

Online impulse buying: a dual analytical approach using partial least square structural equation modelling and fuzzy set qualitative comparative analysis

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Abstract

Purpose – Driven by the convenience and ease of shopping provided by digital platforms, impulse buying has emerged as the most prominent outcome of online retailing. Therefore, the present study aims to examine customer impulse buying in the online shopping environment using the underpinnings of latent state-trait theory.

Design/methodology/approach – Data were collected from 550 respondents through a structured questionnaire. Partial least square structural equation modelling (PLS-SEM) was employed to examine the hypothesised relationships, while fuzzy-set qualitative comparative analysis (fsQCA) was used to identify distinct configurations of conditions associated with online impulse buying.

Findings – The results obtained through PLS-SEM reveal that digital platform cues, namely visual appeal and online reviews and customer traits, namely materialism and shopping enjoyment tendency, significantly influence online impulse buying. Complementing these findings, the fsQCA results identify multiple configurations of platform cues, hedonic browsing and customer traits associated with higher levels of online impulse buying.

Originality/value – This study integrates PLS-SEM with the fsQCA approach to examine impulse buying in the digital shopping environment. Integrating these two analytical approaches not only examines linear relationships among factors but also identifies the optimal combination of variables that explains impulse buying in a digital shopping environment. Thus, the findings can theoretically strengthen the concept of impulse buying and offer implications for marketers and policymakers.

Keywords Digital shopping platforms, Impulse buying, Online shopping, Online impulse buying, PLS-SEM, fsQCA

Paper type Research article

1. Introduction

Online shopping has become an integral part of electronic commerce and it has reshaped global retail landscapes by offering considerable benefits to customers (Sikder and Rolfe, 2023). The rise of online shopping platforms has increased purchase frequency and transformed how individuals engage with products and brands. Digital shopping has gained dominance with the increasing penetration of the internet and smartphones. This dominance subsequently influences an individual's everyday consumption patterns (AL-Zoubi, 2024). Features of online shopping platforms, such as personalised recommendations, interactive designs and user-generated reviews have reduced the gap between browsing and buying (Tomar *et al.*, 2018). Accordingly, impulse buying has emerged as a prominent outcome of digital shopping and requires significant attention. Unlike traditional brick-and-mortar contexts, the online shopping environment offers customers numerous benefits, including

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accessibility, variety, convenience and interactivity. These benefits intensify impulse buying behaviour, leading customers to make purchases on a whim or without planning.

Impulse buying can be described as sudden and unplanned purchase behaviour driven by low deliberation and strong emotional involvement (Rook, 1987). The increasing competition in online marketplaces makes it important to understand impulse buying behaviour (Abdelsalam *et al.*, 2020). Impulse buying behaviour is gaining significance due to its substantial contribution to retailer's revenues and its implications for modern marketing. Impulse purchases increase sales and generate long-term customer–brand relationships. Therefore, examining impulse buying in the online shopping environment is highly relevant from a literature perspective.

While the impulse buying phenomenon has been examined in traditional offline shopping contexts (Beatty and Elizabeth Ferrell, 1998; Dholakia, 2000; Jain and Gandhi, 2021; Piron, 1991), impulse buying in a digital shopping environment has received relatively less attention from researchers (Abdelsalam *et al.*, 2020; Akram *et al.*, 2018; Wells *et al.*, 2011). The existing literature on online impulse buying remains fragmented in explaining the combined influence of website-related stimuli and consumer traits. Earlier studies have largely focused either on external environmental cues (Arachchi and Samarasinghe, 2023; Chen *et al.*, 2018) or on individual psychological factors in isolation (Badgaiyan and Verma, 2014; Lavuri, 2023). Consequently, limited research has examined how these factors interact and combine to shape hedonic browsing and impulse buying behaviour in online shopping environments.

Previous studies on online impulse buying behaviour dwell upon different theoretical frameworks to explain impulse buying behaviour. These frameworks include stimulus–organism–response (SOR) theory, flow theory and dual system theory (Bao and Yang, 2022; Huang, 2016; Kimiagari and Malafe, 2021; Lee and Gan, 2020; Xu *et al.*, 2020). However, these theories offer only limited explanations of online impulse buying. For instance, the SOR theory primarily emphasises the role of external environmental stimuli in generating consumer's internal emotional and cognitive states, which subsequently influence behavioural responses (Mehrabian and Russell, 1974). Although the theory effectively explains impulse buying behaviour, it largely overlooks the independent role of stable personality traits in shaping it. Similarly, flow theory mainly explains a consumer's immersive and enjoyable online experiences by focusing on deep involvement, pleasure and engagement during browsing activities (Csikszentmihalyi, 2014). While the theory adequately captures the experiential and hedonic aspects of online shopping, it offers a limited explanation of how environmental factors and stable consumer predispositions, such as materialism and a tendency toward shopping enjoyment, interact to influence impulse buying behaviour. Furthermore, dual-system theory explains impulse through two distinct mental processing systems: the impulsive system and the reflective system (Strack and Deutsch, 2015). Although this perspective contributes toward understanding the cognitive mechanisms underlying impulse buying behaviour, it primarily focuses on consumer's mental processing patterns and pays comparatively less attention to the simultaneous interaction between environmental cues and stable consumer traits.

Unlike SOR theory, flow theory and dual-process perspectives, the latent state-trait perspective provides a framework for recognising the simultaneous role of relatively enduring consumer characteristics and environmental states (Steyer *et al.*, 1999). Thus, latent state-trait (LST) theory shifts the theoretical focus from explaining impulse buying mainly as a response to external stimuli or momentary psychological experiences to understanding how consumers' relatively stable dispositions operate together with environmental conditions in shaping impulse buying behaviour. In the context of online shopping, this perspective is particularly relevant because the same digital environment may not generate the same behavioural response across consumers with different motivational and self-regulatory dispositions. Accordingly, LST theory integrates trait-like and state-like conditions into a common explanation of online impulse buying. The LST theory proposes that consumer behaviour is not solely determined by temporary stimuli or internal psychological states, but rather emerges

through the interaction between enduring personality traits and context-specific environmental experiences (Ziegler *et al.*, 2009).

Despite the strong relevance of LST theory, its application in the online impulse buying literature remains limited. Existing studies have shown limited integration of stable consumer traits and environmental shopping states (Anindito and Handarkho, 2022). Therefore, empirical research is needed to examine the combined impact of environmental states and consumer traits on online impulse buying. To address this gap, the present study utilises theoretical foundations of LST theory to conceptualise impulse buying as a behavioural outcome that can emerge from the interplay between relatively enduring consumer traits, namely materialism and shopping enjoyment tendency, and environmental conditions, namely visual appeal and online reviews, in the online shopping environment. Thus, the use of LST in the present study extends its application by showing how trait-like and state-like conditions can be considered together to explain online impulse buying.

The examination of impulse buying has traditionally been conducted using only the partial least square structural equation modelling (PLS-SEM) approach (Chen *et al.*, 2016; Floh and Madlberger, 2013; Huang, 2016), where relationships between variables are tested on a one-to-one basis. Findings in the existing literature have predominantly relied on symmetric analytical approaches such as regression and PLS-SEM, which explain the net effects of individual variables but do not capture the complex configurational pathways that lead to impulse buying behaviour. Therefore, evidence remains limited on how combinations of latent environmental states and customer traits collectively influence online impulse buying. To address this limitation, this study complements PLS-SEM with fuzzy set qualitative comparative analysis (fsQCA). The fsQCA configurational analysis extends the study's theoretical contribution by showing that online impulse buying may not arise from isolated antecedents operating independently, but from different combinations of consumer traits and environmental conditions. While the structural model estimates the unique association of individual predictors with impulse buying while holding the other variables constant, the configurational analysis identifies alternative pathways through which the outcome may occur (Rihoux and Ragin, 2009). This provides a configurational extension of the LST perspective by suggesting that the interaction between consumer dispositions and online shopping states may take multiple forms rather than follow a single uniform pathway. Thus, the theoretical insight from the configurational analysis lies in recognising equifinality, i.e. online impulse buying can emerge through alternative combinations of environmental conditions and consumer characteristics.

Overall, the LST perspective establishes the conceptual basis for considering relatively enduring consumer traits alongside environmental online shopping states, whereas the configurational analysis reveals that these conditions can combine through multiple pathways to produce impulse buying. Accordingly, the objective of the present study is to examine customer's impulse buying behaviour in an online shopping environment by employing LST theory through PLS-SEM and the fsQCA approach. Therefore, the present study extends the explanation of online impulse buying from isolated predictor–outcome relationships to a more integrated and configurational understanding of how consumer dispositions and environmental conditions jointly contribute to impulse buying behaviour. By integrating these perspectives, the present study offers a theoretical understanding of impulse buying mechanisms and practical insights for platform designers and marketers to strategically shape customer shopping experiences in digital marketplaces. The study also contributes to the limited evidence from emerging economies, particularly the Indian online retail context.

2. Theoretical background and hypothesis development

2.1 Latent state-trait theory

The present study employs LST theory to explain impulse buying in an online shopping environment. The LST theory was developed by Steyer *et al.* (1999) and posits that an

individual's behaviour results from both customer trait dispositions and environmental state-related factors. According to this theory, certain behavioural tendencies that are relatively enduring over time represent the consumer traits, whereas environmental conditions generate latent states that influence individual behaviour in specific contexts (Pham *et al.*, 2024). Accordingly, it suggests that human behaviour cannot be fully understood through personality characteristics or environmental stimuli alone. The theory provides a valuable foundation for examining customer impulse-buying behaviour, particularly in online shopping. In a digital shopping environment, both customer tendencies and environmental states shape their purchasing behaviour (Kakaria *et al.*, 2023; Lavuri, 2023). Previously, several studies have applied LST theory in different behavioural contexts (Chen *et al.*, 2016; Husnain *et al.*, 2025; Ziegler *et al.*, 2009). For instance, He and Jin (2024) applied LST theory to the live-streaming shopping context and Chen *et al.* (2021) applied it to the social commerce shopping context. Similarly, Zafar *et al.* (2021) considered authenticity a state and impulse-buying tendency a trait and Chen *et al.* (2016) considered information quality as latent states and impulsiveness as consumer traits while examining impulse buying in the social commerce context. Although the LST perspective has been applied to impulse buying across different contexts and variable sets, its application to app-based and website-based online shopping remains relatively limited, particularly when examining visual appeal and online reviews as context-dependent states and materialism and shopping enjoyment tendency as relatively enduring traits.

While prior research has established the relevance of many individual antecedents, the literature suggests that online impulse buying is better understood as a combination of factors in the online shopping environment (Kakaria *et al.*, 2023). From an LST perspective, this literature suggests that impulse buying may be explained by how environmental conditions and enduring predispositions operate together, rather than as isolated influences. In the present study, LST serves as a theoretical lens to distinguish relatively enduring consumer characteristics from environmental influences that arise during online shopping. This distinction is based on the relative temporal stability of a characteristic and its dependence on the immediate situation. Accordingly, visual appeal, online reviews and hedonic browsing are treated as state-related conditions because their manifestation is more dependent on the specific online shopping context, whereas materialism and shopping enjoyment tendency are conceptualised as trait-like characteristics.

Visual appeal, online reviews and hedonic browsing are considered state-related conditions because they are more closely tied to the consumer's immediate online shopping experience. Visual appeal refers to the characteristics of the digital shopping environment that can generate arousal and pleasure during browsing (Parboteeah *et al.*, 2008). These characteristics may vary across websites, platforms and product presentations. Similarly, positive online reviews constitute context-specific informational and social cues that can provide social proof and reduce product-related uncertainty, thereby encouraging impulse purchases (Muhammad *et al.*, 2024). Hedonic browsing reflects the pleasure-oriented experience occurring during online shopping and may vary according to the characteristics of the shopping environment and the situation in which browsing takes place (Kimiagari and Malafe, 2021). Thus, these constructs are treated as state-related not simply because they are associated with the online environment, but because their expression is more dependent on the particular shopping context experienced by the consumer. In prior literature, visual appeal, online reviews and browsing-related experiences have primarily been examined as environmental or experiential factors through perspectives such as SOR (Sihombing *et al.*, 2020), flow theory (Shahpasandi *et al.*, 2020) and cognitive-emotion theory (Verhagen and Dolen, 2011). However, their conceptualisation as context-dependent latent states within the LST framework remains relatively limited. Therefore, the present study conceptualises these variables under state-related conditions that vary with the online shopping context.

In addition to this, materialism and shopping enjoyment tendency are considered as customer traits that independently influence impulse buying. Materialism represents a relatively enduring value-orientation trait of consumers concerning the importance attached to

acquiring and owning products. Consumers with higher levels of materialism may therefore exhibit stronger acquisition desires and be more prone to impulse purchasing across consumption situations (Chetioui and El Bouzidi, 2023). Similarly, shopping enjoyment tendency reflects an individual's relatively enduring propensity to derive pleasure from shopping. Consumers with a stronger enjoyment orientation may consequently be more inclined towards hedonic consumption and impulse buying (Beatty and Elizabeth Ferrell, 1998). These characteristics are therefore considered trait-like because they represent relatively stable individual differences that can influence behaviour across different shopping contexts. Prior literature has examined materialism and shopping enjoyment tendency through perspectives such as social comparison theory (Tran, 2022) and SOR theory (Lavuri, 2023). However, their conceptualisation as relatively enduring trait-like characteristics within the LST framework remains limited. Therefore, the present study conceptualises materialism and shopping enjoyment tendency as trait-related factors, reflecting relatively stable individual characteristics that may influence impulse buying across different shopping contexts.

2.2 Visual appeal, online reviews and hedonic browsing

Visual appeal refers to the design, aesthetics and overall appearance of a shopping platform that creates a pleasing and engaging experience for customers. It includes elements such as colour schemes, layout, imagery and interactivity that can stimulate sensory and emotional responses (Parboteeah et al., 2008; Wells et al., 2011). In online environments, visual appeal plays a particularly significant role in stimulating browsing and influencing purchase decisions. In this context, Jeannot et al. (2022) suggested that customers primarily rely on visual elements to evaluate the attractiveness and usability of an online platform, in which physical contact with the product is absent. These aesthetic cues not only encourage consumers to stay longer on a platform but also increase their browsing on the online shopping platform. Verhagen and van Dolen (2011) suggested that hedonic browsing reflects a state in which customers derive pleasure from the act of browsing. Accordingly, visual appeal is explored as the critical antecedent of hedonic browsing as it enhances the customer's affective involvement on online shopping platforms. Therefore, it is hypothesised that:

H1. Visual appeal significantly influences hedonic browsing.

Online reviews can be described as the consumer-generated opinions on products or services that serve as an informational cue for potential buyers (Muhammad et al., 2024). Product reviews are often perceived as more credible than marketer-generated content, as they reflect the authentic experiences of other customers (Shan, 2016). The literature suggests that online reviews contribute to customer's affective responses by creating reassurance, excitement and curiosity during the shopping process. For instance, Ampadu et al. (2022) suggested that online reviews increase perceived product quality, along with enjoyment and involvement, leading to increased browsing on online shopping platforms. Similarly, Muhammad et al. (2024) suggested that online reviews can generate affective feelings in customers, which can enhance their browsing behaviour. Thus, it is hypothesised that:

H2. Online reviews significantly influence hedonic browsing.

2.3 Hedonic browsing and impulse buying

Hedonic browsing is a customer's exploratory shopping behaviour driven by task-oriented and mood-oriented factors (Floh and Madlberger, 2013). It can be characterised by the customer's affective engagement in the shopping process, in which they browse products not merely to evaluate alternatives but also to experience excitement and sensory stimulation. Prior research suggests that hedonic browsing increases the likelihood of impulsive buying. For instance, Huang (2016) and Kimiagari and Malafe (2021) showed that in online shopping environments, customers are more likely to engage in hedonic browsing because digital platforms provide an

endless assortment of products, personalised recommendations and an engaging interface. Thus, the persuasive environment converts hedonic browsing directly into impulsive behaviour (Leong *et al.*, 2018). Several empirical studies also support this relationship by suggesting hedonic browsing as a significant antecedent of impulse buying (Verhagen and van Dolen, 2011). Based on the above discussion, it is hypothesised that:

H3. Hedonic browsing significantly influences impulse buying.

2.4 Materialism, shopping enjoyment tendency and impulse buying

Materialism is defined as an individual's preference towards materialistic goods as a central life value and a key source of happiness (Sirgy, 1985). Customers with materialistic behaviour often view consumption as a means of self-expression and status enhancement, thereby generating stronger purchase desires. Prior studies show that materialism is positively associated with impulsive buying. For example, Lavuri *et al.* (2022) highlighted that the urge to acquire goods often overshadows rational decision-making. In the online shopping environment, customers interact with a variety of products, personalisation and instant gratification, all of which stimulate a strong urge to make purchases (Pellegriano *et al.*, 2022). Further, Kumar and Kumar (2025) highlighted that materialistic values make customers more responsive towards marketing cues and environmental stimuli, enhancing affective gratification derived from impulsive purchases. Therefore, materialistic individuals are expected to be more prone to impulse buying on online shopping platforms. Thus, we hypothesise:

H4. Materialism significantly influences impulse buying.

Customers' shopping enjoyment tendency refers to the tendency to derive excitement and satisfaction from the act of shopping itself, independent of any specific goal or utilitarian motive (Beatty and Elizabeth Ferrell, 1998). The literature depicts that customers with a high shopping enjoyment tendency are motivated by product acquisition and experiential aspects of shopping, such as browsing, comparing and discovering new products (Mohan *et al.*, 2013). Therefore, individuals who find shopping inherently enjoyable are more likely to make impulsive purchases than those with a low tendency for shopping enjoyment. In prior literature, impulse buying has consistently been linked to customer's enjoyment tendencies. For example, Dawson and Kim (2009) found that the tendency toward shopping enjoyment significantly influences impulsive buying. Similarly, Febrilia and Warokka (2021) showed that a tendency toward shopping enjoyment overshadows rational decision-making and stimulates impulsive purchases. Accordingly, it is hypothesised that:

H5. Shopping enjoyment tendency significantly influences impulse buying.

3. Research methodology

3.1 Research design

The present study empirically examines customer impulse buying behaviour in an online shopping environment. This study analyses the hypothesised model using survey data collected through a structured questionnaire. The conceptual framework examining impulse buying in an online shopping environment is presented in Figure 1.

3.2 Operationalization of variables and instrument design

A structured questionnaire for collecting primary data were developed using items from already established instruments in the literature. The adapted instruments were revised to fit the context of the present research. All the items used in the questionnaire were measured on a five-point scale (strongly disagree –1 to strongly agree –5). The items for visual appeal were

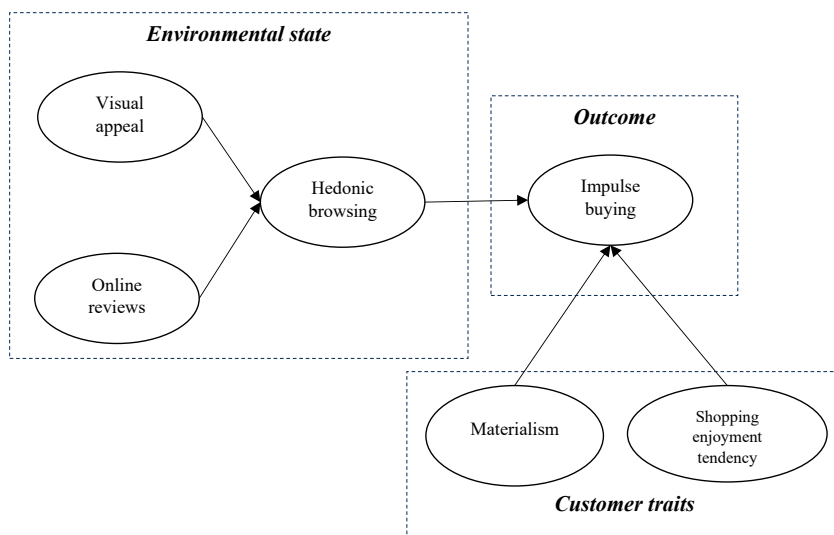


Figure 1. Theoretical framework. Source: The authors

adapted from [Liu et al. \(2013\)](#) and items for online reviews were adapted from [Park et al. \(2007\)](#) and [Zhang et al. \(2018\)](#). Further, the measurement items for materialism were adapted from [Badgaiyan and Verma \(2014\)](#) and [Pupelis and Šeinauskienė \(2023\)](#) and items for the shopping enjoyment tendency were adapted from [Floh and Madlberger \(2013\)](#) and [Nguyen Tat et al. \(2016\)](#). The items for hedonic browsing were adapted from [Zheng et al. \(2019\)](#). Lastly, the measurement items for impulse buying behaviour were adapted from well-established and previously validated scales widely used in prior research to ensure construct validity and comparability with existing studies. The items were adapted from [Ampadu et al. \(2022\)](#), [Park et al. \(2012\)](#) and [Rook and Fisher \(1995\)](#). [Table 1](#) presents a detailed list of measurement items used in the questionnaire.

3.3 Data collection

The present study is based on primary data collected through a structured questionnaire using the survey method. The target population comprised online shoppers residing in Haryana, India. A purposive sampling technique was adopted to select individuals with prior experience of purchasing products online, ensuring that respondents could provide relevant and meaningful insights aligned with the study objectives. Data were collected offline through a physical questionnaire administered in person over one month. To determine eligibility, respondents first answered a screening question about whether they had ever shopped online; only those who confirmed prior online shopping experience proceeded and were included in the survey. In total, the offline survey yielded 600 responses. From these 600 responses, 50 were excluded because they were incomplete and respondents had left items unanswered on the five-point Likert scale (Strongly disagree to strongly agree). This resulted in missing data, leaving 550 valid responses for analysis.

The adequacy of the sample size was assessed using the “10-times rule” ([Hair et al., 2011](#)), which recommends a minimum of ten respondents per questionnaire item. As the questionnaire contained 29 items related to the variables, the minimum required sample was 290 responses. The final sample of 550 responses comfortably exceeds the threshold of 290; therefore, the sample of 550 responses was considered sufficient for the present study. The demographic profile of the 550 respondents is presented in [Table 2](#).

Table 1. Measurement items

Construct	Item	Statements	Author(s)
Visual appeal (VA)	VA1	The online shopping websites are visually pleasing	Liu <i>et al.</i> (2013)
	VA2	The websites are visually appealing	
	VA3	The layouts of shopping websites are visually attractive	
	VA4	The shopping website looks well organised	
Online reviews (OR)	OR1	I always read the reviews presented on the shopping website	Park <i>et al.</i> (2007), Zhang <i>et al.</i> (2018)
	OR2	I find it useful to read reviews on shopping websites	
	OR3	The reviews of other customers on the website make me confident to purchase the product	
	OR4	The reviews of customers on the websites are helpful for decision making	
	OR5	The reviews on shopping websites provide useful information about the product	
	OR6	I find it enjoyable to read online reviews about the product	
Hedonic browsing (HB)	HB1	During web browsing, I am very excited, like playing	Zheng <i>et al.</i> (2019)
	HB2	I enjoy web browsing enough to forget a time out	
	HB3	I look around at items on the internet just for fun	
	HB4	I feel relaxed and forget my problems, while browsing shopping websites	
Materialism (MAT)	MAT1	I like a lot of luxury in my life, although I may not have enough money to pay all my purchases	Badgaiyan and Verma (2014), Pupelis and Šeinauskienė (2023)
	MAT2	I derive lot of pleasure from buying nice things, although I may have a stretch financially	
	MAT3	Some of the important achievements in my life include material possession	
	MAT4	The things I own say a lot about how I am doing in my life	
Shopping enjoyment tendency (SET)	SET1	Shopping is entertaining for me	Floh and Madlberger (2013)
	SET2	Shopping makes me happy	
	SET3	Shopping is the way I like to spend any leisure time	
Impulse buying (IB)	IB1	I often buy things impulsively	Ampadu <i>et al.</i> (2022), Park <i>et al.</i> (2012), Rook and Fisher (1995)
	IB2	If I see the product and I've got money, I buy it	
	IB3	If I find something I like on shopping website, I purchase it immediately	
	IB4	When shopping online, I often have the idea "buy now and think about it later"	
	IB5	When shopping online, I often buy things according to how I feel at the moment	
	IB6	When shopping online, I often buy things without much thinking	
	IB7	The fun online shopping process makes me buy things impulsively	
	IB8	"Just do it" describes the way I purchase products	

Source(s): The authors

Table 2. Demographic profile of respondents

Demographic attribute	Categories	Frequency (<i>n</i> = 550)	Percentage (%)
Age	18–24	369	67.1
	24–35	146	26.54
	Above 35	35	6.36
Gender	Male	280	50.91
	Female	270	49.09
Education	Upto 12th	80	14.55
	Graduation	160	29.09
	Postgraduation	273	49.64
	Professional	27	4.91
	Any other	10	1.82
Income	Below 5 lacs	322	58.55
	5–10 lacs	140	25.45
	10–15 lacs	56	10.18
	above 15 lacs	32	5.82
Frequency of online shopping	Once in a day	24	4.36
	Once in a week	73	13.27
	Once in a month	217	39.45
	Once in three months	236	42.91

Source(s): The authors

3.3.1 Informed consent and ethical consideration. The study was conducted using a questionnaire survey. As the research was non-interventional, anonymous and involved minimal risk, formal ethics committee approval was not required. Informed consent was obtained from all participants prior to data collection and confidentiality, along with anonymity of the responses, was ensured in accordance with ethical guidelines for social science research.

3.4 Data analysis techniques

Data analysis in the present study was conducted using PLS-SEM and the fsQCA approach. Accordingly, the study first assessed the reliability and validity of the measurement model using confirmatory factor analysis (CFA). Next, the study evaluated the significance of hypothesised relationships using bootstrapping, yielding robust estimates of path coefficients and their statistical significance. In addition, fsQCA is used to explore complex, configurational patterns and identify multiple pathways leading to the outcome variable. The application of fsQCA complements the PLS-SEM findings by capturing the combinatorial effects that may not be evident in traditional SEM-based analysis.

4. Data analysis and results

4.1 Data normality and sample skew

Before proceeding with the analysis, descriptive statistics for all constructs were obtained to assess data normality using skewness and kurtosis values. The obtained values showed that the most skewed constructs are online reviews (skewness = -1.501 and kurtosis = 2.115), hedonic browsing (skewness = -1.442 and kurtosis = 1.443) and visual appeal (skewness = -1.430 and kurtosis = 1.957) and the least skewed construct is impulse buying (skewness = -0.094 and kurtosis = -0.849). Further, materialism (skewness = -0.422 and kurtosis = -0.363) and shopping enjoyment tendency (skewness = -0.484 and kurtosis = -0.063) were found to be moderately skewed. The results for skewness and kurtosis show that values fall within the range of -1 to $+1$ for

skewness and -2 to $+2$ for kurtosis for materialism, shopping enjoyment tendency and impulse buying (George and Mallery, 1994) and they fall outside this range for online reviews and hedonic browsing. This suggests that the data are partially normal and partially non-normal. The descriptive statistics, consisting of the mean, standard deviation, skewness and kurtosis for all constructs are presented in Table 3.

4.2 Common method bias

The primary data for the present study were collected using a structured questionnaire. Since the data for all constructs were collected from a single source using a questionnaire, the possibility of common method bias was examined using Harman’s single-factor test. For this purpose, Harman’s single-factor test was conducted in IBM SPSS Statistics 23. The results revealed that a single factor did not account for the majority of the total variance, as the first factor explained only 30.318%, which is below the recommended threshold of 50% (Podsakoff et al., 2003).

In addition to Harman’s single-factor test, full collinearity variance inflation factors (VIFs) were also examined to assess potential common method bias. As a result, all VIF values were found below the recommended threshold of 3.3 (Kock, 2015), suggesting that common method bias is unlikely to pose any issue to the findings of the study. The VIF values for both the inner model and the outer model are presented in Tables 4 and 5.

4.3 PLS-SEM

The PLS-SEM was performed using a two-step approach in Smart PLS. These steps include measurement model and structural model assessments, which are explained in the following sections.

4.3.1 Measurement model assessment. CFA was conducted to confirm the reliability and validity of the proposed model. Accordingly, standardised factor loadings along with reliability and validity values for each construct are obtained. The CFA results depict that factor loadings for all the items are above the threshold value of 0.708, as recommended by Hair et al. (2019). Further, internal consistency reliability, which depicts the precision and accuracy of the measurement items, is measured using Cronbach’s alpha and composite reliability. The values for both reliability measures are above the threshold value of 0.7, as suggested by Fornell and Larcker (1981).

The validity of constructs in a measurement model is assessed using convergent and discriminant validity. Convergent validity depicts how closely the items of that construct are related to each other (Xu et al., 2020) and it is measured using average variance extracted (AVE). The results of our measurement model assessment showed that the AVE for each construct exceeded the 0.5 threshold (Hair et al., 2019). Discriminant validity is assessed to examine the extent to which constructs differ from one another (Hair et al., 2012). It is

Table 3. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. deviation	Skewness	Kurtosis
VA	550	1.00	5.00	3.8718	0.75412	−1.430	1.957
OR	550	1.00	5.00	3.9736	0.79938	−1.501	2.115
HB	550	1.00	5.00	3.8845	0.83801	−1.442	1.443
SET	550	1.00	5.00	3.4800	0.81693	−0.484	−0.063
MAT	550	1.00	5.00	3.2873	0.88061	−0.422	−0.363
IB	550	1.00	5.00	3.0077	0.94106	−0.094	−0.849

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

Table 4. Variance inflation factor (Outer model)

	VIF
VA1	2.080
VA2	1.932
VA3	1.765
VA4	1.518
OR1	2.567
OR2	2.650
OR3	2.472
OR4	2.616
OR5	2.508
OR6	2.018
HB1	2.354
HB2	2.506
HB3	2.349
HB4	2.350
MAT1	1.852
MAT2	1.942
MAT3	1.435
MAT4	1.550
SET1	2.001
SET2	1.963
SET3	1.212
IB1	2.035
IB2	1.960
IB3	2.254
IB4	2.038
IB5	1.935
IB6	2.437
IB7	2.362
IB8	2.163

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

Table 5. Variance inflation factor (Inner model)

	HB	IB	MAT	OR	SET	VA
HB		1.191				
IB						
MAT		1.330				
OR	1.211					
SET		1.290				
VA	1.211					

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

measured using the Fornell–Larcker criterion and heterotrait–monotrait (HTMT) ratio. Accordingly, the square root of the AVE for each construct is higher than the correlation between related constructs. Next, the correlation values among the constructs are below 0.9, which is the threshold set by the HTMT criteria (Henseler *et al.*, 2015). Thus, both the Fornell–Larcker criterion and the HTMT ratio support discriminant validity. The factor loadings of

each item, composite reliability and AVE are presented in Table 6. The discriminant validity of the constructs is shown in Tables 7 and 8.

4.3.2 *Structural model assessment.* PLS path analysis was conducted using the bootstrapping feature in Smart PLS 4.0 to assess the relationships proposed in the structural model. The results show that all the hypotheses are accepted. The results of the PLS path analysis and the path coefficients are presented in Table 9. The overall results of the structural model analysis are shown in Figure 2.

4.3.3 *Explanatory values of the model.* As part of the structural model assessment, model fit is evaluated using the standardised root mean square residual (SRMR). The model showed a good fit with an SRMR value of 0.056, which is less than the threshold value of 0.08 (Hu and Bentler, 1999).

The explanatory values, including the coefficient of determination (R^2), effect sizes (F^2) and predictive power (Q^2) of the proposed model, are also obtained as part of the data analysis. The R^2 value indicates the proportion of variance in the endogenous variable explained by the

Table 6. Construct reliability and convergent validity

Construct	Factor loading	AVE	Cronbach's alpha	Composite reliability
<i>Visual appeal (VA)</i>		0.644	0.815	0.817
VA1	0.828			
VA2	0.799			
VA3	0.823			
VA4	0.758			
<i>Online reviews (OR)</i>		0.689	0.909	0.910
OR1	0.825			
OR2	0.836			
OR3	0.844			
OR4	0.850			
OR5	0.839			
OR6	0.784			
<i>Hedonic browsing (HB)</i>		0.755	0.892	0.892
HB1	0.867			
HB2	0.875			
HB3	0.866			
HB4	0.867			
<i>Materialism (MAT)</i>		0.619	0.795	0.797
MAT1	0.788			
MAT2	0.828			
MAT3	0.753			
MAT4	0.777			
<i>Shopping enjoyment tendency (SET)</i>		0.637	0.740	0.802
SET1	0.801			
SET2	0.757			
SET3	0.835			
<i>Impulse buying (IB)</i>		0.625	0.914	0.915
IB1	0.782			
IB2	0.767			
IB3	0.812			
IB4	0.778			
IB5	0.760			
IB6	0.823			
IB7	0.815			
IB8	0.788			

Source(s): The authors

Table 7. Discriminant validity as per heterotrait–monotrait (HTMT) ratio

	HB	IB	MAT	OR	SET	VA
HB						
IB	0.398					
MAT	0.427	0.657				
OR	0.755	0.178	0.170			
SET	0.403	0.542	0.541	0.290		
VA	0.800	0.367	0.369	0.484	0.347	

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

Table 8. Discriminant validity as per Fornell–Larcker criterion

	HB	IB	MAT	OR	SET	VA
HB	0.869					
IB	0.360	0.791				
MAT	0.358	0.562	0.787			
OR	0.680	0.163	0.144	0.830		
SET	0.318	0.490	0.442	0.213	0.798	
VA	0.683	0.317	0.297	0.418	0.265	0.802

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

Table 9. Bootstrapping results

Hypothesis	Relation	Path coefficient	T-value	p-value	Outcome
H1	VA > HB	0.484	10.262	0.000***	Supported
H2	OR > HB	0.478	9.865	0.000***	Supported
H3	HB > IB	0.132	3.727	0.000***	Supported
H4	MAT > IB	0.394	9.507	0.000***	Supported
H5	SET > IB	0.274	7.094	0.000***	Supported

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal; *** $p < 0.001$

Source(s): The authors

exogenous variable. In our model, the R^2 value for hedonic browsing is 0.655 and for impulse buying is 0.403, which are above the recommended value of 0.1, indicating that the exogenous variables sufficiently explain the dependent variables (Falk and Miller, 1992). The R^2 values for hedonic browsing indicate that visual appeal and online reviews explain substantial variance in hedonic browsing, while materialism and shopping enjoyment explain substantial variance in impulse buying.

Further, F^2 values were obtained to assess the individual contribution of each exogenous construct toward the endogenous constructs in the proposed model. The F^2 value describes the variation in R^2 when the independent variable is removed. In our model, the F^2 value for visual

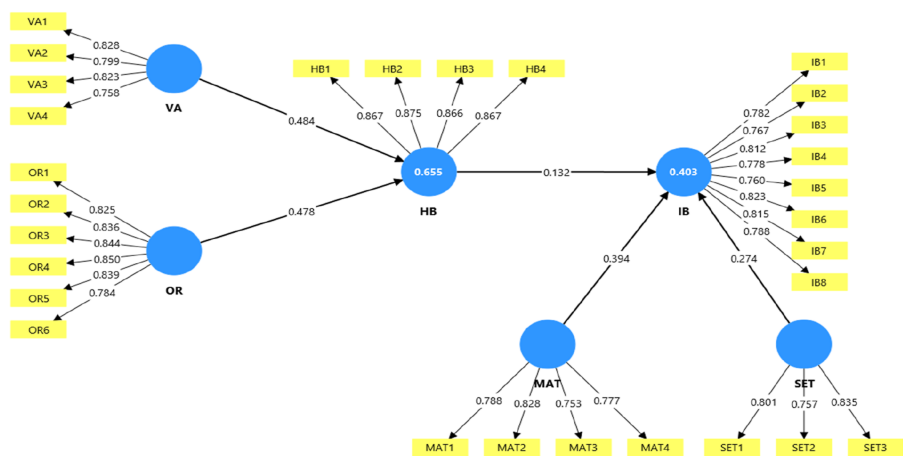


Figure 2. PLS-SEM overall results. Source: The authors

appeal is 0.560, online reviews is 0.547, hedonic browsing is 0.025, materialism is 0.196 and shopping enjoyment tendency is 0.097, which are above the recommended value of 0.02. Accordingly, the F^2 values indicate that visual appeal and online reviews have a large effect on hedonic browsing; hedonic browsing and shopping enjoyment tendency have a small effect on impulse buying; and materialism has a medium effect on impulse buying. Overall, the effect size analysis confirms that all predictor variables contribute to explaining the dependent variables.

Finally, to assess the predictive relevance of the endogenous variables, we obtained Q^2 values using the PLS prediction function in Smart PLS 4.0. According to [Hair et al. \(2019\)](#), the dependent variable has predictive relevance if its Q^2 value is greater than zero. In our model, the Q^2 values for both hedonic browsing (0.649) and impulse buying (0.388) are greater than zero. The Q^2 values for hedonic browsing and impulse buying indicate that both endogenous variables have strong predictive relevance. This confirms that the proposed structural model possesses adequate predictive relevance and satisfactory predictive capability. The values of R^2 , F^2 and Q^2 are listed in [Table 10](#).

4.4 fsQCA

The present study employed fsQCA to explore the interdependency of various antecedents influencing customer impulse buying on online shopping platforms. Identification of the individual effects of independent variables does not respond to the complexities of human

Table 10. Explanatory values of the model

Predictor(s)	Outcome	R^2	Impact	F^2	Effect size	Q^2	Predictive power
Visual appeal	Hedonic browsing	0.655	Moderate	0.560	Large	0.649	Strong
Online reviews				0.547	Large		
Hedonic browsing	Impulse buying	0.403	Moderate	0.025	Small	0.388	Strong
Materialism				0.196	Medium		
Shopping enjoyment tendency				0.097	Small		

Source(s): The authors

behaviour (Rihoux *et al.*, 2021). To address this limitation, our study employed fsQCA to identify combinations of antecedents (examined in our model) that provide more accurate predictions of customer impulsive buying on online shopping platforms (Fernández-Esquinas *et al.*, 2021).

The fsQCA approach uses set theory and Boolean algebra to examine the complex relationships underlying the outcome by comparing cases. Hence, this approach is helpful to explore the possible configuration of factors affecting the outcome variables (Ragin, 2009). There are mainly three assumptions of fsQCA, i.e. conjunction, equifinality and asymmetry (Gil-Cordero *et al.*, 2024). The above-mentioned assumptions suggest that fsQCA can provide meaningful insights into customer impulse buying behaviour on online shopping platforms. To conduct the analysis, we considered all factors in our model to determine which combination is most likely to yield the expected outcome. The model we considered in the present study is expressed as follows:

$$\text{Model: IB} = f(\text{OR, VA, HB, MAT, SET})$$

The fsQCA analysis involves several steps: converting raw data to mean scores, computing descriptives, calibrating the data, generating a truth table, obtaining necessary conditions and identifying the configuration or set of conditions leading to the outcome variable. First, we converted the raw data collected on a 5-point Likert scale to latent variable mean scores using Smart PLS 4.0. After obtaining the latent variable scores, descriptive statistics were calculated to assess the overall distribution of the constructs. The descriptives obtained in fsQCA are presented in Table 11.

After obtaining the descriptives, the data are calibrated into fuzzy sets by applying the 10th, 50th and 90th percentiles as cut-off points, in line with established fsQCA practices (Rihoux and Ragin, 2009). Because the constructs were measured on a five-point Likert scale, the 90th, 50th and 10th percentiles of each variable served as anchors for full membership (0.95), the crossover point (0.50) and full non-membership (0.05) (Fiss, 2011; Pappas and Woodside, 2021). Thus, a respondent scoring at or above the 90th percentile is considered to clearly belong to the set (e.g. high trust), while one scoring at or below the 10th percentile is clearly excluded from it. This calibration transformed latent scores into membership scores ranging from 0 to 1 and made them suitable for set-theoretic analysis.

After calibrating the variables, we generated a truth table to explore possible configurations of conditions associated with the outcome. Afterwards, the analysis of necessary conditions was conducted for both the presence (IB) and absence (~IB) of impulse buying. A condition is typically considered necessary if its consistency exceeds the threshold value of 0.90 (Ragin, 2009). The results indicated that none of the tested conditions is individually necessary to generate impulse buying. The analysis showed that the highest IB consistency values were

Table 11. Descriptive statistics (fsQCA)

Variable	Mean	Std. dev.	Minimum	Maximum	N	Cases missing
HB	-0.0000255	0.999976	-3.45	1.334	550	0
IB	0.0000218	0.999988	-2.178	2.126	550	0
MAT	0.0000182	1.000019	-2.626	1.96	550	0
OR	-0.0000255	0.999991	-3.728	1.289	550	0
SET	-0.0000127	1.000008	-2.92	1.928	550	0
VA	0.0002054	0.99997	-3.816	1.492	550	0

Note(s): HB- Hedonic browsing; IB-Impulse buying; MAT- Materialism; OR-Online reviews; SET- Shopping enjoyment tendency; VA- Visual appeal

Source(s): The authors

observed for hedonic browsing (0.854), materialism (0.853), shopping enjoyment tendency (0.839) and visual appeal (0.847). These values indicate that the conditions are individually relevant to IB, but none of them exceeds the 0.90 threshold required to be considered necessary. For ~ IB, the highest scores are obtained for ~ MAT (0.794) and ~SET (0.767), which again did not reach the necessity threshold. These findings suggest that no single condition is essential for explaining the presence or absence of impulse buying, underscoring the phenomenon’s configurational nature and highlighting the importance of examining combinations of factors in the sufficiency analysis. This is common in social science studies (such as impulse buying, consumer behaviour and organisational studies) because human behaviour is rarely explained by a single, strict, necessary condition. The necessary condition analysis is presented in [Table 12](#).

The subsequent sufficiency analysis identified multiple pathways leading to impulse buying, consistent with the principle of equifinality. The overall solution demonstrated high coverage (0.91) and consistency (0.76), both above the solution consistency threshold of 0.75. This indicates that the derived configurations explain a substantial share of the outcome with acceptable reliability. The fsQCA results indicate multiple configurational pathways leading to the outcome, with all identified configurations showing acceptable consistency values ranging from 0.82 to 0.88. The MAT*SET configuration has the highest raw coverage (0.75), suggesting this combination is present in a substantial proportion of cases exhibiting the outcome. However, its relatively low unique coverage (0.03) indicates that only a small proportion of cases are explained exclusively by this configuration, while a considerable portion of its coverage overlaps with other sufficient configurations. Therefore, the high raw coverage of MAT*SET should not be interpreted as evidence that it independently accounts for 75% of the outcome.

Similarly, HB*MAT*VA shows high raw coverage (0.72) but low unique coverage (0.02), indicating substantial overlap with other pathways. OR*SET and HB*SET*VA also show relatively high raw coverage (0.71 each), while their unique coverage is 0.01 and 0.00, respectively, further suggesting that these configurations largely overlap with other sufficient pathways. MAT*OR*VA has a raw coverage of 0.67 but 0.00 unique coverage, indicating that its cases are entirely shared with other configurations. The remaining configurations, i.e. HB*OR*~VA, ~HB*SET*~VA and ~HB*MAT*~OR*~VA, show lower raw coverage (0.49, 0.43 and 0.37, respectively), with unique coverage of 0.01 for each.

Overall, the findings suggest that the outcome can be achieved through multiple overlapping combinations of conditions rather than through a single dominant pathway. The consistency values indicate that these configurations are sufficiently reliable as pathways to

Table 12. Necessary condition analysis

Outcome variable: IB			Outcome variable: ~IB		
	Consistency	Coverage		Consistency	Coverage
HB	0.854	0.712	HB	0.747	0.612
MAT	0.853	0.808	~HB	0.649	0.814
~HB	0.535	0.683	MAT	0.631	0.588
~MAT	0.565	0.609	~MAT	0.794	0.841
OR	0.810	0.674	OR	0.783	0.641
~OR	0.568	0.727	~OR	0.602	0.757
SET	0.839	0.785	SET	0.664	0.611
~SET	0.584	0.639	~SET	0.767	0.824
VA	0.847	0.725	VA	0.740	0.623
~VA	0.559	0.686	~VA	0.673	0.813
Note(s): ~ means “absence” of variable					
Source(s): The authors					

the outcome, whereas the differences between raw and unique coverage highlight the extent to which the identified pathways share cases. Thus, the results support a configurational and equifinal perspective, in which different combinations of conditions can be associated with the same outcome. The relevant pathways obtained via fsQCA, along with their raw coverage and consistency, are presented in [Table 13](#).

5. Discussion

Using the theoretical underpinnings of latent state-trait theory, the present study examined customer's impulse buying in an online shopping environment. We examined the impact of visual appeal, online reviews, materialism, shopping enjoyment tendency and hedonic browsing on impulse buying behaviour. The examination was conducted using PLS-SEM and the fsQCA approach. The findings support all hypothesised relationships and highlight the complex interplay among the proposed variables in driving impulse buying behaviour.

5.1 PLS-SEM findings

The PLS-SEM results show that visual appeal and online reviews significantly influence hedonic browsing ([H1](#) and [H2](#) supported), confirming the role of aesthetic and informational cues in stimulating customer exploration on online shopping platforms. This finding aligns with prior research of [Kimiagari and Malafe \(2021\)](#) and [Zhang et al. \(2018\)](#) and suggests that visually engaging interfaces and positive social proof in the form of online reviews enhance customer affection, as reflected in increased hedonic browsing. The findings also align with the underpinnings of latent state-trait theory and suggest that visual appeal represents an environmental state, while online reviews represent an informative latent state. These states activate consumer's emotional and experiential responses during the online shopping experience and influence their purchase behaviour ([Chen et al., 2016](#)). Next, the results confirm that hedonic browsing influenced by visual appeal and online reviews influences impulse buying ([H3](#) supported), indicating that hedonic browsing enhances customer's experiential engagement with the platform. This finding supports the results provided in previous literature [Floh and Madlberger \(2013\)](#), [Huang \(2016\)](#), [Kimiagari and Malafe \(2021\)](#) and [Shahpasandi et al. \(2020\)](#). The findings also theoretically support the suggestion of latent state-trait theory by showing that impulse buying is not merely a function of external states but is also linked to affective states, such as hedonic browsing ([Muhammad et al., 2024](#)). Hence, these findings suggest that online retailers should strategically design interfaces and content to maximise hedonic engagement, thereby increasing the likelihood of impulse purchases.

Table 13. Configurations leading to impulse buying

	MAT	SET	OR	VA	HB	Raw coverage	Unique coverage	Consistency
MAT*SET	●	●				0.75	0.03	0.88
HB*MAT*VA	●			●	●	0.72	0.02	0.87
OR*SET		●	●			0.71	0.01	0.82
HB*SET*VA		●		●	●	0.71	0	0.86
MAT*OR*VA	●		●	●		0.67	0	0.86
HB*OR*~VA			●	○	●	0.49	0.01	0.83
~HB*SET*~VA		●		○	○	0.43	0.01	0.86
~HB*MAT*~OR*~VA	●		○	○	○	0.37	0.01	0.88
Note(s): * means "and"; ● means "presence" of condition; ○ means "absence" of condition; ~ means "absence" of condition								
Source(s): The authors								

The findings also suggest that trait-based factors, namely shopping enjoyment tendency and materialism, are positively associated with impulse buying (H4 and H5 supported). This finding supports prior literature on dispositional factors related to impulse buying (Badgaiyan and Verma, 2014; Nguyen Tat *et al.*, 2016), suggesting that individuals with a materialistic orientation and individuals with a high propensity for shopping enjoyment are more prone to making impulse purchases. The findings also support the trait aspect of latent state-trait theory, suggesting that consumer traits, such as materialism and shopping enjoyment tendency, appear to operate independently of external cues (Zafar *et al.*, 2021). Overall, the results highlight a dual pathway through which impulse buying occurs in an online shopping environment. This dual aspect indicates that online impulse buying is shaped by latent state factors, including visual appeal, online reviews and hedonic browsing, as well as trait factors, including shopping enjoyment tendency and materialism.

5.2 fsQCA findings

The fsQCA results provide important insights into the complex mechanisms underlying impulse buying in the online shopping context. The configurational findings strongly support the theoretical underpinnings of latent state-trait theory by demonstrating that online impulse buying behaviour emerges from the interaction between stable consumer traits and environmental shopping states. The results show that no single condition is individually necessary for impulse buying, confirming that impulse buying cannot be explained by any single factor. Hence, our results show multiple configurations, highlighting the equifinal nature of online impulse buying.

The first set of configurations established through fsQCA highlights the strong role of trait-based conditions. This suggests that the combination of materialism and shopping enjoyment tendency (MAT*SET) has the highest coverage (75%), indicating that customer traits are sufficient to influence impulse buying, regardless of other cues. This finding aligns with Badgaiyan and Verma (2014). From the perspective of latent state-trait theory, both materialism and shopping enjoyment tendency represent relatively stable trait-like characteristics that predispose consumers toward impulsive purchase behaviour. This suggests that enduring consumer traits can independently create favourable conditions for impulse buying even without external stimuli.

Similarly, the solution involving materialism alone (37% coverage), in the absence of other conditions ($\sim\text{HB}^*\text{MAT}^*\sim\text{OR}^*\sim\text{VA}$), shows that a materialistic orientation can independently affect impulsive buying behaviour. These findings align with prior literature (Lavuri, 2023; Pellegrino *et al.*, 2022), suggesting that customers with higher materialistic values and enjoyment tendencies are more inclined to make impulse purchases. This finding also supports the trait-based underpinnings of latent state-trait theory by demonstrating that stable personality traits such as materialism can independently affect impulsive buying tendencies even when environmental stimuli are relatively weak or absent. The interaction of trait-based variables and configuration is provided in Figure 3.

The second group of configurations reflects the importance of latent-state conditions such as visual appeal, online reviews and hedonic browsing. For example, the configuration $\text{HB}^*\text{MAT}^*\text{VA}$ suggests that visual appeal, when combined with materialism and hedonic browsing, strongly affects impulse buying (72% coverage). Similarly, $\text{HB}^*\text{SET}^*\text{VA}$ indicates that visual appeal, when reinforced by shopping enjoyment tendency and hedonic browsing, strongly stimulates impulse buying (71% coverage). These configurational findings support Kimiagari and Malafe (2021) and Sihombing *et al.* (2020) by highlighting the role of visual appeal and hedonic browsing in generating impulse buying when combined with personality traits such as materialism and shopping enjoyment tendency. These findings reflect the interaction between consumer traits and environmental states. Materialism and shopping enjoyment tendency represent the stable traits, whereas hedonic browsing and visual appeal function as environmental states during online shopping experiences. The combination of

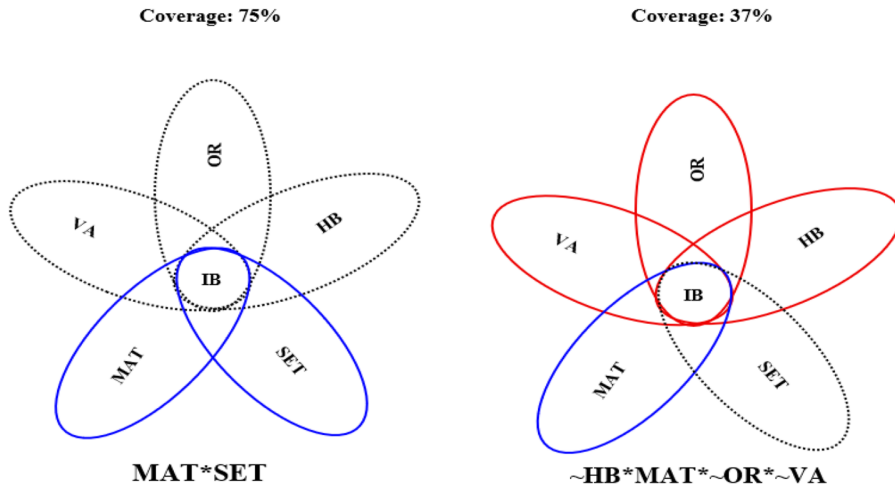


Figure 3. Visual representation of fsQCA configurational pathways. ____ Condition present; ____ Condition absent; _____ Condition omitted. Source: The authors

visually appealing website environments and pleasure-oriented browsing intensifies the impulsive tendencies of the consumers. The above interactions are presented in [Figure 4](#).

Furthermore, the other configurations demonstrate that impulse buying can emerge even in the absence of certain conditions. For instance, $HB*OR*\sim VA$ reveals that hedonic browsing and online reviews are also sufficient even without a strong visual appeal (49% coverage). This finding aligns with the suggestions of [Muhammad et al. \(2024\)](#), [Shamim and Islam \(2022\)](#) and [Xu et al. \(2020\)](#) and highlights that consumer's experiential browsing behaviour and social validation through online reviews can compensate for weaker website aesthetics. From the latent state-trait perspective, temporary environmental states generated by enjoyable browsing and persuasive social information may independently activate impulsive responses. Next, the configuration $\sim HB*SET*\sim VA$ suggests that the tendency to enjoy shopping alone can impact impulse buying (43% coverage), even when hedonic browsing and visual appeal are absent.

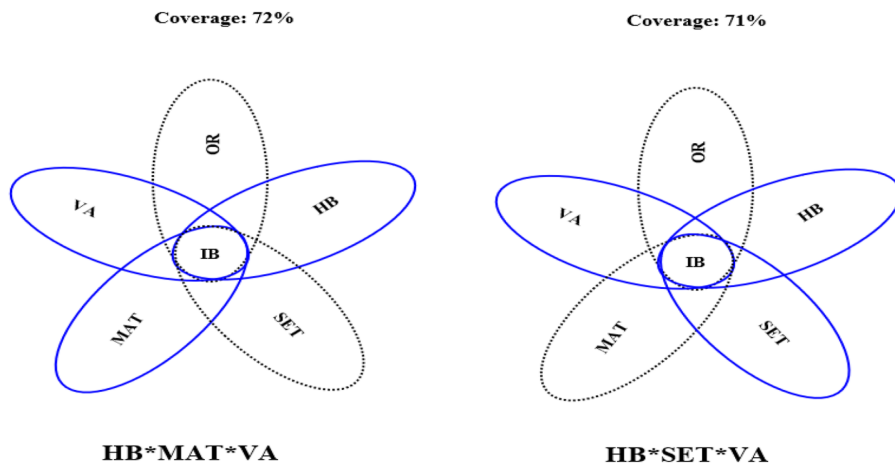


Figure 4. Visual representation of fsQCA configurational pathways. ____ Condition present; ____ Condition omitted. Source: The authors

This finding is supported by [Badgaiyan and Verma \(2014\)](#) and shows that consumers with a high tendency toward shopping enjoyment may engage in impulse buying even without hedonic browsing and visual appeal. This finding highlights the dominant influence of stable trait-like predispositions on consumer purchase behaviour. Consumers who inherently enjoy shopping may exhibit impulse buying regardless of external stimuli. These asymmetric findings emphasise that different customers may rely on distinct cues and that not all conditions need to be present simultaneously to stimulate impulse buying. The configurations are presented in [Figure 5](#).

Lastly, the configurational results reveal that impulse buying is a multifaceted and equifinal phenomenon. Both trait-like conditions (materialism, shopping enjoyment tendency) and state-like conditions (visual appeal, online reviews and hedonic browsing) form alternative and overlapping pathways leading to impulse buying. The OR*SET (71% coverage) and MAT*OR*VA (67% coverage) configurations suggest that online impulse buying results from the interplay of consumer factors and platform cues rather than any single dominant factor. The configuration OR*SET (71% coverage) suggests that consumer shopping enjoyment tendency, when facilitated by positive online reviews, can strongly generate impulse buying behaviour. The configuration MAT*OR*VA (67% coverage) also shows that materialistic consumers, when exposed to positive reviews and highly appealing visuals on online shopping platforms, are highly likely to engage in impulse buying. These findings align with [Febrilia et al. \(2024\)](#), [Kimiagari and Malafe \(2021\)](#) and [Parboteeah et al. \(2008\)](#) by supporting the overall perspective of latent state-trait theory. These findings show that materialism and shopping enjoyment tendency are stable internal traits, while online reviews and visual appeal are external environmental cues that influence consumers during the purchase process. Positive reviews and visually appealing websites may reinforce consumer's emotional excitement and shopping pleasure, thereby increasing the likelihood of impulsive purchase decisions. From a managerial perspective, e-commerce platforms should recognise these alternative pathways and tailor strategies to enhance platform appeal and accommodate consumer traits, thereby maximising impulse purchases. The phenomenon is presented in [Figure 6](#).

Overall, the configurations presenting the highest coverage include MAT*SET (75%), HB*MAT*VA (72%), OR*SET (71%) and HB*SET*VA (71%). These conditions indicate that consumer traits are highly important in explaining online impulse buying behaviour ([Badgaiyan and Verma, 2014](#); [Pellegrino et al., 2022](#)). However, when these traits interact with

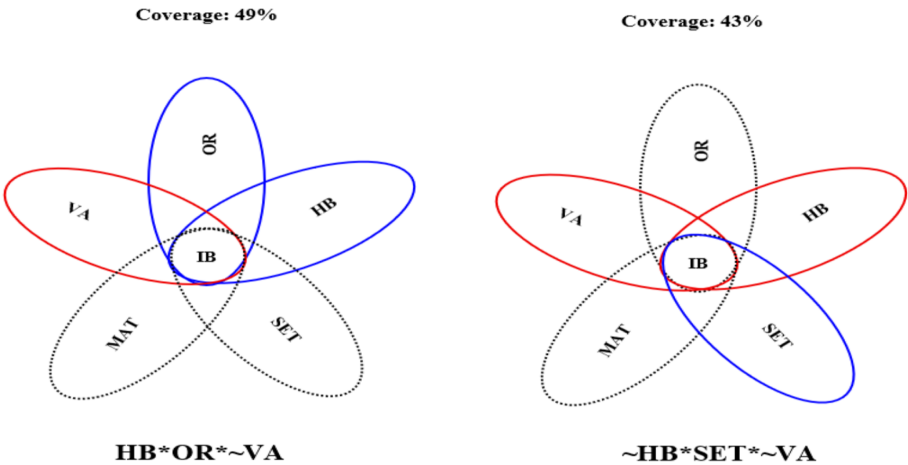


Figure 5. Visual representation of fsQCA configurational pathways. — Condition present; Condition absent; ——— Condition omitted. Source: The authors

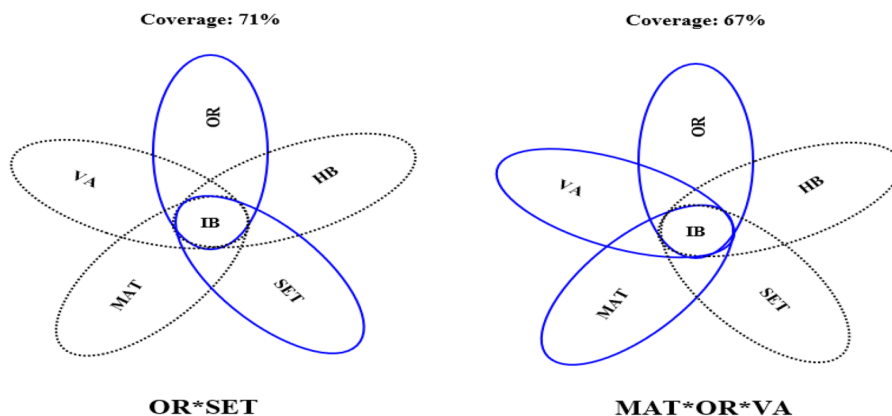


Figure 6. Visual representation of fsQCA configurational pathways. — Condition present; - - - Condition omitted. Source: The authors

favourable environmental states such as hedonic browsing, visual appeal and online reviews, the likelihood of impulse buying increases significantly (Anindito and Handarkho, 2022; Zafar *et al.*, 2021). These findings provide strong theoretical evidence that online impulse buying behaviour cannot be explained solely by personality traits or environmental stimuli, but rather by their combined, interactive influence, which aligns closely with the assumptions of latent state-trait theory.

6. Implications of the study

The findings of the present study have several important theoretical and practical implications related to the examination of online impulse buying behaviour. These implications are explained in the upcoming sections.

6.1 Theoretical implications

The findings of the study provide important theoretical implications by using LST theory in explaining online impulse buying behaviour, particularly among Indian online shoppers and the younger consumer segment. Since the empirical data were collected from online shoppers in Haryana, India and most of the respondents belonged to the younger age group, the findings offer contextual insights into impulse-buying behaviour within this consumer setting. Building on this context, the findings of the study suggest that consumer's online impulse-buying behaviour emerges from the interaction between external environmental states and consumer's psychological predispositions. By integrating visual appeal, online reviews and hedonic browsing as latent state dimensions, with materialism and shopping enjoyment tendency as trait dimensions, the study broadens the theoretical scope of LST theory within digital commerce research. The significant relationships among visual appeal, online reviews and hedonic browsing strengthen our understanding of latent states within LST theory and suggest that impulse buying is dynamically activated by external digital stimuli. Furthermore, the significant relationships of materialism and shopping enjoyment tendency with impulse buying indicate that this behaviour is connected to consumer's psychological orientations.

The outcomes of fsQCA demonstrate the principle of equifinality, in which multiple alternative combinations of latent states and traits lead to the same outcome of impulse buying. For instance, the configuration MAT*SET exhibits the highest coverage, indicating that psychological predispositions and experiential motivations can operate jointly to facilitate impulsive purchasing. Thus, the influence of materialism is better understood as part of a

broader psychological configuration rather than as an isolated antecedent. Furthermore, the configurations HB*MAT*VA and HB*SET*VA theoretically highlight the interaction between the consumer's browsing motivation, psychological orientation and characteristics of the online shopping environment. In particular, the recurrence of hedonic browsing and visual appeal across these configurations suggests that visually stimulating environments may strengthen the impulse-buying potential of consumers who are engaged in hedonic browsing. Next, the configurations OR*SET and MAT*OR*VA extend the theoretical understanding of online reviews beyond their conventional interpretation as informational cues. Within a configurational framework, online reviews may contribute to impulse buying when they co-exist with particular psychological and environmental conditions. The findings therefore suggest that the effect of social/informational cues is contingent on the consumer's underlying motivational state and the characteristics of the shopping environment.

The other configuration HB*OR*~VA demonstrates that visual appeal is not a necessary condition for impulse buying across all pathways. Similarly, ~HB*SET*~VA indicates that impulse buying can occur without hedonic browsing and without visual appeal when shopping enjoyment is present. These findings provide evidence of equifinality and imply that different combinations of conditions can lead to the same outcome. Finally, the configuration ~ HB*MAT*~OR*~VA further reinforces the principle of equifinality by indicating that impulse buying can also be associated with a configuration characterised by the absence of hedonic browsing, online reviews and visual appeal in combination with the presence of materialism. This finding implies that the mechanisms underlying online impulse buying are not reducible to a single dominant pathway. Instead, different consumer states and environmental conditions can combine in distinct ways to produce the same behavioural outcome.

Overall, these findings contribute theoretically by shifting the explanation of online impulse buying from a linear, variable-centred perspective toward a configurational perspective. The study suggests that online impulse buying is a multidimensional, configurational phenomenon shaped by the simultaneous interaction between experiential states and stable personality traits. By combining symmetric analysis with asymmetric fsQCA findings, the study advances theoretical understanding beyond linear relationships and highlights that consumer behaviour in online commerce environments is complex and driven through multiple alternative pathways.

6.2 Practical implications

The findings of the present study provide several practical implications for online retailers and platform designers, particularly those serving Indian online shoppers and the younger consumer segment. As the sample predominantly comprises younger consumers and the data were collected from Indian online shoppers, the identified relationships provide meaningful context for understanding how the younger consumer segment responds to different features of online shopping environments, particularly in the Indian online retail market. Accordingly, the significant relationship between visual appeal and hedonic browsing implies that online retailers should prioritise the aesthetics of their websites and applications. E-commerce platforms should use high-resolution product images, visually appealing layouts, fast-loading pages, attractive colour combinations and organised product displays to create an engaging shopping atmosphere. Second, the significant impact of online reviews on hedonic browsing suggests that businesses should actively strengthen their review management strategies. Retailers should encourage verified customers to leave detailed reviews, ratings and product images after purchase. They can use features such as highlighting "most relevant reviews", displaying customer testimonials and integrating video reviews to improve trust and maintain consumer's browsing interest. Third, the significant influence of hedonic browsing on impulse buying suggests that retailers can use live-stream shopping sessions and influencer-based product demonstrations. The inclusion of these features can encourage customers to browse

more on online shopping platforms, thereby enhancing their shopping experience. Fourth, the strong influence of materialism on impulse buying suggests that marketers should emphasise the trendy and aspirational aspects of products in promotional campaigns. Accordingly, cues like exclusivity along with premium branding strategies, can particularly appeal to highly materialistic consumers and increase impulsive purchasing. Fifth, the significant role of the tendency to enjoy shopping in impulse buying shows that retailers should create enjoyable digital experiences through interactive and engaging content, including virtual try-on features, AI-powered styling suggestions and customised shopping journeys.

The fsQCA findings demonstrate that different combinations of factors can influence impulse buying behaviour. For instance, the MAT*SET configuration with the highest coverage suggests that online retailers can focus on creating enjoyable, engaging shopping experiences for consumers with stronger materialistic consumption tendencies. Similarly, the HB*MAT*VA and HB*SET*VA configurations suggest that retailers should not treat platform visual appeal as an independent factor, but instead integrate it with enjoyable browsing experiences and psychologically relevant product presentation. This integration is particularly relevant when consumers browse for pleasure and have stronger materialistic orientations and a higher tendency for shopping enjoyment. Next, the OR*SET configuration suggests that retailers can prominently integrate customer reviews, ratings, photographs and user-generated experiences into product pages while maintaining an enjoyable shopping interface. Similarly, the MAT*OR*VA configuration suggests that retailers can combine persuasive social information with strong visual merchandising. For example, product pages can integrate customer ratings and reviews alongside high-quality images, videos and visually prominent product information. This combination may be particularly useful for products for which consumers rely on both social validation and visual presentation before making spontaneous purchase decisions.

Further, the HB*OR*~VA configuration shows that strong visual appeal is not required in every pathway to impulse buying. Retailers should therefore not assume that expensive or highly elaborate visual design is necessary for all consumers. Similarly, the ~HB*SET*~VA configuration indicates that impulse buying can occur even without hedonic browsing and strong visual appeal when shopping enjoyment is present. This suggests that functional shopping environments can also incorporate elements that make purchasing enjoyable, such as smooth navigation, personalised recommendations, convenient search, rewards and frictionless checkout experiences. Finally, the ~HB*MAT*~OR*~VA configuration shows that impulse buying can emerge through a different pathway, driven by materialism in the absence of other factors. From a managerial perspective, this finding cautions against adopting a one-size-fits-all digital marketing strategy. Retailers should recognise that some consumers may respond to product-oriented or psychologically based purchasing cues. Accordingly, consumer segmentation and personalised marketing strategies may be more effective than applying identical promotional techniques to all online shoppers.

Overall, the fsQCA results suggest that online retailers should adopt a configuration-based rather than single-factor approach to impulse-buying strategies. The study suggests that online retailers should adopt a multidimensional and consumer-centric strategy rather than relying on isolated marketing tactics. However, retailers should also ensure that the design of online shopping environments remains transparent and does not deliberately exploit consumer's vulnerabilities or impair their ability to make informed choices. They should balance commercial objectives with responsible consumer engagement. Retailers can use the identified impulse-buying mechanisms to improve the shopping experience while allowing consumers sufficient information and choices to make informed decisions. Accordingly, visual appeal, relevant information, credible reviews and other identified impulse-buying stimuli can facilitate engaging shopping experiences, but should not involve misleading information, artificial scarcity or excessive psychological pressure. This approach can help retailers pursue impulse-buying opportunities while maintaining consumer trust, transparency and long-term customer relationships. Thus, the findings should not be interpreted solely as a

7. Limitations and future research directions

Despite providing meaningful insights into customer impulse buying in the online shopping environment, the present study has several limitations that also offer opportunities for future research. First, the study collected data through a structured offline survey. Researchers can adopt an experimental approach to collect data for examining customer's online impulse-buying behaviour. Next, the present study used cross-sectional data collected at a single point in time to examine impulse buying behaviour. This limits the ability of the data to examine changes in consumer behaviour over time and establish relationships. Future studies may use longitudinal data to better understand impulse buying behaviour and changes in behaviour over time. Another limitation is that the study was conducted among online shoppers in Haryana, India, using a purposive sampling approach. Therefore, the findings are situated within the geographical and consumer context represented by the sample and do not uniformly apply to online shoppers across other countries. Future studies could replicate the proposed model across different cultural settings to examine the consistency of the identified relationships and configurations. Furthermore, the sample was predominantly concentrated in the 18–24 age group, which may limit the generalisability of the findings to older online consumers. Future research could therefore conduct comparative analyses across different age cohorts to assess whether the identified relationships and configurations remain consistent across consumer segments. The present study considered e-store factors, such as visual appeal and informational factors like online reviews to examine impulse buying. Future studies can examine factors like marketing cues and social influence cues to examine impulse buying in the online shopping environment. Finally, the present study focuses on the broader context of online shopping, which can be further divided into distinct subdomains such as social commerce and live-streaming commerce. Hence, future studies should examine impulse buying in other shopping contexts to identify variable configurations that contribute to impulsive buying behaviour.

8. Conclusion

The present study examined customer's impulse buying in an online shopping environment by integrating both trait-based and state-based factors. Using structural equation modelling and fsQCA, the findings show that no single condition is sufficient to explain impulse buying. Instead, multiple sufficient configurational pathways can generate impulse buying. Specifically, materialism and a tendency toward shopping enjoyment emerged as the most significant factors, while visual appeal, online reviews and hedonic browsing served as powerful environmental factors that stimulated impulse buying in various combinations. By confirming all hypothesised relationships and uncovering alternative pathways, the study highlights the dynamic nature of impulse buying. Overall, the findings suggest that impulse buying in an online shopping environment is not a linear outcome but rather an interaction between consumer tendencies and online shopping cues. This contributes to a more detailed view of impulse buying and provides a foundation for both future research and practical implications aimed at understanding and shaping consumer purchasing behaviour in digital marketplaces.

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