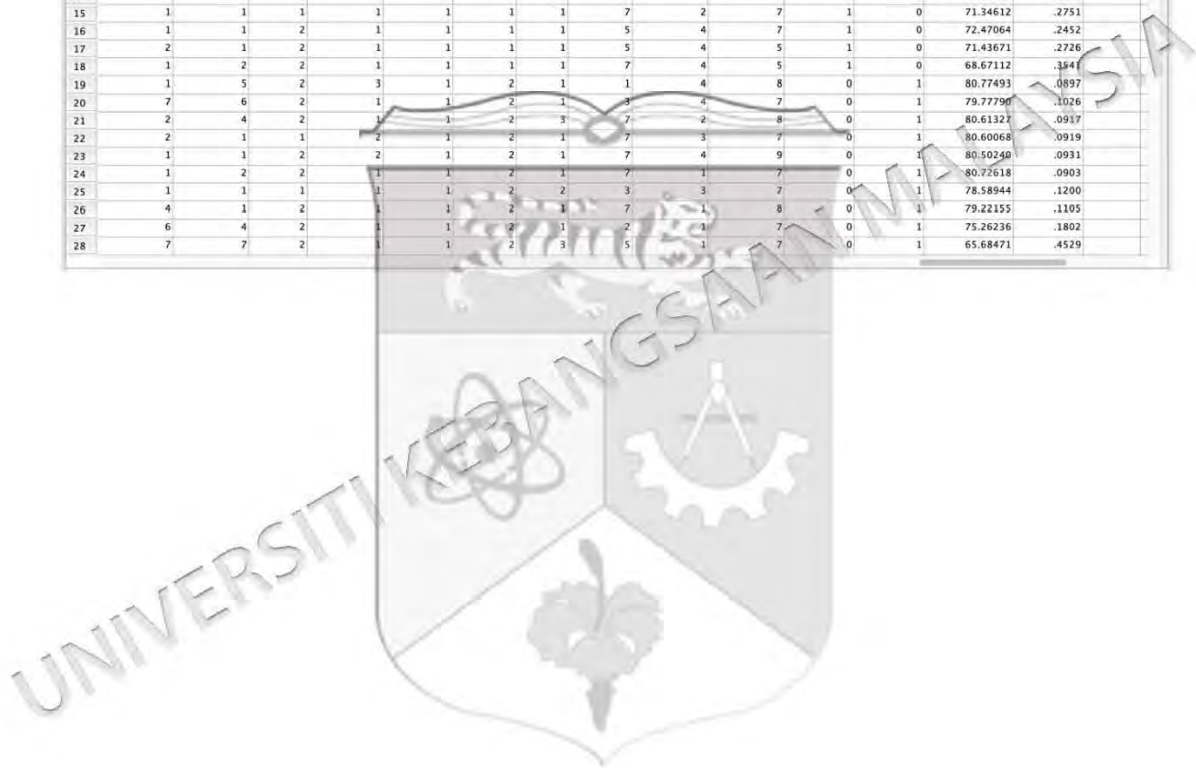
APPENDIX D

RESULTS OF MAHALANOBIS ANALYSIS FOR OUTLIERS

Mahal_Analysis.sav [DataSet1] - IBM SPSS Statistics Data Editor

Visible: 91 of 91 Variables

	FW7	FW8	Gender	Ethnicity	Nationality	Birth_Year	Marital_Status	Income	Occupation	Education	D1	D2	MAH_1	pMAH_1
1	1	1	2	3	1	1	1	1	4	5	1	0	83.24534	.0632
2	4	2	1	2	1	1	1	3	4	5	1	0	82.07002	.0749
3	2	2	2	1	1	1	1	3	4	7	1	0	81.03866	.0865
4	2	5	2	3	1	1	1	3	4	5	1	0	80.58952	.0920
5	1	1	2	1	1	1	1	1	4	5	1	0	81.59332	.0801
6	5	6	2	1	1	1	1	2	1	5	1	0	78.27206	.1249
7	1	1	2	1	1	1	1	7	4	7	1	0	79.34734	.1087
8	1	1	2	1	1	1	1	1	4	3	1	0	77.00027	.1465
9	2	3	2	1	1	1	1	4	4	5	1	0	74.81491	.1898
10	1	1	2	1	1	1	1	3	4	5	1	0	76.23650	.1607
11	2	3	2	1	1	1	1	5	2	5	1	0	75.71995	.1709
12	2	2	1	2	1	1	1	1	1	4	1	0	73.36755	.2229
13	1	1	2	3	1	1	1	1	4	7	1	0	71.42708	.2729
14	3	2	2	1	1	1	1	4	4	7	1	0	71.46196	.2719
15	1	1	1	1	1	1	1	7	2	7	1	0	71.34612	.2751
16	1	1	2	1	1	1	1	5	4	7	1	0	72.47064	.2452
17	2	1	2	1	1	1	1	5	4	5	1	0	71.43671	.2726
18	1	2	2	1	1	1	1	7	4	5	1	0	68.67112	.3841
19	1	5	2	3	1	2	1	1	4	8	0	1	80.77493	.0897
20	7	6	2	1	1	2	1	3	4	7	0	1	79.77796	.1026
21	2	4	2	1	1	2	3	7	2	8	0	1	80.61327	.0917
22	2	1	1	2	1	2	1	7	3	7	0	1	80.60068	.0919
23	1	1	2	2	1	2	1	7	4	9	0	1	80.50240	.0931
24	1	2	2	1	1	2	1	7	1	7	0	1	80.72618	.0903
25	1	1	1	1	1	2	2	3	3	7	0	1	78.58944	.1200
26	4	1	2	1	1	2	1	7	1	8	0	1	79.22155	.1105
27	6	4	2	1	1	2	1	2	1	7	0	1	75.26236	.1802
28	7	7	2	1	1	2	3	5	1	7	0	1	65.68471	.4529



APPENDIX E

MARDIA'S MULTIVARIATE KURTOSIS

Output of skewness and kurtosis calculation

Sample size: 387

Number of variables: 9

Univariate skewness and kurtosis

	Skewness	SE_skew	Z_skew	Kurtosis	SE_kurt	Z_kurt
FR	-0.161	0.124	-1.297	0.420	0.247	1.699
FW	0.974	0.124	7.854	0.409	0.247	1.655
IBB	0.172	0.124	1.385	-0.747	0.247	-3.020
PT_AG	-0.591	0.124	-4.767	-0.221	0.247	-0.893
PT_CN	-0.451	0.124	-3.638	-0.417	0.247	-1.685
PT_EX	-0.052	0.124	-0.423	0.184	0.247	0.743
PT_NR	-0.039	0.124	-0.312	-0.373	0.247	-1.507
PT_OP	0.129	0.124	1.040	1.878	0.247	7.589
SMU	-0.308	0.124	-2.485	-0.394	0.247	-1.590

Mardia's multivariate skewness and kurtosis

	b	z	p-value
Skewness	10.38504	669.834803	0
Kurtosis	112.42867	9.386979	0

APPENDIX F

TEST OF DIFFERENCES

		Group Statistics			
	Respondents	N	Mean	Std. Deviation	Std. Error Mean
SMU	Early	267	4.5404	1.16201	.07111
	Late	120	4.3857	1.15978	.10587
IBB	Early	267	3.8910	1.51889	.09295
	Late	120	3.7556	1.43349	.13086
FR	Early	267	5.6166	.86129	.05271
	Late	120	5.4896	.90307	.08244
PT_NR	Early	267	3.8625	1.28678	.07875
	Late	120	3.7214	1.28936	.11770
PT_CN	Early	267	4.8869	.93000	.05692
	Late	120	4.8967	.95828	.08748
PT_AG	Early	267	5.2215	.95672	.05855
	Late	120	5.1583	1.03428	.09442
PT_EX	Early	267	4.2322	1.07522	.06580
	Late	120	4.0917	1.09250	.09973
PT_OP	Early	267	4.8261	.97692	.05979
	Late	120	4.6679	.96201	.08782
FW	Early	267	2.6966	1.31113	.08024
	Late	120	2.6208	1.22173	.11153
Gender	Early	267	1.70	.461	.028
	Late	120	1.68	.467	.043
Birth_Year	Early	267	1.88	.812	.050
	Late	120	1.97	.809	.074
Income	Early	267	4.43	2.034	.122
	Late	120	3.55	2.096	.199
Education	Early	267	6.36	1.578	.095
	Late	120	5.66	1.424	.135

Independent Samples Test

		Levene's Test for Equality of Variances				95% Confidence Interval of the Difference				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SMU	Equal variances assumed	.032	.858	1.212	385	.226	.15468	.12763	-.09626	.40563
	Equal variances not assumed			1.213	229.685	.226	.15468	.12754	-.09661	.40598
IBB	Equal variances assumed	1.016	.314	.825	385	.410	.13541	.16409	-.18720	.45803
	Equal variances not assumed			.844	241.841	.400	.13541	.16051	-.18077	.45160
FR	Equal variances assumed	.749	.387	1.321	385	.187	.12699	.09610	-.06196	.31594
	Equal variances not assumed			1.298	219.755	.196	.12699	.09785	-.06585	.31983

PT_NR	Equal variances assumed	.065	.79 9	.997	385	.319	.14106	.14151	- .1371 6	.4192 9
	Equal variances not assumed			.996	228.86 7	.320	.14106	.14162	- .1379 7	.4201 0
PT_CN	Equal variances assumed	.291	.59 0	-.095	385	.925	-.00978	.10318	- .2126 4	.1930 9
	Equal variances not assumed			-.094	223.17 8	.925	-.00978	.10436	- .2154 4	.1958 9
PT_AG	Equal variances assumed	1.82 6	.17 7	.586	385	.558	.06318	.10785	- .1488 8	.2752 3
	Equal variances not assumed			.569	213.96 7	.570	.06318	.11110	- .1558 1	.2821 6
PT_EX	Equal variances assumed	.016	.90 1	1.18 3	385	.237	.14054	.11876	- .0929 6	.3740 4
	Equal variances not assumed			1.17 6	226.00 1	.241	.14054	.11948	- .0949 0	.3759 9
PT_OP	Equal variances assumed	.068	.79 5	1.48 1	385	.139	.15825	.10686	- .0518 5	.3683 6
	Equal variances not assumed			1.49 0	232.52 7	.138	.15825	.10624	- .0510 6	.3675 7

FW	Equal variance s assumed	1.26 4	.26 2	.537	385	.592	.07580	.14113	- .2016 9	.3532 8
	Equal variance s not assumed			.552	244.74 1	.582	.07580	.13739	- .1948 3	.3464 2
Gender	Equal variance s assumed	.266	.606	.262	385	.794	.013	.051	-.087	.113
	Equal variance s not assumed			.260	226.37 2	.795	.013	.051	-.087	.114
Birth_Year	Equal variance s assumed	.532	.466	-.929	385	.354	-.083	.089	-.258	.092
	Equal variance s not assumed			-.930	230.08 9	.353	-.083	.089	-.258	.093
Income	Equal variance s assumed	.394	.531	-.484	385	.629	-.115	.239	-.584	.354
	Equal variance s not assumed			-.490	236.52 2	.624	-.115	.235	-.579	.348
Education	Equal variance s assumed	.254	.614	-.304	385	.761	-.053	.173	-.392	.287
	Equal variance s not assumed			-.308	236.40 7	.758	-.053	.170	-.388	.283

APPENDIX G

HARMAN'S SINGLE FACTOR TEST

Component	Total Variance Explained					
	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.015	20.023	20.023	12.321	18.955	18.955
2	9.789	15.060	35.083			
3	4.192	6.450	41.533			
4	3.802	5.850	47.382			
5	2.419	3.722	51.104			
6	2.354	3.622	54.726			
7	1.809	2.784	57.509			
8	1.662	2.557	60.066			
9	1.506	2.317	62.383			
10	1.400	2.154	64.536			
11	1.264	1.944	66.480			
12	1.120	1.724	68.204			
13	1.092	1.680	69.884			
14	1.058	1.627	71.511			
15	.995	1.532	73.043			
16	.938	1.444	74.487			
17	.857	1.319	75.806			
18	.826	1.271	77.077			
19	.755	1.161	78.238			
20	.705	1.084	79.322			
21	.660	1.015	80.338			
22	.644	.990	81.328			
23	.616	.947	82.276			
24	.605	.930	83.206			
25	.563	.866	84.072			
26	.537	.826	84.898			
27	.514	.790	85.688			
28	.486	.747	86.435			
29	.471	.724	87.160			
30	.458	.705	87.865			
31	.412	.634	88.499			
32	.401	.616	89.115			
33	.390	.601	89.715			

34	.370	.570	90.285			
35	.368	.566	90.851			
36	.345	.531	91.382			
37	.337	.519	91.901			
38	.328	.505	92.405			
39	.307	.473	92.878			
40	.283	.436	93.314			
41	.283	.435	93.749			
42	.272	.419	94.168			
43	.255	.392	94.560			
44	.245	.376	94.936			
45	.242	.372	95.308			
46	.238	.365	95.674			
47	.224	.345	96.018			
48	.218	.335	96.353			
49	.211	.324	96.677			
50	.198	.305	96.982			
51	.190	.292	97.274			
52	.171	.264	97.538			
53	.164	.252	97.790			
54	.156	.240	98.029			
55	.154	.237	98.266			
56	.150	.231	98.497			
57	.141	.217	98.714			
58	.127	.195	98.909			
59	.121	.186	99.095			
60	.111	.171	99.265			
61	.109	.167	99.432			
62	.107	.165	99.597			
63	.098	.150	99.748			
64	.085	.131	99.879			
65	.079	.121	100.000			

APPENDIX H

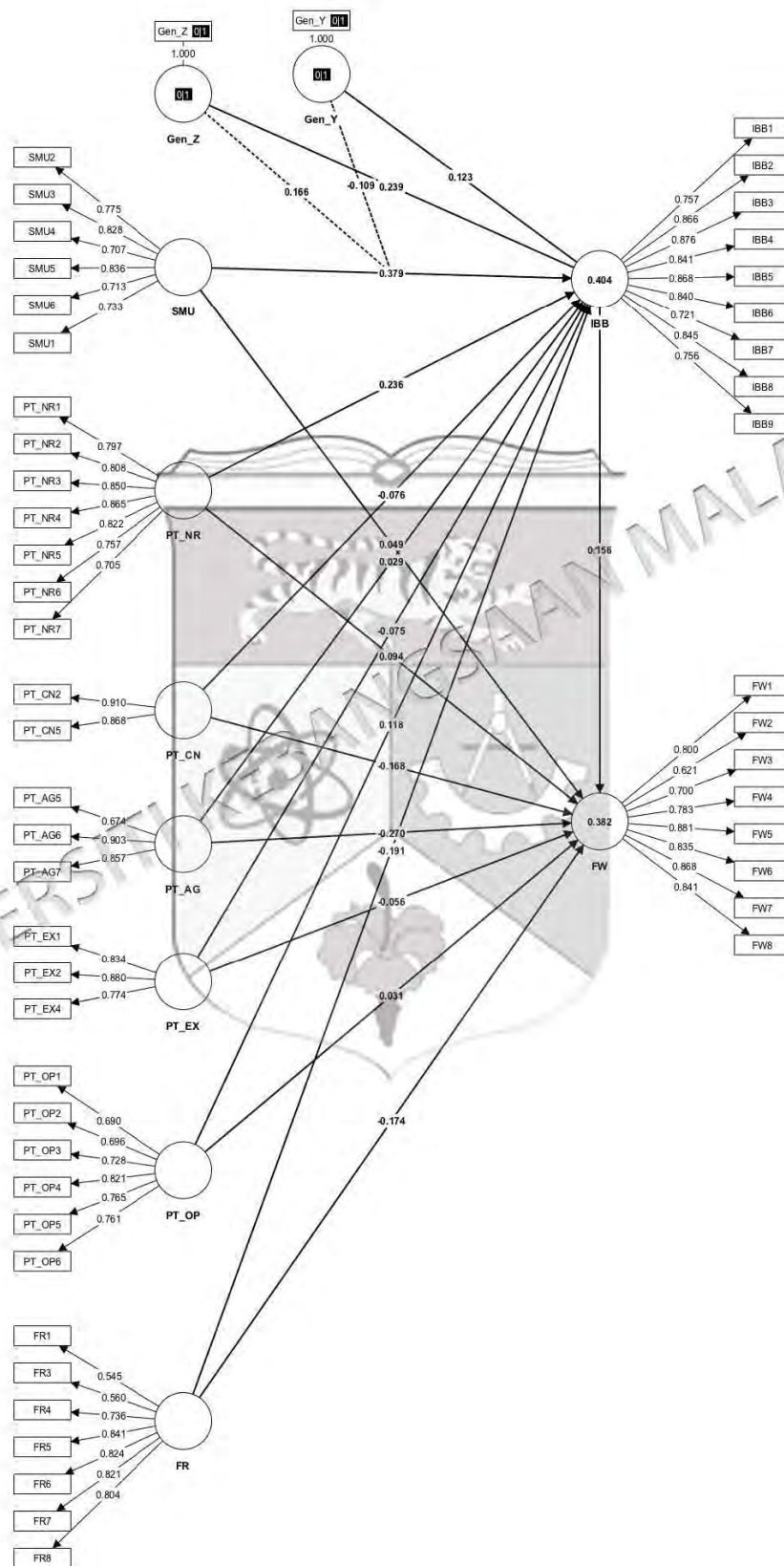
FULL COLLINEARITY ASSESSMENT

Model		Coefficients ^a					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	.676	.144		4.681	<.001		
	SMU	-.003	.017	-.012	-.192	.848	.614	1.629
	IBB	.010	.013	.052	.786	.432	.601	1.664
	FR	-.010	.020	-.030	-.478	.633	.665	1.503
	PT_NR	-.002	.014	-.009	-.139	.889	.571	1.750
	PT_CN	-.044	.019	-.141	-2.296	.022	.685	1.460
	PT_AG	.015	.021	.049	.715	.475	.550	1.820
	PT_EX	.004	.016	.014	.234	.815	.747	1.339
	PT_OP	.011	.019	.035	.567	.571	.697	1.436
	FW	-.022	.013	-.102	-1.613	.108	.645	1.551

a. Dependent Variable: Random

APPENDIX I

MEASUREMENT MODEL PLS OUTPUT



APPENDIX J

STRUCTURAL MODEL PLS OUTPUT

