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More Than a Meal: Consumer Values and Moral Considerations Behind China's Online Food Over-Ordering

Yanrui Michael Tao

taoyanrui@gmail.com

Pingdingshan University

Farzana Quoquab

Universiti Teknologi Malaysia

Jihad Mohammad

UCSI University

Yi Zhang

Xinxiang University

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Abstract

Food over-ordering in online food delivery services contributes significantly to resource inefficiency and food waste, posing challenges to sustainable consumption. Drawing on behavioural reasoning theory, this study investigates how experiential and environmental values shape consumers' moral disengagement, moral obligation, attitudes, and over-ordering behaviour in the context of Chinese online food delivery platforms. An online survey of 331 consumers was analysed using partial least squares structural equation modelling (PLS-SEM). The results indicate that attitude towards food over-ordering significantly increases over-ordering behaviour and mediates the relationship between experiential values and over-ordering behaviour. Moral obligation towards the environment negatively impacts both attitudes towards food over-ordering and their over-ordering behaviour, while moral disengagement positively affects over-ordering behaviour. Experiential and environmental values significantly influence moral obligation and moral disengagement. Experiential values affect attitudes towards food over-ordering, with various food choices moderating the relationship between attitudes towards food over-ordering and over-ordering behaviour. By integrating value-based and moral mechanisms, this study provides empirical evidence on consumer-level drivers of food waste within digitally mediated food systems and highlights pathways to reduce resource inefficiency and environmental burdens associated with food delivery services. The findings contribute to interdisciplinary research on sustainable consumption by demonstrating how value activation and moral engagement can support more environmentally sustainable consumption patterns in rapidly expanding food service sectors.

Paper type – Research paper

1. Introduction

The online food delivery service (OFDS) platform facilitates information exchange, providing consumers with convenient and diverse dining services (Ray et al., 2019), while creating growth opportunities for service platforms and restaurants (Kalantarzadeh Tezerjany, 2024). Although this industry provides consumers with more choices for obtaining food, it also exacerbates environmental problems (Tao et al., 2024). While consumers enjoy the convenience of having food delivered directly to their homes with just a few clicks on their smartphones (Wang et al., 2021), this convenience causes an increase in the consumption of plastic products, which imposes a significant burden on the natural environment (Guanghan et al., 2018; Li et al., 2021; Olsson et al., 2010; Shroff et al., 2022). Therefore, how to guide consumers to practice sustainable concepts in food delivery consumption has become a key issue in balancing industry development and ecological sustainability.

While prior research examines consumer behaviour through different perspectives (i.e., Hamid & Azhar, 2023; Su et al., 2022), critical gaps persist regarding food waste's environmental, economic, and social impacts (Papargyropoulou et al., 2014; Thyberg & Tonjes, 2016). Firstly, although past research has been conducted on food waste, the role of OFDS in exacerbating food waste through over-ordering has not been fully examined. Since the convenience of OFDS and the marketing strategies adopted by practitioners may inadvertently encourage over-ordering. Secondly, the behavioural reasoning theory (BRT), which considers reasons for/against specific behaviours (Sharma et al., 2021) was rarely applied compared to other single-perspective frameworks. BRT theory helps to elucidate the subtle decision-making processes that consumers experience when using online delivery platforms. Thirdly, while consumer experiences generate multifaceted values (experiential, environmental) that shape attitudes and behaviours, their interplay with moral considerations

(disengagement, obligations) remains under-examined. Addressing these gaps is crucial for reducing food waste caused by over-ordering and promoting sustainability in the industry.

Based on the discussions, this study aims to examine the direct relationship between experiential value, environmental value, moral disengagement, moral obligation, attitude towards over-ordering behaviour and over-ordering behaviour. Both experiential and environmental values may influence consumers' moral considerations, leading to different moral choices that further impact their attitudes and behaviours. Besides, this study also examines the mediation effect of attitudes towards food over-ordering and the moderating effects of various food choices and convenience. Utilising BRT theory, this research aims to provide a comprehensive understanding of the values and moral considerations driving over-ordering in the OFDS industry. By addressing those gaps, it addresses the importance of understanding consumer values, ethical considerations, and attitudes toward consumption behaviours, offering valuable insights for marketers to develop more inclusive and effective strategies to combat over-ordering in OFDS.

2. Literature review and hypotheses development

2.1 Behavioural Reasoning Theory

Over-ordering on OFDS platforms drives food waste, harming the environment and sustainable human development (Islam et al., 2023). While frameworks like the value-belief-norm theory (VBN) (Stern et al., 1999) and the Planned Behaviour Theory (TPB) (Ajzen, 1991) analyse consumer behaviour, they ignore the against-perspective. BRT (Westaby, 2005) addresses this gap by examining both reasons for and against behaviours, linking them to individual values and beliefs (Tandon et al., 2020).

The current study employs BRT theory to examine the factors driving over-ordering behaviours in OFDS. Previous research has highlighted the significant impact of experiential (Sharma, 2021) and environmental (Tamar et al., 2021) factors on individual sustainable behaviour. To investigate their effects on consumer over-ordering behaviours, this study conceptualises these factors as values. Additionally, this study introduces the constructs of moral disengagement (reasons against) and moral obligation (reasons for) to assess their impact on over-ordering behaviour. These values and reasons collectively shape an individual's global motives, and this study uses the attitude towards over-ordering as a measure of BRT's global motives component. By analysing how these factors interact, this study aims to gain a deeper understanding of over-ordering behaviour in OFDS and provide strategies for marketers.

2.2 Attitude towards food over-ordering and over-ordering Behaviour

Past studies examined the relationship between attitude and behaviour in different contexts, and this link has been widely examined, such as the impact of eco-friendly purchasing attitudes in the sharing economy (Matharu et al., 2020), and how preferences for local foods influence decisions about travel destinations (Choe & Kim, 2018). Based on that, we predict that consumer attitudes may similarly influence over-ordering behaviour. Specifically, a positive attitude toward over-ordering food may lead consumers to order more food than they need. This is consistent with the finding of Sharma et al. (2021) that consumers' positive attitudes are related to an increase in shopping routines. Additionally, due to information asymmetries, the OFDS

environment may amplify such behaviour, for instance, consumers are unclear about the portions and ingredients of meals, which can inadvertently lead to over-ordering (Li et al., 2024). Therefore, we assume that:

H1: Attitude towards food over-ordering has a significant and positive impact on over-ordering behaviour.

2.3 Reasons, attitude towards food over-ordering and over-ordering behaviour

Moral factors play important roles in influencing consumers' environmental behaviours. Prior research has shown that moral norms can help individuals avoid wasting food (Chen, 2023; Sampene et al., 2023). Additionally, Aydin and Yildirim (2021) identified a negative relationship between moral attitudes and consumer behaviours related to food waste, while Kirmani et al. (2023) mentioned that moral obligations positively influence attitudes toward sharing leftover food. Building on the findings, we are aiming to examine the impact of moral obligations on consumers' reactions. Moral obligation towards the environment is defined as the belief in an individual's duty to choose services and options that minimise environmental harm (O'Connor & Assaker, 2021). Many consumers recognise that unsustainable food waste behaviours negatively impact the environment and sustainable development (Wakefield & Axon, 2020), and their moral obligation may prevent their unsustainable reactions. Thus, we expect that their moral obligations not only influence individuals' attitudes toward over-ordering, but also their over-ordering behaviour.

H2: Moral obligation towards the environment has a significant and negative impact on attitudes towards food over-ordering.

H3: Moral obligation towards the environment has a significant and negative impact on food over-ordering behaviour.

On the contrary, moral disengagement refers to a cognitive process in which consumers defend their choices that have a negative impact on the environment, to avoid feeling guilty or painful about their negative environmental behaviour (Bandura, 1999). A simpler explanation is that moral disengagement is an individual's method of rationalising their departure from moral standards (Tao et al., 2024). Past studies have shown that moral disengagement can affect attitudes by enabling consumers to rationalise actions that contradict their environmental values, thereby maintaining a positive self-image despite engaging in unsustainable practices (Sharma & Lal, 2020; Yakut, 2021). Moral disengagement can also further influence an individual's environmental behaviours, allowing consumers to participate in unsustainable actions without experiencing the guilt typically associated with their environmental attitudes (Bandura, 1999; Harris & He, 2019; Kilian & Mann, 2020). Based on the previous findings, when consumers place orders online, they might justify over-ordering by minimising the perceived impact of their behaviour or shifting responsibility to service providers and condoning unsustainable reactions. Thus, this study proposes that

H4: Moral disengagement has a significant and positive impact on attitudes towards food over-ordering.

H5: Moral disengagement has a significant and positive impact on over-ordering behaviour.

2.4 Experiential Value

Holbrook (1999, p.5) defined consumer value as "a relativism-based interactive preference experience characterised by a subject's interaction with a product or service", indicating the significance of the interaction between customers and products in shaping perceived values. Expanding on this, Mathwick et al. (2001) described experiential value as the benefits gained through direct interaction or indirect appreciation (such as remote observation) with a product or service. Flint (2006) further argued that consumers actively contribute to the creation of experiential value through their consumption activities. Similarly, Varshneya and Das (2017) posited that consumer experience involves a series of different signals that interact with consumers, not in isolation but as a cohesive framework aimed at providing value through every buying experience. Building on these perspectives, this study measures the experiential value from three dimensions: aesthetics, service excellence, and consumer ROI (Mathwick et al., 2001), and based on the suggestion of Varshneya and Das (2017), this study considers experiential value as a second-order construct.

Attitude is understood as rooted in emotional, behavioural, and cognitive elements, as they are based on self-acquisition rather than external sources (Van Wee et al., 2019). Accordingly, self-acquired experiences play a crucial role in shaping consumer attitudes (Hanafiah et al., 2021). When individuals accumulate rich personal experiences, attitudes are formed through cognitive responses, suggesting that consumers' experiential values (such as aesthetics, service quality, and ROI) can influence their attitudes toward a product or service. Besides, Mohammad et al. (2022) and Ahn et al. (2019) mentioned that the value of experience can have different impacts on attitudes in different contexts. Thus, there is a pressing need to examine this relationship specifically in the OFDS sector. Given that consumers' ordering decisions are often influenced by past experiences, factors such as exceptional service, competitive pricing, and visually appealing food images may create a more favourable perception of merchants or products. This, in turn, can influence consumers' attitudes towards food over-ordering. Thus, this study proposes:

H6: Experiential value has a significant and positive impact on attitudes towards food over-ordering.

The issue of food waste is universally regarded as a behaviour to be avoided across various contexts (Gjerris & Gaiani, 2013). Extensive evidence indicates that consumers often experience feelings of guilt when they find themselves wasting food (Li & Roe, 2024; Roe et al., 2020). Thus, when the experiential value of a consumer's dining experience inspires their moral obligation, they may realise the importance of minimising waste and choosing environmentally friendly choices (Lehtokunnas et al., 2022). On the contrary, when the experiential value of consumers triggers moral disengagement, like when facing tempting discounts. They may defend their attitude of over-ordering by focusing on immediate satisfaction and ignoring long-term consequences or moral considerations, thereby avoiding guilt (Leviston & Walker, 2020).

H7: Experiential value has a significant and positive impact on moral obligation towards the environment.

H8: Experiential value has a significant and positive impact on moral disengagement.

2.5 Environmental Value

Faced with unprecedented environmental challenges, modern consumers are increasingly drawn to sustainable products (Lazaric et al., 2020; Punyatoya, 2015) and are becoming increasingly aware of how their consumption habits affect the environment (Gomes et al., 2023). This heightened awareness not only influences purchasing decisions but also shapes consumers' attitudes toward responsible consumption. Past

research has found that environmental values are an important determinant of pro-environmental decisions (Ünal et al., 2018), with environmental value addressed as the way individuals perceive and interact with the natural environment (Boeve-de Pauw et al., 2012). Biswas and Roy (2015) further elaborated that it contains relatively stable beliefs concerning issues such as the earth's population limits and the relationship between the environment and development. Expanding on this perspective, Bogner and Wiseman (2006) introduced a two-dimensional framework of environmental value: “preservation” and “utilisation.” While these dimensions represent distinct aspects of environmental concern, Milfont and Duckitt (2004) argued that they are not mutually exclusive. Instead, individuals can simultaneously support both environmental preservation and resource utilisation, believing that these values can coexist in promoting environmental protection. This also reflects that treating environmental value as a second-order construct can provide a more comprehensive understanding of the impact of environmental value on consumers' attitudes and behaviours. Based on these insights, we believe that environmental values can influence individuals to face environmental issues with a positive attitude. In the OFDS, when consumers order food online, their environmental value also suppresses their attitude of over-ordering to avoid food waste. Thus:

H9: Environmental value has a significant and negative impact on attitudes towards food over-ordering.

When individuals perceive their online ordering experience from the perspective of environmental values, they are more likely to internalise a sense of moral responsibility and minimise waste as much as possible (Lehtokunnas et al., 2022). These values align with the moral obligation of sustainable action and minimise environmental harm. As a result, individuals who hold strong environmental values are less prone to moral disengagement when confronted with ecological issues. Detert et al. (2008) also found that empathy can suppress moral disengagement. In the OFDS, environmental values not only cultivate individuals' sense of moral obligation, but may also trigger sympathetic responses towards environmental degradation (such as food waste), thereby further avoiding moral disengagement. Therefore, this study considers that:

H10: Environmental value has a significant and positive impact on moral obligation.

H11: Environmental value has a significant and negative impact on moral disengagement.

2.6 Attitude towards food over-ordering as a mediator

Tandon et al. (2020) highlighted that a clearer understanding of mediators can help close the gap between consumer attitudes and behaviours. Accordingly, examining the mediating role of attitudes provides insight into the decision-making processes behind online food ordering. Quach et al. (2020) have demonstrated that consumer attitudes can mediate experiential value and purchasing behaviour in social media activities. In the current context, a good experience can significantly enhance experiential value, leading consumers to over-order as they seek to explore different culinary options and maximise their dining experiences. Based on BRT theory, this study proposes that experiential value shapes consumers' attitudes toward over-ordering, which in turn influences their further behaviours.

Environmental value reflects an individual’s concern for sustainability and the ecological impact of their consumption choices, and plays a fundamental role in shaping sustainable consumer habits (Biswas & Roy, 2015). Shin et al. (2017) highlighted that attitudes reflect an individual's values and that environmental attitudes are a key prerequisite for environmental behaviour. According to BRT theory, individuals who prioritise

environmental issues are likely to develop negative attitudes towards food over-ordering due to its wastefulness and adverse environmental impact. This attitude mediates the relationship between environmental values and over-ordering behaviour. Previous research has validated the value-attitude-behaviour (VAB) hypothesis across various contexts (Sadiq et al., 2022; Shin et al., 2017), highlighting the need to explore this relationship within the context of OFDS. Thus, this study seeks to enhance understanding of how attitudes may influence behaviour in this context and proposes the following hypotheses:

H12: Attitude towards food over-ordering mediates the relationship between experiential value and food over-ordering behaviour.

H13: Attitude towards food over-ordering mediates the relationship between environmental value and food over-ordering behaviour.

2.7 Moderating effects

Online platforms provide efficient and convenient choices for people's lives (Duarte et al., 2018), a benefit that is particularly evident in OFDS, where consumers can easily order meals from the comfort of their homes (Keeble et al., 2022). According to Bao and Zhu (2021), diverse food choices enhance consumer perceived value and satisfaction, which in turn influence consumer behaviour. They further explain that the convenience and variety of food choices available anytime, anywhere are crucial factors affecting service quality. Supporting this view, past studies have argued that service quality significantly impacts consumer intentions in different contexts (Ahmad & Zhang, 2020; Gulzari et al., 2022). Based on these findings, this study believes that a convenient and simple ordering process and an irresistible variety of food choices will make it difficult for people to resist temptation, leading to an attitude of over-ordering, ultimately evolving into behaviour.

H14: Various food choice has a moderating effect on the link between attitude towards food over-ordering and food over-ordering behaviour.

H15: Convenience has a moderating effect on the link between attitude towards food over-ordering and food over-ordering behaviour.

The hypothetical relationship between the suggested variables is shown in Fig. 1.

<Insert Fig. 1 here>

3. Methodology

3.1 Sample and data collection

Data were collected using the Chinese online survey platform Wenjuanxing, targeting individuals aged 18 and above who had used OFDS in China. A non-probability convenience sampling method was employed, with the questionnaire distributed via forums, social media, and survey websites. To ensure the questionnaire's validity, all items used in the study were sourced from previous research and underwent multiple reviews before distribution. Appendix 1 shows the measurement items. Besides, based on Hair et al. (2021), a minimum of 250 responses was required, based on the rule of five respondents per item (50*5 = 250). A total of 350 responses were collected, with 347 deemed valid. After removing outliers, 331 responses for further analysis.

3.2 Respondents’ profile

Based on the collected data, this study analysed participants' demographic characteristics. Specifically, among the 331 participants, the participation rates of males (57%) and females (43%) were similar. In addition, participants aged 18–35 are the largest group, accounting for 75% of all samples. Additionally, most respondents were single (55%) and held bachelor’s degrees (52%). Besides, the participants are from various parts of China and are relatively evenly distributed. Students (27%) and professionals (14%) constituted the largest occupational group. In terms of income, 47% earned between CNY 4,001 and 7,000, while 25% earned between CNY 7,001 and 10,000. Please refer to Appendix 2 for details.

4. Analysis and findings

4.1 Model assessment

This study employs PLS-SEM (SmartPLS 4.0) to analyse the proposed model. PLS-SEM is well-suited for exploratory research, enabling simultaneous evaluation of measurement and structural models while maximising explained variance (Hair et al., 2019; Mohammad et al., 2021). Based on the two-stage approach, the study first assessed the measurement model’s validity and reliability, then evaluated the structural model’s predictive power (Hair et al., 2021; Zhang et al., 2023). Path significance was tested using bootstrapping with 5,000 resamples (Hair et al., 2021). Since both independent and dependent variables were measured from the same respondents, it was necessary to examine common method variance (CMV) (Podsakoff et al., 2003). To resolve this problem, this study followed the guidance of Podsakoff et al. (2003), including conducting Harman's single-factor test using principal component analysis (PCA) without rotation. The analysis indicated that CMV was not a concern, as the first component accounted for only 31.901% of the total variance.

4.2 Assessment of measurement model

In this study, all 12 constructs were assessed reflectively and evaluated for internal consistency reliability and validity (Hair et al., 2019). Table 1 indicates that outer loadings for all items were above 0.60, with composite reliability (CR) and Cronbach's alpha (CA) for all constructs exceeding the recommended threshold of 0.7, and the average variance extracted (AVE) for all constructs surpassing the advised value of 0.50 (Hair et al., 2021). These results collectively support the robustness and adequacy of the measurement model in terms of internal consistency and convergent validity (Hair et al., 2021).

Table 1
Reliability and convergent validity

Construct	Item	Outer loadings	Cronbach's alpha	Composite reliability	AVE
Aesthetic (AES)	AES1	0.871	0.827	0.877	0.647
	AES2	0.860			
	AES3	0.884			
	AES4	0.555			
Convenience (CV)	CV1	0.975	0.900	0.923	0.802
	CV2	0.939			
	CV3	0.757			
Moral disengagement (MD)	MD1	0.835	0.786	0.857	0.605
	MD2	0.881			
	MD3	0.763			
	MD4	0.604			
Moral obligation towards the environment (MOB)	MOB1	0.962	0.955	0.971	0.918
	MOB2	0.964			
	MOB3	0.948			
Attitude towards food over-ordering (OA)	OA1	0.778	0.846	0.892	0.677
	OA2	0.913			
	OA3	0.912			
	OA4	0.661			
Over-ordering behaviour (OOB)	OOB1	0.701	0.910	0.931	0.694
	OOB2	0.870			
	OOB3	0.826			
	OOB4	0.902			
	OOB5	0.871			
	OOB6	0.811			
Preservation (PR)	PR1	0.790	0.843	0.882	0.521
	PR2	0.705			
	PR3	0.542			

Construct	Item	Outer loadings	Cronbach's alpha	Composite reliability	AVE
	PR4	0.634			
	PR5	0.826			
	PR6	0.805			
	PR7	0.707			
Consumer ROI (ROI)	ROI1	0.727	0.729	0.841	0.639
	ROI2	0.856			
	ROI3	0.810			
Service Excellence (SE)	SE1	0.775	0.855	0.897	0.639
	SE2	0.689			
	SE3	0.705			
	SE4	0.905			
	SE5	0.895			
Utilization (UT)	UT1	0.861	0.927	0.941	0.667
	UT2	0.892			
	UT3	0.890			
	UT4	0.758			
	UT5	0.901			
	UT6	0.809			
	UT7	0.596			
	UT8	0.784			
Various food choices (VF)	VF1	0.945	0.919	0.947	0.857
	VF2	0.953			
	VF3	0.878			

To assess discriminant validity, both the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT) method were employed (Mohammad et al., 2021). Table 2 presents these results. The square root of AVE (diagonal values) was greater than the corresponding row and column values, and all HTMT values were below 0.85. Therefore, the model showed good discriminant validity and is appropriate for the following research.

Table 2
The Heterotrait-Monotrait ratio of correlations (HTMT) and Fornell and Larcker discriminant validity

AES	**AES**	**CV**	**MD**	**MOB**	**OA**	**OOB**	**PR**	**ROI**	**SE**	**UT**	**VF**
CV	0.251										
MD	0.163	0.130									
MOB	0.222	0.477	0.246								
OA	0.217	0.221	0.112	0.120							
OOB	0.122	0.112	0.425	0.216	0.153						
PR	0.265	0.526	0.278	0.678	0.193	0.227					
ROI	0.334	0.426	0.091	0.492	0.355	0.091	0.495				
SE	0.272	0.463	0.163	0.597	0.319	0.188	0.657	0.615			
UT	0.085	0.162	0.654	0.408	0.109	0.260	0.462	0.119	0.197		
VF	0.249	0.842	0.124	0.548	0.194	0.142	0.529	0.517	0.555	0.177	
	ASE	CV	MD	MOB	OA	OOB	PR	ROI	SE	UT	VF
AES	0.804										
CV	0.229	0.895									
MD	0.063	-0.086	0.778								
MOB	0.230	0.448	-0.261	0.958							
OA	0.172	0.201	-0.091	0.127	0.823						
OOB	0.031	-0.127	0.368	-0.214	0.103	0.833					
PR	0.236	0.469	-0.239	0.619	0.181	-0.204	0.722				
ROI	0.256	0.345	-0.028	0.435	0.285	-0.042	0.407	0.799			
SE	0.242	0.422	-0.059	0.547	0.288	-0.179	0.568	0.513	0.799		
UT	0.008	0.172	-0.598	0.397	0.097	-0.251	0.421	-0.001	0.191	0.817	
VF	0.237	0.761	-0.095	0.514	0.176	-0.138	0.478	0.442	0.502	0.172	0.926

<Insert Table 1 here>

<Insert Table 2 here>

4.3 Structural model assessment

Hair et al. (2021) pointed out that evaluating a structural model involves examining the path coefficient, the coefficient of determination (R^2), effect sizes (F^2), and predictive relevance (Q^2). As indicated in Table 3 and

based on the guidance of Cohen (1988), the R^2 values for MD and MOB are greater than 0.26, demonstrating a significant amount of explained variance in these variables. OA (0.127) and OOB (0.190) exhibit moderate variance, explained by their antecedents. For predictive power, all Q^2 values are greater than zero (Hair et al., 2021). This indicates that the model has significant predictive relevance for all endogenous constructs. This study also evaluated the effect size (F^2) of each exogenous variable based on the guidance of Cohen (1988), Table 4 shows the result.

Table 3
Results of the structural model.

No.	Relationships	β	SE	t. values	R^2	F^2	Q^2	Decision
H1	OA- >OOB	0.161	0.059	2.729	0.190	0.029	0.041	S
H2	MOB- >OA	-0.165	0.081	2.038	0.127	0.016	0.084	S
H3	MOB- >OOB	-0.081	0.040	2.025		0.006		S
H4	MD- >OA	-0.082	0.081	1.012		0.005		NS
H5	MD- >OOB	0.362	0.053	6.850		0.143		S
H6	EXV- >OA	0.409	0.066	6.212		0.121		S
H7	EXV- >MOB	0.410	0.049	8.413	0.489	0.276	0.476	S
H8	EXV- >MD	0.198	0.065	3.066	0.294	0.047	0.277	S
H9	ENV- >OA	0.034	0.099	0.349		0.001		NS
H10	ENV- >MOB	0.426	0.047	8.990		0.298		S
H11	ENV- >MD	-0.590	0.063	9.435		0.415		S

Table 4
Results of indirect effects

No.	Relationships	β	SE	t. values	CI: [LL-UL]	Decision
H12	EXV- >OA- >OOB	0.070	0.028	2.532	[0.026, 0.113]	S
H13	ENV- >OA- >OOB	0.006	0.018	0.319	[-0.020, 0.038]	NS
H14	VF*OA- >OOB	0.173	0.101	1.714	[0.033, 0.366]	S
H15	CV*OA- >OOB	-0.114	0.095	1.205	[-0.299, 0.016]	NS

Furthermore, according to the guidance of Hair et al. (2021), the path coefficients (β) were assessed through a bootstrapping procedure using 5000 resamples. According to Table 3, attitude towards food over-ordering (β = 0.161, t = 2.729, p<0.05) positively affects over-ordering behaviour, which means H1 was supported. In addition, moral obligation towards the environment has a negative effect on attitude towards food over-ordering (β=-0.165, t = 2.038, p<0.05) but no significant impact on over-ordering behaviour (β=-0.081, t = 2.025, p<0.05), which reflects that H2 and H3 were supported. Additionally, moral disengagement does not significantly affect attitudes towards food over-ordering (β=-0.082, t = 1.012, p > 0.05), but it has a significant positive impact on

over-ordering behaviour (β = 0.362, t = 6.850, p < 0.05). Therefore, H4 was not supported, whereas H5 was supported. Next, experiential values positively affect attitude towards food over-ordering (β = 0.409, t = 6.212, p<0.05), moral obligation towards the environment (β = 0.410, t = 8.413, p<0.05), moral disengagement (β = 0.198, t = 3.066, p<0.05), which means that H6, H7, and H8 were supported. Moreover, environmental values positively affect attitude towards food over-ordering (β = 0.034, t = 0.349, p>0.05), moral obligation towards the environment (β = 0.426, t = 8.990, p<0.05), and negatively affect moral disengagement (β=-0.590, t = 9.435, p<0.05), which indicates that H9 was rejected, but H10 and H11 were supported.

<Insert Table 3 here>

Besides, the mediating effects were examined using the bootstrapping method (Mohammad et al., 2021). Table 4 shows the result. First, the bootstrapping results showed a significant mediating effect of attitude towards food over-ordering (β = 0.070, t = 2.532, p<0.05) between experiential value and over-ordering behaviour, and 95% Boot CI: [0.026, 0.113], which indicates H12 was supported. Second, the result shows a mediating effect of attitude towards food over-ordering (β = 0.006, t = 0.319, p<0.05), between environmental value and over-ordering behaviour, because 95% Boot CI: [-0.020, 0.038] includes 0, which shows this mediation effect is not significant. Thus, H13 was rejected. Moreover, this study also examined the moderating effects of various food choices (β = 0.173, t = 1.714, p<0.05) and convenience (β=-0.114, t = 1.205, p > 0.05) between attitudes towards food over-ordering and over-ordering behaviour. The outcome shows that H14 was supported, and H15 was rejected. All results are shown in Fig. 2.

<Insert Table 4 here>

<Insert Fig. 2 here>

5. Discussions and conclusions

Over-ordering is considered as a key contributor to food waste (Sharma et al., 2024). As the need to reduce its negative impact on both human well-being and the environment grows more urgent, it is also necessary to address this issue within emerging industries (Tao et al., 2024). Based on this concern, we examined the issue of food over-ordering driven by OFDS in mainland China. This study is based on BRT theory to examine the interaction between different values and reasons, attitude and over-ordering behaviour. Additionally, this study examined the mediation effects of OA and the moderating effects of VF and CV. To achieve these goals, a theoretical framework grounded in BRT was established and tested using PLS-SEM. The following paragraphs provide a detailed discussion of the findings.

The results of this study provide evidence for the relationship between OA and OOB (H1). This finding supports the view that environmental attitudes have a significant impact on an individual’s behaviour (Matharu et al., 2020). Thus, it is believed that Chinese consumers who hold a positive attitude towards over-ordering when using OFDS can result in ordering more food than necessary and ultimately result in over-ordering. In addition, this study also confirmed the moderating effects of various food choices on OA and OOB (H14), but the moderating effect of convenience (H15) on the same link was not supported. Those findings highlight that food variety is a key aspect of service quality that may encourage them to try more foods, leading them to overlook their actual needs and ultimately resulting in over-ordering (Bao & Zhu, 2021). In contrast, convenience only reduces the difficulty of ordering and does not affect consumers' psychological motivation or decision-making

process. While Prakash et al. (2023) highlighted a positive link between convenience and green consumer behaviour, the present study offers new insights by revealing that convenience has no significant effect on non-green behaviours.

This study supports BRT by confirming the influence of moral obligation (reasons for) and moral disengagement (reasons against) on individual behaviour. MOB, as the positive reason, has been found to have negative effects on OA (H2) and OOB (H3). These findings align with the past studies that reflected moral obligations can constrain an individual's over-ordering, either in attitude or behaviour. Such internal constraints promote pro-environmental awareness (Zhang et al., 2023), encouraging individuals to consider their actual food needs and avoid unnecessary waste when ordering. On the other hand, moral disengagement, as against reason, has been found to have a negative effect on OA (H4), which is contrary to the expectation. This surprising result might be influenced by cultural factors, particularly the attitudes of Chinese consumers who may hold strong ethical views against wastefulness, even if they are morally disengaged. Cultural norms in China emphasize frugality and respect for food (Long et al., 2024), which could lead morally disengaged individuals to still maintain a negative attitude towards over-ordering. However, the relationship between MD and OOB (H5) aligned with expectations, showing a positive effect. This indicates that individuals who morally disengage are more likely to rationalise or justify their over-ordering behaviour (Bandura, 1999), reducing guilt and making such behaviour more likely. This consistency suggests that while MD might not shift attitudes as expected due to cultural influences, it does facilitate over-ordering behaviour by reducing internal conflict and ethical concerns in the context of OFDS.

According to BRT, this study also examines the relationships between values, reasons and the global motives. The results support the direct relationships between EXV and OA (H6), MOB (H7), and MD (H8). When consumers gain high experiential value, this experiential value inspires a positive attitude towards further experiencing the service. The result of H6 is consistent with the findings of Mohammad et al. (2022) and Ahn et al. (2019). In OFDS, beautiful presentations, excellent service, and perceived cost-effectiveness enhance consumer satisfaction and encourage consumers to try more dishes and services. Therefore, over-ordering is a forgivable behaviour by consumers in this situation. Besides, we found that EXV also significantly influences both MOB (H7) and MD (H8), revealing a complex psychological mechanism. On one hand, when consumers' dining experiences are rich in experiential value, they are more likely to feel a moral obligation to minimize food waste and make environmentally friendly choices. This finding aligns with Lehtokunnas et al. (2022), suggesting that the positive emotions and satisfaction derived from these experiences heighten consumers' awareness of their environmental responsibilities, promoting sustainable behaviours. On the other hand, the indulgent nature of high experiential value can also foster moral disengagement, where consumers rationalise over-ordering by emphasising short-term enjoyment while downplaying long-term consequences (Moore, 2008; Sharma & Paço, 2021). This rationalisation reduces feelings of guilt associated with food waste, making over-ordering more justifiable. Thus, while EXV can encourage responsible consumption, it can also create justifications that weaken self-regulation, leading to over-ordering.

This study also investigated the effects of ENV. Firstly, it found that ENV has no significant impact on OA (H9), which is inconsistent with Ünal et al. (2018) findings. This conflict may be attributed to different age groups. While middle-aged consumers are more actively engaged in sustainable practices (Bleidorn et al., 2021), the participants in this study were primarily young consumers, and they are the main users of OFDS (Suhartanto et al., 2022). Due to their fast-paced lifestyles, they often prioritise convenience and variety over strict

environmental concerns. However, when they have more time and resources, they tend to show greater confidence in adopting eco-friendly behaviours (Qi et al., 2025). Furthermore, some consumers perceive over-ordering to enhance their dining experience. For instance, they may intentionally over-order amounts of food with the expectation of consuming leftovers in subsequent meals, thereby reducing additional carbon emissions (i.e., repeated ordering generates additional packaging or carbon emissions from delivery) and reinforcing their environmental commitments. This perspective aligns their behaviour with resource utilisation rather than wastefulness. Secondly, this study found that ENV has a positive effect on MO (H10) and a negative effect on MD (H11), which confirms previous studies (Detert et al., 2008; Lehtokunnas et al., 2022). This suggests that when consumers consider ordering takeout, their awareness of environmental protection and resource conservation strengthens their sense of moral obligation to act responsibly (Wahba, 2008). Thus, they are less likely to over-order or rationalise such behaviour. These findings indicate that ENV fosters more ethical and sustainable consumption practices.

Regarding the mediating effects, the results show that OA mediates the link between EXV and OOB (H12), supporting both BRT theory and the findings of Quach et al. (2020). Specifically, experiential factors such as appealing food images, enticing discounts, and excellent service can shape consumers' positive attitudes toward over-ordering, which in turn leads to actual over-ordering behaviour. In other words, a positive attitude formed through enjoyable and varied dining experiences tends to translate into action. However, the hypothesis that OA mediates the relationship between ENV and food OOB (H13) was not supported. As Latif et al. (2012) pointed out that ENVs have direct effects on individual behaviours rather than altering attitudes. This unexpected result indicates that environmental values influence behaviour rather than changing attitudes. For example, consumers with strong environmental values might prioritise practical aspects such as efficient resource use and minimizing waste through planned consumption of leftovers. This directly impacts their ordering behaviour without changing their attitude towards over-ordering.

6. Theoretical contribution

This study makes contributions to the body of knowledge in several areas. Specifically, this is the first time BRT theory has been applied to construct a conceptual framework for understanding consumers' over-ordering behaviours in the context of China's OFDS. The conceptual framework incorporates several emerging variables, including OOB, OA, MD, MOB, ENV, EXV, VF and CV, and considers various direct and indirect links. It aims to predict consumer over-ordering behaviour in emerging markets like China. This research has found that BRT theory and combining proposed variables can effectively explain consumers' over-ordering behaviour, especially in emerging economies. This indicates that future studies can build upon this research by incorporating additional theories and variables to better understand individual behaviour in various settings. As such, the findings offer broader relevance and provide a strong basis for continued exploration in the field of consumer behaviour.

Moreover, this pioneering study seeks to understand how two key values influence the moralities and attitudes of OFDS consumers and how those factors contribute to their OOB. This study creatively considers ENV and EXV as second-order constructs, and the findings verified their reliability and validity. The research highlights the significance of these two values in predicting OOB among consumers using OFDS in China, demonstrating that these values can effectively predict consumer moral considerations and attitudes. Except for the unexpected result regarding the effect of this is a key finding of the study, suggesting that cultural context may

shape how MD influences OA. Moreover, the results highlight the potential of ENV and EXV as higher-order constructs in future environmental studies. This study also makes a novel contribution by applying BRT theory to examine MD and MOB as opposing perspectives, providing a more comprehensive understanding of how different moral considerations influence consumer behaviour.

Furthermore, this research also examined new indirect links, specifically the mediating role of OA between EXV, ENV, and OOB. The results indicated that the EXV of Chinese consumers is associated with OA, which enhances their OOB. However, ENV was found to directly impact OOB rather than through OA, aligning with Latif et al. (2012). Additionally, this study examined two new relationships: the moderating roles of various food choices and convenience on OA and OOB. It was found that convenience can only enhance people's online ordering experience, whereas various food choices can overwhelm consumers and lead to over-ordering.

7. Managerial implications

This study provides valuable guidance for policymakers and industry professionals aiming to promote the sustainable growth of China's OFDS sector. Its findings also offer broader implications for the global OFDS industry, emphasising the need for coordinated strategies to curb food waste resulting from over-ordering and to advance sustainable industry practices.

This study supports and extends these efforts by highlighting the critical and novel connections. Specifically, the connection between experiential value and environmental value with people's moral disengagement and moral obligations. Policymakers should enhance people's pursuit of experiential value (such as aesthetics, customer ROI, and outstanding service) through educational activities while reasonably evaluating their actual needs. This approach aims to reduce instances of moral disengagement. Secondly, policymakers should cultivate environmental values through media promotion and other forms of outreach, particularly from a protection perspective, and try to promote people's rational use of natural resources based on protection. Thirdly, the study found that various food choices can lead to over-ordering. To address this phenomenon, policymakers should establish industry norms that require service providers to offer smaller portion options. This approach can balance the demand for diverse foods while minimising food waste. Fourthly, this study found that consumers' environmental moral obligations are still at the attitude level. Policymakers should help consumers establish a higher level of understanding of moral obligations through measures such as publicity and education, economic incentives, and improving policies and regulations, in order to reduce the gap between attitudes and behaviours caused by moral obligations.

In addition, for practitioners, the green and sustainable development of OFDS is not only related to the development of the industry but also to the well-being of human society. This study provides four insights for practitioners. Firstly, application environment and experiential value: This study emphasizes the importance of environmental value and experiential value in predicting consumer behaviour. Practitioners should integrate these values with environmental protection into their service and marketing strategies. For example, promoting environmental practices and emphasising unique and high-quality experiences can positively influence consumer attitudes and reduce over-ordering. Secondly, enhancing customer education and engagement: practitioners should focus on educating consumers about the environmental impact of their food choices and the importance of sustainable consumption. This can be achieved through targeted campaigns and informational content emphasising the benefits of responsible ordering and the negative consequences of food

waste. Thirdly, offering customised portion sizes: The study found that various food choices can lead to over-ordering. To mitigate this, practitioners should provide smaller, customisable portion sizes that cater to consumers' desire for variety without contributing to food waste. This approach can enhance customer satisfaction and align with sustainability goals. Fourthly, cultural sensitivity in strategy development: The findings suggest that cultural differences play a significant role in consumer behaviour. Practitioners should consider the cultural context when developing and implementing strategies to reduce over-ordering. Understanding local values and preferences can help in crafting more effective interventions.

8. Limitations and future research directions

While the research primarily focuses on the issue of over-ordering within China's OFDS, several limitations suggest avenues for future research. Firstly, the study's focus on China may limit its generalizability, as the rapid development of OFDS in China differs from the experiences of some developing countries. Future research could expand this framework to different national contexts to enhance its applicability. Secondly, this study employed a cross-sectional survey design. Future research could adopt a longitudinal approach to track changes in consumer attitudes and behaviours over time. Finally, while this study relies on quantitative methods, future studies could benefit from using mixed methods to gain a more comprehensive understanding.

Declarations

Funding Declaration

This research was not supported by funding.

Ethics Approval and Consent to Participate

This study was reviewed and approved by an institutional ethics committee. The research was conducted using an online questionnaire survey and involved consumer behaviour, which falls within the category of low-risk research in the social sciences. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee, as well as with the principles of the Declaration of Helsinki.

Informed consent was obtained from all individual participants included in the study. Prior to participation, respondents were informed of the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time. All data were collected anonymously and used solely for academic research purposes.

Data availability

The data will be furnished upon request.

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Figures

Figure 1. Conceptual framework

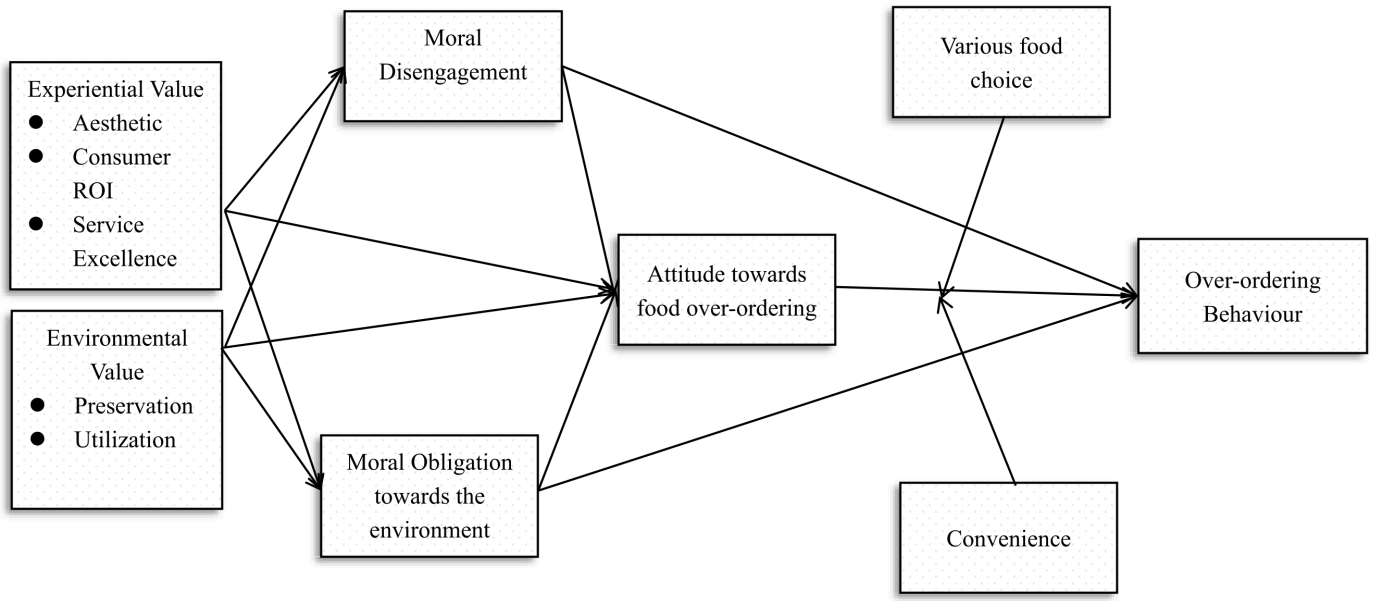


Figure 1

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Figure 2. PLS structural model

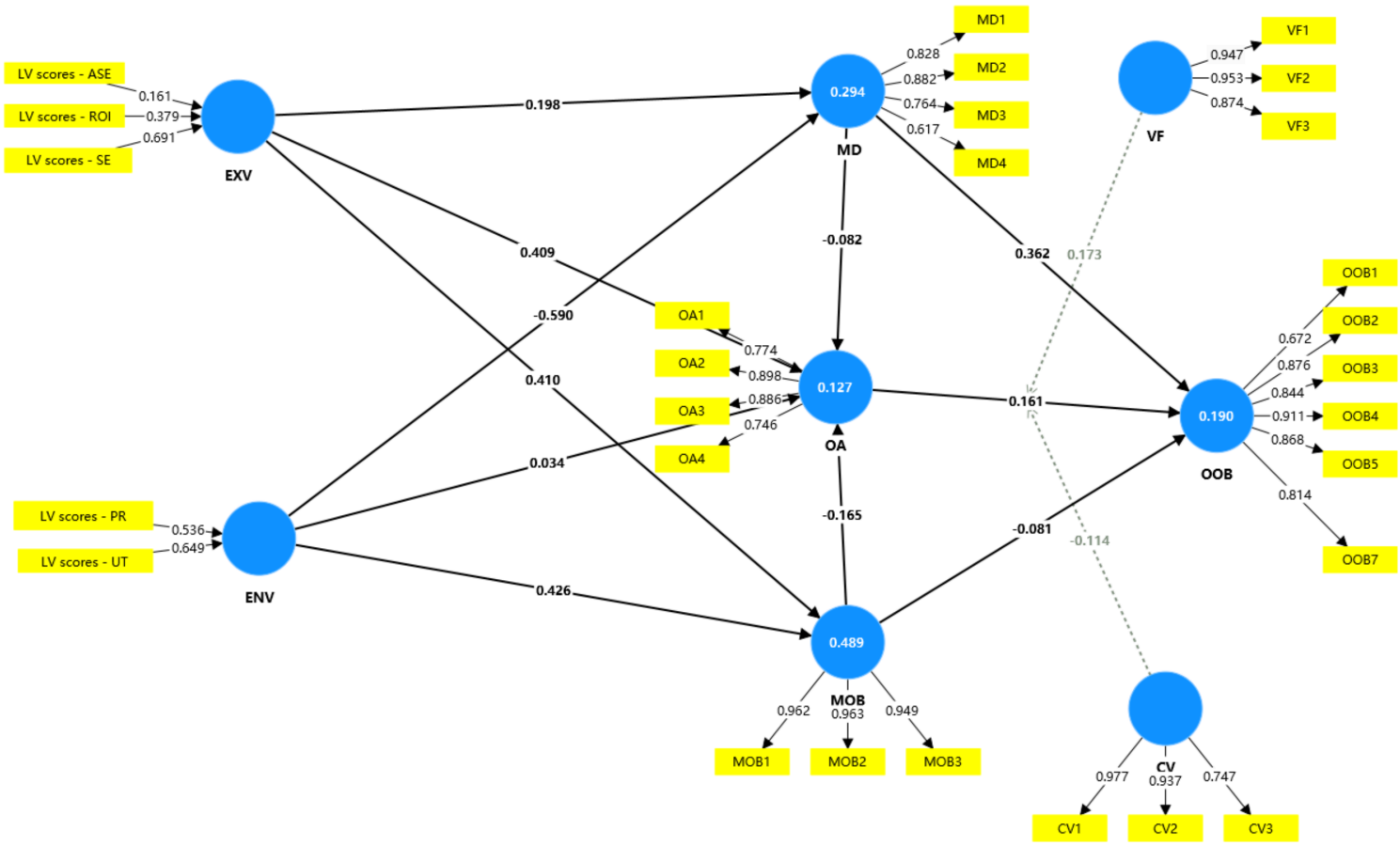


Figure 2

See image above for figure legend

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