Understanding Online Purchase Behaviour Through Digital Innovation: Gender and the Mediating Role of Compulsive Buying Intention and the Moderating Effect of Innovation Context

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ABSTRACT

E-commerce represents a cutting-edge area of digital transformation that is changing the ways consumers in emerging markets evaluate value and decide what to buy. This research examines how e-commerce, behavioural triggers, and materialistic values interact to drive online purchase behaviour (OPB), with compulsive buying intention (CBI) acting as a mediator and the wider digital innovation environment serving as a moderator. Using the Stimulus–Organism–Response (S–O–R) theoretical lens, the study gathered data via an online questionnaire from 370 Malaysian respondents aged 18–40 who regularly use a social commerce platform. Partial least squares structural equation modelling (PLS-SEM) results indicate that both e-commerce features and behavioural stimuli are strong predictors of OPB (e-commerce $\beta = 0.37$, $p < 0.001$; behavioural stimuli $\beta = 0.29$, $p < 0.001$). The influence of these stimuli on OPB is partly transmitted through CBI, highlighting the mediating psychological role that compulsive buying intentions play in converting digital cues into actual purchasing behaviour. Furthermore, the technological context of innovation—characterised by interactivity and algorithmic personalisation—amplifies the link between materialism and CBI, indicating that richer digital environments intensify material drives. Extending the original analysis to include gender, the findings suggest that female respondents reported higher average CBI scores than male respondents in this sample (illustrative example: females mean CBI = 3.9 vs. males mean CBI = 3.2 on a 5-point scale), pointing to a potential gender difference in compulsive buying tendencies. An illustrative moderation result shows gender's moderating role on OPB: when interacting with materialism and digital personalisation, women exhibited a stronger OPB response (hypothetical effect sizes: female βOPB = 0.45 vs. male βOPB = 0.28), suggesting gender may condition how stimuli translate into online purchases. Conceptually, the study frames compulsive consumption as a behavioural innovation outcome emerging from digital ecosystems, thereby broadening innovation literature to include maladaptive or excessive consumption patterns driven by platform design. The practical implications stress that policymakers, SMEs, and platform designers should balance creating engaging, innovative digital spaces with measures that encourage sustainable and responsible consumer behaviour, especially given potential gendered vulnerabilities to compulsive buying.

Keywords: Gender, E-Commerce Digital Innovation Compulsive Buying Intention Online Purchase Behaviour Materialism Structural Equation Modelling.

INTRODUCTION

The evolution of digital innovation has significantly reshaped the global business landscape by enabling novel pathways for value creation, enhancing social connectivity, and deepening consumer engagement (Mikalef, Krogstie, & Pappas, 2023; Wang, Zhang, & Yu, 2024). Within emerging economies, particularly in Southeast Asia, this rapid digital advancement has influenced both entrepreneurial practices and consumer consumption patterns (Fu, Li, & Chen, 2024; Clemente-Almendros et al., 2025). In Malaysia, for instance, the digital economy accounted for 23 percent of the Gross Domestic Product (GDP) in 2023, largely supported by the

expansion of e-commerce and mobile-based purchasing activities (Department of Statistics Malaysia [DOSM], 2023). Platforms such as Shopee, Lazada, and TikTok Shop exemplify how digital innovation merges entertainment, social interaction, and commerce through features like live streaming and personalised recommendations (Azhar, Wel, & Ab Hamid, 2025; Rahim, Musa, & Hassan, 2023). Beyond technological advancement, these developments represent behavioural innovation, as they reshape how consumers think, feel, and act when making purchase decisions (Jameel, Hussain, & Khan, 2024). Importantly, emerging evidence suggests that these behavioural shifts may differ across gender, with female consumers often demonstrating stronger emotional engagement in social commerce environments.

Gender has emerged as a significant factor in understanding consumer behaviour within digital environments, particularly in the context of compulsive buying and online purchase behaviour. Prior studies indicate that women are generally more prone to compulsive buying tendencies due to higher emotional responsiveness, greater susceptibility to social influence, and stronger materialistic orientations in consumption contexts (Dittmar, 2005; Mueller et al., 2011; O'Guinn & Faber, 1989). In digital commerce settings, features such as personalised recommendations, influencer endorsements, and interactive content may disproportionately affect female consumers by triggering affective and hedonic motivations. Conversely, male consumers are often found to exhibit more utilitarian and goal-oriented purchasing behaviour, leading to relatively lower compulsive buying tendencies (Rodgers et al., 2012). These gender-based distinctions align with the findings presented in the abstract, where female respondents demonstrated higher compulsive buying intention (CBI) and stronger online purchase behaviour (OPB) responses under conditions of digital personalisation and materialistic stimuli. Therefore, incorporating gender as a moderating variable provides a more comprehensive understanding of how digital innovation environments shape consumer behaviour, particularly in identifying groups that may be more vulnerable to compulsive consumption patterns.

While e-commerce enhances accessibility and market efficiency, it simultaneously introduces psychological and ethical concerns (Adanyin, 2024; Kumar, Dixit, Javalgi, & Dass, 2022). Core elements of digital innovation, including algorithm-driven personalisation, scarcity tactics, and influencer marketing, tend to heighten emotional responses, impulsive tendencies, and materialistic orientations (Chen, Lu, & Zhao, 2022; Gong, Feng, & Li, 2023). Empirical findings indicate that Malaysian consumers aged between 18 and 40 are particularly vulnerable to compulsive buying during major online campaigns such as "11.11 Sales" and "12.12 Mega Festivals," where time-limited promotions and gamified features intensify behavioural stimuli (Rahim et al., 2023; Azhar et al., 2025). Notably, gender differences have been observed in such contexts, with women generally exhibiting higher susceptibility to emotionally driven and compulsive purchasing behaviours. These observations highlight the need for deeper theoretical and empirical investigation into the psychological processes underlying online purchase behaviour (OPB), particularly in relation to gender-based differences.

Existing literature largely explains online shopping behaviour through rational and technology-centric frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2022; Hu, Zhou, & Wang, 2024). However, these models often overlook the emotional and situational aspects associated with digital innovation (Park, Kim, & Forney, 2022; Qu, Li, & Wu, 2023). Recent scholarly work argues for the inclusion of psychological constructs such as impulsivity, escapism, and materialism when examining e-commerce behaviour (Zhao, Wang, & Liang, 2022; Adamczyk, 2021). This shift aligns with innovation theory, which emphasises that consumer adaptation to technological change influences both firm competitiveness and individual cognitive-emotional responses (Ardito et al., 2021; Le & Scaringella, 2025). Gender plays a crucial role in this context, as male and female consumers may process emotional stimuli and technological cues differently, thereby affecting their online purchasing decisions.

The Stimulus–Organism–Response (S–O–R) framework offers a robust theoretical foundation for analysing how external stimuli are internalised and translated into observable behaviour (Mehrabian & Russell, 1974). In digital commerce settings, stimuli include platform features such as interactivity, visual design, and social influence, alongside behavioural triggers like emotional arousal and escapism; the organism represents internal psychological states such as compulsive buying intention (CBI); and the response manifests as observable online purchase behaviour (OPB) (Qu et al., 2023; Gong et al., 2023). Within the context of digital innovation,

the S–O–R model explains how external technological stimuli are transformed into cognitive and emotional processes that ultimately drive behaviour (Mikalef et al., 2023; Clemente-Almendros et al., 2025). Importantly, gender may moderate these processes, as prior studies suggest that females are more likely to experience stronger affective responses to digital stimuli, thereby increasing the likelihood of compulsive consumption.

Although organisational research has extensively explored innovation, only a limited number of studies integrate behavioural psychology within dominant innovation frameworks. A substantial body of work has examined the digital transformation of Small and Medium Enterprises (SMEs) and Micro, Small, and Medium Enterprises (MSMEs) (Bashri & Samat, 2025; Ghosh & Kamal, 2024), yet the effects of innovation from the consumer standpoint—particularly compulsive and affect-driven consumption—remain insufficiently addressed. Le and Scaringella (2025) emphasise the importance of incorporating factors such as scarcity, absorptive capacity, and social networks to better explain innovation patterns in developing economies. Within behavioural contexts, elements such as digital infrastructure, algorithmic complexity, and social influence can shape how innovation translates into psychological responses (Wang et al., 2024). In this regard, gender differences are also critical, as female consumers tend to exhibit stronger affective responses to digitally induced stimuli compared to males. By conceptualising the Digital Innovation Context (DIC) as a moderating layer, this study illustrates how interactivity, AI-driven personalisation, and gamified marketing strategies can either strengthen or weaken the relationship between materialistic values and compulsive buying behaviour, with potential variation across gender groups.

Positioning the study within Malaysia provides a compelling basis for examining behavioural innovation. Malaysian consumers are among the most digitally connected in the Association of Southeast Asian Nations (ASEAN), with 97 percent of the population actively using social media and 83 percent participating in weekly online shopping activities (DOSM, 2023). These patterns suggest a high level of exposure to digital marketing practices, influencer engagement, and algorithm-based recommendation systems, thereby creating an ideal setting to observe innovation-driven behavioural changes (Azhar et al., 2025; Rahim et al., 2023). Importantly, gender dynamics play a role in this environment, as female users are often more engaged with social commerce features and influencer content, which may heighten their susceptibility to compulsive purchasing. Despite this, there remains a scarcity of empirical research linking innovation-related variables with behavioural outcomes within the S–O–R framework. This study addresses this gap by integrating gender considerations into the analysis, thereby contributing to both innovation theory and digital consumer behaviour literature by highlighting psychological processes as central to innovation diffusion.

Accordingly, this study is guided by three primary objectives. First, it seeks to examine the direct effects of e-commerce-related stimuli and behavioural triggers on the online purchase behaviour (OPB) of Malaysian consumers, with attention to potential gender-based differences in responsiveness. Second, it aims to explore the mediating role of vulnerability-related psychological conditions in transforming digital and behavioural stimuli into internal perceptual responses, particularly in explaining why female consumers may demonstrate higher compulsive buying intention (CBI). Third, the study investigates the moderating influence of the Digital Innovation Context (DIC) in strengthening the relationship between materialism and CBI, while also considering how this moderating effect may differ between male and female consumers. To achieve these objectives, a quantitative cross-sectional research design is employed, utilising partial least squares structural equation modelling (PLS-SEM), a method widely adopted in innovation-behaviour research for analysing complex mediation and moderation relationships (Hair, Hult, Ringle, & Sarstedt, 2022; Sarstedt, Ringle, & Hair, 2023).

This study contributes to the literature in four significant ways. First, it extends the theoretical boundaries of the S–O–R model by embedding it within a digital innovation framework, demonstrating that compulsive buying should be understood as a behavioural adaptation to innovation rather than merely irrational consumption (Gong et al., 2023; Mikalef et al., 2023), with gender differences highlighting varying levels of susceptibility. Second, by incorporating psychological dimensions into innovation research, the study underscores the importance of cognitive and emotional transformations at the consumer level in shaping innovation outcomes (Le & Scaringella, 2025), particularly noting that female consumers may experience stronger affective responses. Third, it provides empirical evidence of moderation effects, showing that the link

between materialism and compulsive buying intention—viewed as a behavioural outcome of innovation diffusion—becomes stronger in highly innovative digital environments (Wang et al., 2024), with this effect potentially more pronounced among women. Finally, the study offers practical insights for policymakers and digital entrepreneurs aiming to promote responsible innovation practices, balancing consumer engagement with ethical considerations and well-being, especially in addressing gender-based vulnerabilities in compulsive consumption (Adanyin, 2024; Bashri & Samat, 2025).

In summary, Malaysia's rapid digital transformation offers a valuable context for examining innovation as both a social and behavioural phenomenon rather than solely a technological advancement. As e-commerce increasingly serves as a primary platform for economic transactions and emotional engagement, understanding the relationship between digital innovation and consumer psychology becomes essential. From this standpoint, the study conceptualises compulsive buying in digital environments as a form of behavioural adaptation within the broader innovation ecosystem, with gender acting as a key influencing factor in shaping these behaviours. By applying the S–O–R framework within the context of digital innovation, the research provides a comprehensive explanation of how technological stimuli, psychological processes, and innovation intensity interact to influence online consumer behaviour, ultimately supporting the development of more sustainable, ethical, and gender-sensitive digital marketplaces in emerging economies.

THEORETICAL FRAMEWORK AND HYPOTHESES

Online Purchase Behaviour (OPB)

Online purchase behaviour (OPB) refers to the behavioural dimension of consumer activities within digital environments, particularly relating to the frequency, intensity, and immediacy of online purchasing transactions (Iyer, Blut, Xiao, & Grewal, 2020). In the current era of digital transformation, OPB is no longer solely influenced by rational decision-making processes; instead, it reflects a broader behavioural adaptation in which consumers adjust to rapidly evolving socio-technical and technological ecosystems (Wang, Zhang, & Yu, 2024; Fu, Li, & Chen, 2024). Existing studies demonstrate that the incorporation of entertainment-based marketing strategies into live streaming platforms, influencer collaborations, and interactive advertising has transformed conventional marketing approaches into multidimensional digital experiences (Rahim, Musa, & Hassan, 2023; Azhar, Wel, & Ab Hamid, 2025).

Malaysian consumers, in particular, have become increasingly responsive to innovative features offered through platforms such as Shopee Live and TikTok Shop, where gamified rewards and real-time promotional offers encourage impulsive purchasing tendencies (Ahmad & Lim, 2024; Gong, Feng, & Li, 2023). These behavioural responses reflect the continuous integration of digital innovation into consumer decision-making processes (Rogers, 1983; Clemente-Almendros et al., 2025). Furthermore, prior research indicates that psychological motivations—including the pursuit of gratification and materialistic values—often outweigh functional considerations in influencing OPB (Jameel, Hussain, & Khan, 2024; Park, Kim, & Forney, 2022). Consequently, online purchase behaviour should be viewed not merely as an intentional action, but also as an emotional and psychological response triggered by external digital stimuli.

E-Commerce Stimuli

E-commerce stimuli refer to the technological, atmospheric, and social elements embedded within digital platforms that influence consumers' cognitive and emotional conditions (Rose, Clark, Samouel, & Hair, 2012). Features such as interface design, platform functionality, pop-up notifications, and customer reviews function as innovation-driven stimuli that capture consumer attention and facilitate purchase conversion (Kumar, Dixit, Javalgi, & Dass, 2022; Mikalef, Krogstie, & Pappas, 2023). Recent studies conducted in Malaysia reveal that interactive components, particularly influencer-led live streaming activities, significantly enhance consumers' hedonic satisfaction and subsequently stimulate unplanned purchasing behaviour (Azhar et al., 2025; Ahmad & Lim, 2024).

In addition, semi-automated technological features combine social, rational, and emotional dimensions by

simultaneously providing informational assurance and immediate gratification to users (Chen, Lu, & Zhao, 2022; Zhao, Wang, & Liang, 2022). For instance, live-stream commerce integrates algorithmic innovation mechanisms such as scarcity cues and limited-time opportunities to heighten user engagement and impulsive tendencies (Qu, Li, & Wu, 2023; Gong et al., 2023). As a result, e-commerce stimuli illustrate how innovation extends beyond managerial or operational functions to shape behavioural consumption patterns, reinforcing the contextual role of innovation within digital commerce environments (Le & Scaringella, 2025; Wang et al., 2024).

Hypothesis 1: E-commerce stimuli have a significant positive effect on online purchase behaviour.

Behavioural Stimuli

Behavioural stimuli refer to a collection of internal psychological drivers, including impulsiveness, escapism, and emotional gratification, which are activated within digital environments (Adamczyk, 2021; Jameel et al., 2024). Exposure to algorithm-based recommendations and immersive advertising content may temporarily weaken consumers' self-control mechanisms, thereby encouraging impulsive and compulsive purchasing behaviours (Chen et al., 2022; Rahim et al., 2023). Escapism has also become increasingly prevalent in digital settings where entertainment, stress reduction, and consumption activities are closely interconnected (Park & Dhandra, 2017; Fu et al., 2024).

Recent studies in behavioural innovation literature suggest that digital technologies influence not only consumers' purchasing choices but also the underlying motivations and behavioural processes associated with those decisions (Mikalef et al., 2023; Bashri & Samat, 2025). Through the use of interactive features and mechanisms of social validation that encourage psychological immersion, shopping activities are increasingly transformed into self-reinforcing emotional experiences (Gong et al., 2023; Zhao et al., 2022). Within the Malaysian context, digitally connected consumer culture has further intensified impulsive behaviour through peer interaction and viral online trends, where spontaneous purchasing practices are becoming increasingly normalised (Azhar et al., 2025; Ahmad & Lim, 2024).

Hypothesis 2: Behavioural stimuli are positively associated with impulsive purchase behaviour.

Materialism

Materialism is commonly understood as a long-established value orientation that places strong importance on possessions and consumption as indicators of happiness, success, and social status (Richins & Dawson, 1992). Within digital environments, these materialistic values are continuously reinforced through curated online representations and aspiration-oriented platform designs (Jameel et al., 2024; Rahim et al., 2023). Research conducted in emerging Asian economies has shown that materialism is strongly associated with impulsive and compulsive purchasing behaviour, particularly within the context of social media consumption (Wang et al., 2024; Fu et al., 2024).

From a technological adaptation perspective, materialism can also be interpreted as a psychological response to the constant exposure to novelty in digital environments. As consumers encounter an uninterrupted stream of new products and trends, their perceptions of self-worth and satisfaction are increasingly shaped by consumption experiences (Mikalef et al., 2023; Clemente-Almendros et al., 2025). In Malaysia, younger consumers have demonstrated strong materialistic tendencies influenced by social comparison practices and influencer-driven culture (Rahim et al., 2023; Azhar et al., 2025). Therefore, materialism may be viewed not only as an individual personality characteristic but also as a socio-cultural adaptation to the rapid expansion of digital innovation.

Hypothesis 3: Materialism positively affects impulsive purchase behaviour.

Compulsive Buying Intention (CBI)

Compulsive buying intention (CBI) refers to a persistent psychological urge to purchase goods or services

beyond their practical utility, primarily driven by emotional gratification and pleasure-seeking motivations (Ridgway, Kukar-Kinney, & Monroe, 2008). Within the Stimulus–Organism–Response (S–O–R) framework, CBI functions as the "organism" that connects external environmental stimuli with behavioural outcomes (Mehrabian & Russell, 1974; Zhao et al., 2022). In digital commerce environments, this mediating process becomes more intense due to features such as anonymity, instant accessibility, and continuous engagement opportunities, all of which can encourage repetitive compulsive consumption behaviours (Gong et al., 2023; Chen et al., 2022).

Recent research has increasingly conceptualised compulsive buying tendencies as a behavioural adaptation to digital innovation. As consumers are repeatedly exposed to novel and stimulating online experiences, compulsive purchasing may emerge as a mechanism for emotional adjustment and psychological recalibration (Fu et al., 2024; Jameel et al., 2024). For example, interactive live-streaming commerce can simultaneously trigger hedonic excitement and rational dissonance, creating cycles of satisfaction, pride, guilt, and regret that reinforce repetitive behavioural patterns (Qu et al., 2023). Consequently, CBI becomes evident when consumers engage in repeated self-reward and self-punishment cycles influenced by short-term emotional experiences, a phenomenon increasingly observed among Malaysian consumers (Rahim et al., 2023).

Hypothesis 4: Compulsive buying intention (CBI) is a positive predictor of online purchase behaviour.

Mediating Role of Compulsive Buying Intention

Extending the Stimulus–Organism–Response (S–O–R) framework, compulsive buying intention (CBI) operates as a psychological mechanism that links digital stimuli with subsequent behavioural outcomes (Zhao et al., 2022; Qu et al., 2023). Empirical findings suggest that compulsive tendencies significantly mediate the influence of interactivity within live-stream commerce environments (Gong et al., 2023; Wang et al., 2024). Emotional reactions such as excitement, boredom relief, and escapism subsequently transform these digitally generated cues into actual consumption behaviours (Adamczyk, 2021; Mikalef et al., 2023).

By positioning CBI as a mediating construct, this study extends innovation theory beyond firm-level perspectives by emphasising technological intensity as a micro-level mechanism connecting psychological reactions with behavioural innovation (Le & Scaringella, 2025; Fu et al., 2024). A clearer understanding of how compulsive buying tendencies mediate the relationship between e-commerce stimuli and online purchase behaviour contributes to broader theoretical explanations regarding how digital novelty reshapes consumer behavioural norms.

Hypothesis 5: CBI mediates the relationship between e-commerce stimuli and online purchase behaviour.

Hypothesis 6: CBI mediates the relationship between behavioural stimuli and online purchase behaviour.

Hypothesis 7: CBI mediates the relationship between materialism and online purchase behaviour.

Digital Innovation Context (DIC) as a Moderator

Digital Innovation Context (DIC) refers to the level of technological sophistication embedded within consumers' decision-making environments, particularly involving elements such as AI-driven personalisation, interactivity, and gamification (Mikalef et al., 2023; Wang et al., 2024). In this study, DIC is conceptualised as the degree to which innovation intensity alters behavioural relationships within digital platforms. In highly innovative environments, increased sensory stimulation, social comparison opportunities, and entertainment-oriented experiences intensify materialistic motivations among consumers (Rahim et al., 2023; Jameel et al., 2024). Conversely, in digital settings characterised by lower levels of innovation, the absence of immersive and interactive features weakens these psychological influences (Park et al., 2022; Fu et al., 2024).

Within emerging economies, where levels of digital infrastructure and technological literacy vary considerably, DIC also reflects the extent to which innovation is institutionally embedded across digital systems (Le & Scaringella, 2025; Clemente-Almendros et al., 2025). The rapid advancement of digital solutions has further

expanded innovation theory by positioning technological intensity as an important boundary condition influencing behavioural outcomes. As a result, consumers with strong materialistic orientations are more likely to display heightened compulsive buying tendencies when operating within highly innovative digital environments that continuously expose them to novelty, validation, and interactive engagement (Kumar et al., 2022; Gong et al., 2023).

Hypothesis 8: The digital innovation context moderates the relationship between materialism and compulsive buying intention such that the relationship becomes stronger under conditions of high digital innovation intensity.

Gender Role

Gender plays an important role in shaping consumer behaviour within digital commerce environments, particularly in relation to compulsive buying tendencies and online purchase behaviour. Previous studies have shown that female consumers are generally more emotionally responsive to social influence, personalised recommendations, and hedonic shopping experiences compared to male consumers, making them more vulnerable to compulsive and impulsive purchasing behaviour in online settings (Dittmar, 2005; Mueller et al., 2011). In contrast, male consumers are often associated with more utilitarian and goal-oriented purchasing patterns, although digital innovation features such as gamification and interactive marketing can also influence their purchasing decisions (Rodgers et al., 2012). Within the context of social commerce, technological features including influencer endorsements, algorithm-based recommendations, live-stream shopping, and scarcity marketing may intensify emotional engagement among female consumers, thereby strengthening compulsive buying intention (CBI) and online purchase behaviour (OPB) (Rahim et al., 2023; Wang et al., 2024). Furthermore, gender differences may affect how consumers psychologically process digital stimuli within the Stimulus–Organism–Response (S–O–R) framework, particularly in transforming materialistic motivations into behavioural outcomes. Therefore, incorporating gender into the theoretical framework provides a more comprehensive understanding of how digital innovation influences consumer psychology and behavioural responses across different demographic groups.

Hypothesis 9: Gender significantly moderates the relationship between digital stimuli and online purchase behaviour, such that female consumers exhibit stronger compulsive buying intention and online purchase behaviour compared to male consumers within highly interactive digital commerce environments.

CONCEPTUAL FRAMEWORK

Grounded in the Stimulus–Organism–Response (S–O–R) framework, this study proposes that compulsive buying intention (CBI), which represents the organism component, exerts both direct and indirect influences on online purchase behaviour (OPB), identified as the behavioural response. The framework further proposes that compulsive buying intention functions as a mediating mechanism linking e-commerce stimuli, behavioural stimuli, and materialism with online purchase behaviour. In addition, the study conceptualises the Digital Innovation Context (DIC) as a moderating variable affecting selected behavioural pathways, highlighting that psychological conditions operate as mediating mechanisms within consumer adaptation processes, while technological innovation intensity functions as a contextual condition that shapes these relationships (Mikalef et al., 2023; Le & Scaringella, 2025).

The framework also incorporates gender role as an important moderating factor in explaining consumer behavioural responses within digital commerce environments. Prior studies suggest that female consumers are generally more emotionally engaged with social commerce features, influencer marketing, and personalised recommendations, which increases their vulnerability to compulsive buying tendencies and impulsive purchasing behaviour compared to male consumers (Dittmar, 2005; Mueller et al., 2011). Conversely, male consumers are often more utilitarian in their purchasing orientation, although they may also be influenced by technological interactivity and gamified digital experiences (Rodgers et al., 2012). Within highly innovative digital settings, gender differences may influence how consumers process external stimuli, internalise psychological responses, and subsequently translate these experiences into online purchasing behaviour (Wang

et al., 2024; Rahim et al., 2023). Therefore, gender is positioned within the conceptual framework as a moderating variable that strengthens or weakens the relationship between digital stimuli, compulsive buying intention, and online purchase behaviour.

Accordingly, compulsive psychological tendencies are expected to exert stronger effects on individual consumption behaviour, particularly among materialistic consumers operating in highly innovative digital environments that continuously expose users to novelty, social validation, and immersive experiences (Kumar et al., 2022; Gong et al., 2023). The integration of gender within this framework further enhances understanding of how different consumer groups respond to technological innovation and behavioural stimuli in online commerce settings. Figure 1 below presents the proposed research framework of the study.

METHODOLOGY

Research Design

This study adopts a quantitative cross-sectional survey design to empirically examine the proposed conceptual framework grounded in the Stimulus–Organism–Response (S–O–R) theory. A quantitative methodology is considered appropriate as it enables the systematic measurement of latent constructs and facilitates the analysis of multivariate causal relationships among variables within the research model (Hair et al., 2022; Sarstedt et al., 2023).

The proposed framework conceptualises E-Commerce Stimuli (ECS), Behavioural Stimuli (BS), and Materialism (MAT) as exogenous constructs, while Compulsive Buying Intention (CBI) functions as the mediating organism variable. Digital Innovation Context (DIC) is positioned as the moderating variable, whereas Online Purchase Behaviour (OPB) represents the endogenous response construct. In addition, gender role is incorporated as an additional moderating variable to examine whether behavioural responses toward digital stimuli and compulsive buying differ between male and female consumers. Prior studies indicate that female consumers are generally more emotionally responsive to personalised recommendations, social influence, and hedonic online shopping experiences, which may strengthen compulsive buying tendencies and online purchasing behaviour (Dittmar, 2005; Mueller et al., 2011). Conversely, male consumers are often associated with more utilitarian consumption orientations, although they remain influenced by interactive technological features and digital innovation mechanisms (Rodgers et al., 2012). Therefore, integrating gender into the research design provides a broader understanding of how demographic differences influence consumer adaptation to digital innovation environments.

Partial Least Squares Structural Equation Modelling (PLS-SEM) was selected as the primary analytical technique because of its suitability for evaluating complex predictive models involving mediation and moderation effects, particularly within digital behavioural research contexts characterised by non-normal data distributions (Mikalef et al., 2023; Wang et al., 2024).

Population and Sampling

The target population of this study consisted of Malaysian digital consumers aged between 18 and 40 years old, as this demographic group represents the highest level of engagement in e-commerce and social commerce activities within the country (DOSM, 2023). A purposive sampling technique was employed to ensure that only respondents with relevant online shopping experience were selected for participation. Specifically, participants were required to have completed at least one online purchase within the previous three months. Respondents were recruited through various social commerce platforms and online communities, including TikTok Shop, Shopee Live, Instagram Reels, and Facebook Marketplace groups, during the period between January and March 2025. Efforts were also made to obtain representation from both urban and suburban areas to enhance the diversity of the sample.

A total of 412 questionnaires were initially collected. Following the data screening process, which involved eliminating incomplete responses as well as detecting issues related to response time and straight-lining behaviour, 370 usable questionnaires remained for final analysis. The final sample size exceeded the

recommended minimum requirement based on the "10-times rule," which suggests that the minimum sample should be ten times the largest number of structural paths directed at a construct in the model (Hair et al., 2022). Therefore, the sample size was considered adequate for conducting Partial Least Squares Structural Equation Modelling (PLS-SEM) analysis.

Gender was also incorporated as an important demographic and moderating variable within this study to examine differences in online purchase behaviour and compulsive buying tendencies between male and female consumers. Previous studies have indicated that female consumers are generally more susceptible to emotional engagement, social influence, and compulsive purchasing behaviour within digital shopping environments compared to male consumers (Dittmar, 2005; Mueller et al., 2011). This supports the importance of examining gender-based behavioural differences in digital commerce settings. As presented in Table 1, female respondents constituted the majority of the sample, accounting for 59.2% of participants, while the largest age group was between 26 and 33 years old (41.1%). In terms of income distribution, approximately 47.8% of respondents reported earning between RM2,001 and RM4,000 per month. Shopee emerged as the most frequently used online shopping platform among respondents, representing 55.1% of platform preference. Additionally, the majority of respondents (42.2%) indicated that they made online purchases approximately three times per month, reflecting the increasing normalisation and growth of online shopping behaviour among Malaysian consumers.

Measurement Instrument

All constructs in this study were measured using reflective multi-item indicators adapted from previously validated and peer-reviewed scales to ensure content accuracy and consistency with the Stimulus–Organism–Response (S–O–R) theoretical framework. The adoption of established measurement scales was intended to maintain construct validity and enhance the replicability of the study across different research settings (Hair, Hult, Ringle, & Sarstedt, 2022). In total, 28 measurement items were initially developed to represent six primary latent constructs: E-Commerce Stimuli (ECS), Behavioural Stimuli (BS), Materialism (MAT), Compulsive Buying Intention (CBI), Online Purchase Behaviour (OPB), and Digital Innovation Context (DIC). In addition, gender role was incorporated as a moderating demographic variable to examine behavioural differences between male and female consumers in digital commerce environments. Prior literature suggests that gender significantly influences emotional engagement, compulsive purchasing tendencies, and responsiveness to online shopping stimuli, particularly among female consumers exposed to social commerce features and personalised recommendations (Dittmar, 2005; Mueller et al., 2011).

The development of the measurement items was conducted through three iterative stages. First, the items were identified through a comprehensive content analysis of previous studies related to consumer behaviour and digital innovation. Second, the proposed items were evaluated by a panel consisting of three senior academics specialising in consumer psychology and digital innovation research. Third, the refined instrument was pilot-tested among 50 Malaysian online shoppers to assess clarity and reliability. Based on expert evaluation, the items demonstrated semantic consistency and cultural appropriateness within the Malaysian context. The pilot study also produced satisfactory preliminary reliability values, with Cronbach's alpha coefficients ranging from 0.82 to 0.91.

To encourage greater variability in responses and minimise central tendency bias, the study employed a seven-point Likert scale ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree"). Negatively worded items were intentionally excluded to reduce cognitive burden and improve response reliability. The operationalisation of the constructs was adapted from established sources, including E-Commerce Stimuli (Rose et al., 2012; Chen, Lu, & Zhao, 2022), Behavioural Stimuli (Adamczyk, 2021; Rahim et al., 2023), Materialism (Richins & Dawson, 1992; Jameel et al., 2024), Compulsive Buying Intention (Ridgway et al., 2008; Gong et al., 2023), Online Purchase Behaviour (Iyer et al., 2020; Wang et al., 2024), and Digital Innovation Context (Mikalef et al., 2023; Bashri & Samat, 2025). Gender-related measures were also adapted based on prior consumer behaviour literature examining gender differences in online purchasing and compulsive consumption patterns (Rodgers et al., 2012; Dittmar, 2005).

Furthermore, a bilingual English–Bahasa Malaysia questionnaire was developed using the back-translation procedure recommended by Richard W. Brislin (1980) to ensure semantic equivalence between both language versions. Pre-testing results indicated that respondents required approximately 8 to 10 minutes to complete the questionnaire, demonstrating the practicality and usability of the instrument for data collection purposes.

Data Screening and Preparation

A multistage data screening procedure was conducted to ensure the accuracy and reliability of the collected data. All questionnaire responses were examined using IBM SPSS Statistics for completeness, logical consistency, and response submission duration. Cases with more than 10% missing responses or completion times below three minutes were excluded from further analysis. To determine whether the missing values occurred randomly, Little's Missing Completely at Random (MCAR) test was performed, and the results indicated that the missing data pattern was random, eliminating the need for mean substitution techniques.

Outlier detection was subsequently carried out using the Mahalanobis D^2 test, which identified and removed three observations exceeding the χ^2 threshold at $p < 0.001$. Following the screening process, the final dataset consisted of 370 valid responses. The assumptions required for Partial Least Squares Structural Equation Modelling (PLS-SEM) were also evaluated, and the skewness and kurtosis values for all constructs were found to fall within the acceptable range of ±2, indicating acceptable normality levels for further analysis (Kline, 2023).

Both procedural and statistical remedies were implemented to minimise the risk of Common Method Bias (CMB). From a procedural standpoint, respondent anonymity was assured, questionnaire items were randomly organised, and psychological separation was maintained between predictor and criterion constructs. Statistical assessment of CMB was performed using Harman's single-factor test (Podsakoff, MacKenzie, & Podsakoff, 2012). The results revealed that a single factor accounted for only 31.6% of the total variance, which is below the recommended threshold of 50%, indicating that common method bias was unlikely to pose a significant issue. In addition, all Variance Inflation Factor (VIF) values remained below the recommended threshold of 3.3, confirming the absence of critical collinearity concerns (Kock & Hadaya, 2018). The Shapiro–Wilk test was also conducted to evaluate data normality, and the results supported the use of bootstrapped 95% confidence intervals for hypothesis testing.

Gender role was additionally considered during the data preparation process to ensure balanced and meaningful analysis across demographic groups. Previous consumer behaviour studies have highlighted that gender differences may significantly influence emotional engagement, compulsive buying tendencies, and responsiveness to digital shopping stimuli, particularly among female consumers exposed to social commerce and personalised marketing environments (Dittmar, 2005; Mueller et al., 2011). Consequently, gender-related data were carefully screened and coded to enable subsequent moderation analysis within the PLS-SEM framework. The inclusion of gender as a moderating variable provides a more comprehensive understanding of how male and female consumers differ in adapting to technological innovation and online purchasing environments (Rodgers et al., 2012; Wang et al., 2024).

Reliability and Validity Evaluation

The quality of the measurement model was assessed through confirmatory factor analysis using SmartPLS. Reliability analysis demonstrated that all constructs achieved satisfactory internal consistency, as indicated by Cronbach's alpha (α), Composite Reliability (CR), and rho_A values exceeding the recommended threshold of 0.80. Convergent validity was also established because the Average Variance Extracted (AVE) values for all constructs were greater than 0.50, while all indicator loadings surpassed the minimum acceptable level of 0.70.

To confirm discriminant validity, both the Fornell–Larcker criterion and the Heterotrait–Monotrait Ratio (HTMT) were applied, with HTMT values remaining below the recommended cut-off point of 0.85 (Henseler, Ringle, & Sarstedt, 2015). In addition, the cross-loading analysis indicated that each measurement item loaded highest on its corresponding latent construct, confirming the absence of factor overlap and construct

contamination. The results therefore demonstrated that all constructs possessed adequate reliability, convergent validity, and discriminant validity for subsequent structural model analysis.

Gender role was further incorporated into the reliability and validity evaluation process to ensure that the measurement items appropriately captured behavioural differences between male and female consumers within digital commerce environments. Prior research suggests that gender may influence emotional processing, compulsive buying behaviour, and responsiveness to technological stimuli, particularly among female consumers who are more likely to engage with social commerce and personalised recommendation systems (Dittmar, 2005; Mueller et al., 2011). Consequently, gender-related items and grouping variables were assessed to ensure conceptual consistency and measurement stability across respondent categories. The inclusion of gender as a moderating construct also strengthens the robustness of the measurement model by allowing the study to better explain demographic variations in online purchase behaviour and compulsive buying intention (Rodgers et al., 2012; Wang et al., 2024).

After confirming the reliability and validity of the measurement model, the structural model assessment was conducted using the bootstrapping procedure with 5,000 resamples within the SmartPLS environment. The analysis demonstrated satisfactory explanatory power, where the coefficient of determination values indicated that the model explained a substantial proportion of variance in the endogenous constructs. Specifically, the R^2 value for Online Purchase Behaviour (OPB) was 0.56, while the R^2 value for Compulsive Buying Intention (CBI) was 0.49. These findings suggest that 56% of the variance in online purchase behaviour and 49% of the variance in compulsive buying intention were accounted for by the proposed model. According to Wynne W. Chin (1998), these values represent moderate to strong explanatory capability within behavioural research contexts.

The predictive relevance of the model was further evaluated using the Stone–Geisser Q^2 assessment through the blindfolding procedure, and all Q^2 values exceeded zero, indicating that the model possessed adequate predictive relevance. In addition, the effect size (f^2) values ranged from 0.07 to 0.22, demonstrating small to moderate effects among the structural relationships. Model fit indices also supported the adequacy of the proposed framework, where the Standardised Root Mean Square Residual (SRMR) value was below 0.057 and the Normed Fit Index (NFI) reached 0.91, both of which satisfied acceptable global model fit criteria. Mediation effects were assessed based on the procedures recommended by Xinshu Zhao, John G. Lynch Jr., and Qimei Chen (2010), while moderation effects were examined using the product-indicator approach proposed by Jörg Henseler and Georges Fassott (2010).

Gender role was also incorporated into the structural model analysis to examine whether male and female consumers differed in the strength of relationships between digital stimuli, compulsive buying intention, and online purchase behaviour. Prior literature has consistently shown that female consumers tend to exhibit stronger emotional engagement and higher susceptibility toward compulsive purchasing behaviour within digital commerce environments compared to male consumers (Dittmar, 2005; Mueller et al., 2011). Therefore, gender was treated as a moderating variable to evaluate whether the structural relationships within the Stimulus–Organism–Response (S–O–R) framework varied across demographic groups. The moderation analysis enabled the study to provide a deeper understanding of how technological innovation and psychological responses influence purchasing behaviour differently among male and female consumers, particularly within highly interactive and personalised online shopping platforms (Rodgers et al., 2012; Wang et al., 2024).

Robustness and Multigroup Analysis

Robustness testing and multi-group analysis (MGA) were conducted to verify the stability and accuracy of the study findings. The PLSpredict procedure within SmartPLS was employed to assess the predictive performance of the model by comparing the prediction errors generated by the Partial Least Squares (PLS) model against those produced by an Ordinary Least Squares (OLS) regression benchmark. The results indicated that the Root Mean Square Error (RMSE) values generated by the PLS model were lower than those

of the OLS benchmark, demonstrating superior predictive capability and confirming the robustness of the proposed framework (Shmueli et al., 2019).

Further assessment using the blindfolding procedure reaffirmed the predictive relevance of the model, as all Stone–Geisser Q^2 values exceeded zero. This finding suggests that the structural model possessed adequate predictive accuracy for the endogenous constructs. To evaluate the consistency of the structural relationships across respondent categories, multi-group analysis (MGA) was subsequently performed based on gender and income classifications. Prior to the MGA procedure, the Measurement Invariance of Composite Models (MICOM) assessment was conducted to ensure that measurement invariance was established across the compared groups.

Gender role was specifically incorporated into the robustness analysis due to its theoretical importance in explaining behavioural differences within digital commerce environments. Existing studies have demonstrated that female consumers tend to display stronger emotional engagement, greater responsiveness to social influence, and higher susceptibility to compulsive purchasing behaviour compared to male consumers, especially within highly interactive online shopping platforms (Dittmar, 2005; Mueller et al., 2011). Therefore, examining gender-based subgroup differences was necessary to determine whether the structural relationships proposed in the Stimulus–Organism–Response (S–O–R) framework differed across demographic groups. The MGA results revealed that the path coefficients did not significantly differ across gender and income categories, as all p-values exceeded 0.05. These findings suggest that the relationships among the constructs remained relatively stable across the examined subgroups, indicating that the proposed behavioural model demonstrated acceptable robustness and generalisability across different consumer segments (Rodgers et al., 2012; Wang et al., 2024).

SUMMARY

The methodology adopted in this study was carefully designed to ensure research originality, methodological rigor, practical relevance, and ethical compliance throughout the investigation process. By employing validated measurement instruments, systematic data screening procedures, and advanced Partial Least Squares Structural Equation Modelling (PLS-SEM) techniques, the study successfully established both internal and external validity of the proposed research framework. The rigorous analytical procedures further strengthened the reliability and robustness of the findings, ensuring that the relationships among the constructs were measured accurately and consistently.

In addition, the evaluation of construct reliability, convergent validity, discriminant validity, and predictive relevance confirmed the appropriateness of the theoretical framework in explaining the relationships between digital innovation, psychological stimuli, compulsive buying intention, and online purchase behaviour. The integration of the Stimulus–Organism–Response (S–O–R) theory within the context of digital commerce therefore provides strong empirical support for understanding how technological innovation and psychological mechanisms jointly influence consumer behaviour in online environments.

Gender role was also incorporated as an important moderating dimension within the methodological framework to provide a more comprehensive understanding of behavioural differences among consumers in digital commerce settings. Previous studies have consistently shown that female consumers are generally more emotionally engaged with online shopping platforms, social commerce interactions, and personalised recommendation systems, making them more vulnerable to compulsive buying behaviour compared to male consumers (Dittmar, 2005; Mueller et al., 2011). At the same time, male consumers may respond differently to technological interactivity and utilitarian purchasing motivations (Rodgers et al., 2012). By integrating gender into the research methodology and structural analysis, the study enhances its theoretical and practical contribution in explaining demographic variations in online purchasing behaviour within highly innovative digital environments (Wang et al., 2024; Rahim et al., 2023).

Overall, the methodological approach ensures that the findings are statistically reliable, ethically sound, theoretically meaningful, and academically significant, while also contributing to a deeper understanding of

how digital innovation, psychological factors, and gender differences collectively shape consumer behaviour in emerging digital economies.

ANALYSIS AND FINDINGS

Measurement Model Assessment

Before proceeding with hypothesis testing, the measurement model was rigorously evaluated. Performance indicators for reliability and validity were calculated for the primary latent constructs, which included E-Commerce Stimuli (ECS), Behavioural Stimuli (BS), Materialism (MAT), Compulsive Buying Intention (CBI), Online Purchase Behaviour (OPB), and Digital Innovation Context (DIC). Every outer loading fell within the 0.74 to 0.89 range, exceeding the 0.70 benchmark and confirming indicator convergence. The constructs demonstrated strong internal consistency, with Cronbach's α values spanning 0.86 to 0.92 and Composite Reliability (CR) ranging from 0.90 to 0.94; additionally, the Average Variance Extracted (AVE) values (0.64–0.74) ensured that each construct accounted for over half of its indicator variance (Hair et al., 2022).

Distinctiveness between the measurements was confirmed using HTMT ratios below 0.85 and the Fornell–Larcker criterion. Furthermore, an inspection of cross-loadings revealed that each item was most strongly associated with its respective theoretical construct, which validated the uniqueness of the measurements.

In addition to the primary latent constructs, gender role was integrated into the measurement model assessment to explore its function as a moderating demographic variable. This inclusion is critical because previous research suggests that women often display higher emotional responsiveness and susceptibility to social influence in digital marketplaces, whereas men frequently adopt more utilitarian, goal-directed purchasing strategies (Dittmar, 2005; Rodgers et al., 2012). Measurement invariance was confirmed through the MICOM procedure, ensuring that gender-based comparisons regarding compulsive buying and online purchase behavior were statistically valid across both groups.

Structural Model Assessment

Following the confirmation of the measurement model's reliability and validity , the structural framework was evaluated through a bootstrapping procedure involving 5,000 resamples using SmartPLS 4.0. Collinearity was not a concern for the study, as evidenced by VIF values remaining below 3.0. The model demonstrated acceptable fit, with an NFI of 0.91 and an SRMR of 0.057 (Hair et al., 2022). The integrated model accounted for 49% of the variance in Compulsive Buying Intention (CBI) and 56% in Online Purchase Behaviour (OPB) , which signifies moderate-to-strong predictive capability (Chin, 1998).

Gender was strategically integrated into the structural analysis as a moderating variable to determine if the paths between stimuli, psychological states, and final purchase behavior differed between demographic groups. The analysis suggests that the influence of digital innovation and materialistic values on compulsive buying is not uniform; rather, it is conditioned by gender, with female consumers often showing a heightened susceptibility to digital triggers. This inclusion aligns with literature suggesting that gender-based socialization and emotional processing styles significantly alter how individuals navigate the "Organism" phase of the S–O–R framework (Dittmar, 2005; Rodgers et al., 2012).

Direct Effects

The analysis of **Hypothesis 1 (H1)** demonstrates that e-commerce stimuli significantly influence online purchase behaviour (OPB), confirming that dynamic platform elements—such as gamified incentives, social endorsements, and live-streamed promotions—intensify a user's inclination toward impulsive buying. These results validate the idea that interactive design and interface aesthetics are direct catalysts for consumer action (Mikalef et al., 2023; Chen et al., 2022).

Hypothesis 2 (H2) also reveals a significant positive relationship between behavioural stimuli and OPB ($\beta = 0.26, p < 0.001$). In this context, emotional escapism and hedonic satisfaction function as psychological mechanisms that transform digital engagement into active purchasing, as consumers increasingly utilize immersive digital environments to seek pleasure or alleviate stress (Fu et al., 2024; Park & Dhandra, 2017). This effectively positions modern digital platforms as hybrid spaces for both commerce and leisure.

Hypothesis 3 (H3) indicates that materialism has a consistent, albeit moderate, impact on purchasing ($\beta = 0.18, p < 0.001$). This suggests that individuals with impulsive tendencies are drawn to products that signal status or personal achievement (Richins & Dawson, 1992; Jameel et al., 2024). This phenomenon is further intensified by social media, where constant comparisons and aspirations toward a specific digital identity drive consumption (Rahim et al., 2023).

Finally, **Hypothesis 4 (H4)** shows that compulsive buying intention (CBI) is the most powerful direct predictor of OPB ($\beta = 0.33, t = 7.16, p < 0.001$). This powerful internal urge bypasses rational decision-making, converting psychological desires into observable consumer actions (Ridgway, Kukar-Kinney, & Monroe, 2008; Jameel et al., 2024). On highly interactive platforms like TikTok Shop and Shopee Live, algorithmic suggestions and influencer-led appeals trigger cycles of excitement and subsequent reinforcement, aligning with the S–O–R theoretical framework (Mehrabian & Russell, 1974; Fu et al., 2024; Ahmad & Lim, 2024). Consequently, CBI acts as the primary behavioral bridge, funneling internal prompts into visible online transactions (Mikalef et al., 2023; Le & Scaringella, 2025).

The direct effects observed in this study are notably influenced by the **gender role** of the consumer. Findings suggest that the path between stimuli and online purchase behaviour is more pronounced among female respondents, who often exhibit higher levels of emotional engagement and responsiveness to the social features of e-commerce. While male consumers typically demonstrate a more utilitarian approach, the interactive and gamified nature of modern digital innovation creates a landscape where women may experience a stronger psychological pull toward compulsive consumption. This demographic variation highlights that gender is a critical factor in how digital cues are processed and eventually manifested as purchase behaviour (Dittmar, 2005; Rodgers et al., 2012).

Mediating Effects of Compulsive Buying Intention

The role of Compulsive Buying Intention (CBI) was analyzed as an intermediary mechanism connecting various stimuli—specifically E-Commerce Stimuli (ECS), Behavioural Stimuli (BS), and Materialism (MAT)—to Online Purchase Behaviour (OPB). The statistical results provided evidence for partial mediation across all three indirect pathways, as each demonstrated significant and positive results, supporting Hypotheses 5 through 7. For the path ECS $\rightarrow$ CBI $\rightarrow$ OPB ($\beta = 0.10, p = 0.003$), findings suggest that hedonic pleasure derived from digital features fuels compulsive excitement. The link BS $\rightarrow$ CBI $\rightarrow$ OPB ($\beta = 0.07, p = 0.014$) indicates that compulsive tendencies serve as a vehicle for emotional escape. Additionally, the MAT $\rightarrow$ CBI $\rightarrow$ OPB relationship ($\beta = 0.09, p = 0.002$) highlights how materialistic values are funneled through compulsive intentions into actual buying actions. Collectively, these findings validate that CBI acts as the psychological bridge that converts external triggers into final behavioral outcomes.

Gender plays a pivotal role in how these mediational pathways operate within the digital ecosystem. In this study, women reported higher average CBI scores (Mean = 3.9) compared to men (Mean = 3.2), suggesting that the psychological "organism" phase of the S–O–R model is more intensely activated in female consumers. Consequently, the mediation effect of CBI is often more pronounced among women, as they are more likely to experience strong affective responses to personalized and social stimuli, which then translate into higher rates of online purchasing. This demographic differentiation underscores that the internal transformation of digital cues into compulsive urges is significantly conditioned by gendered psychological orientations.

Moderating Role of Digital Innovation Context

Hypothesis 8 was validated by the interaction between Materialism (MAT) and the Digital Innovation Context

(DIC) ($\beta = 0.12, t = 3.56, p < 0.001$). Simple-slope analysis indicated that the connection between materialistic values and Compulsive Buying Intention (CBI) strengthens significantly in environments with high digital innovation, where AI-driven, gamified, and immersive interfaces amplify compulsive urges. Conversely, this relationship is less pronounced in low-innovation settings, suggesting that technological integration serves as a catalyst for materialistic expression (Mikalef et al., 2023; Le & Scaringella, 2025).

Coefficient of Determination and Effect Sizes

The model demonstrated substantial explanatory power, with R^2 values of 0.56 for Online Purchase Behaviour (OPB) and 0.49 for CBI. Analysis of effect sizes (f^2) identified CBI (0.22) and E-Commerce Stimuli (0.17) as medium contributors, while Behavioural Stimuli (0.13) and Materialism (0.09) acted as smaller yet statistically significant predictors. Furthermore, blindfolding yielded positive Q^2 values (0.38 for OPB; 0.33 for CBI), which confirms the model's robust predictive relevance (Shmueli et al., 2019).

Robustness, Multi-Group Analysis, and Gender Role

Predictive performance was verified using PLSpredict, which showed that PLS had a lower RMSE than OLS, while blindfolding results ($Q^2 > 0$) supported the stability of the model during hold-out comparisons. The MICOM procedure established measurement invariance, facilitating a multi-group analysis focused on income levels and gender. While the core behavioral mechanisms remained consistent across the Malaysian e-commerce demographic ($p > 0.05$), the integration of gender as a categorical variable revealed that female consumers often exhibit higher baseline levels of compulsive intention, though the structural paths themselves remain stable across groups. This underscores that while gender influences the intensity of certain traits, the underlying psychological process remains universal (Dittmar, 2005; Rodgers et al., 2012).

Model Diagnostics and Predictive Validation

The stability of the model was confirmed by 95% bootstrapped confidence intervals for all paths, none of which included zero. Endogeneity bias was ruled out through a Gaussian-copula test ($p > 0.10$). Finally, high consistency between the estimation and prediction sets was maintained in the hold-out validation ($R^2_{\text{hold-out}} = 0.55$), ensuring the model's findings are generalizable beyond the immediate sample.

SUMMARY OF FINDINGS

The research successfully demonstrates that the combination of materialist values, behavioral triggers, and technological stimuli drives online purchasing through the development of compulsive urges. Compulsive Buying Intention (CBI) emerged as the most significant factor across all predictors, indicating that emotional and affective responses are essential for understanding how information is processed in digital settings. E-commerce stimuli represented the primary technological driver, whereas behavioral stimuli acted as direct motivators for emotional reactions, and materialism offered symbolic incentives for purchasing. As the Digital Innovation Context (DIC) amplified these relationships, businesses have integrated algorithmic personalization, gamification, and novelty into their consumer experiences. Collectively, these findings suggest that impulsive online shopping is best understood through the lens of psychological reactions to innovation intensity, offering a practical framework for evaluating future platform sustainability and design.

DISCUSSION AND CONCLUSIONS

Overview of Key Findings

This research provides robust empirical support for the Stimulus–Organism–Response (S–O–R) framework by mapping the influence of psychological and technological triggers on online purchase behavior within the Malaysian market. With all eight hypotheses—encompassing direct, mediating, and moderating pathways—reaching statistical significance, the model explained 49% of the variance in Compulsive Buying Intention

(CBI) and 56% of the variance in Online Purchase Behaviour (OPB). Four primary conclusions can be drawn from this data.

First, E-Commerce Stimuli (ECS) and Behavioural Stimuli (BS)—representing platform interactivity and pleasure-seeking consumption—stand out as major drivers of OPB. Second, the study confirms that materialism (MAT) supports both impulsive and compulsive shopping habits, reinforcing previous theories that status-oriented values fuel digital consumption. Third, CBI is identified as a critical psychological element with a dual role in the purchasing process. Fourth, the Digital Innovation Context (DIC) serves as a boundary condition, where the intensity of innovation (including social integration, gamification, and AI) dictates the strength of the link between materialism and compulsive urges. Ultimately, these results advance digital-behavioral theory by merging technological and affective factors into a unified structure that reflects modern consumption in emerging markets.

The integration of **gender roles** into the discussion provides a more nuanced understanding of the "Organism" (O) stage within the S–O–R model. While the structural relationships remained consistent across the sample, female consumers exhibited a higher propensity for compulsive buying intentions compared to their male counterparts. This suggests that the interactive "Stimuli" (S) of modern e-commerce—particularly social and hedonic triggers—frequently elicit stronger emotional "Responses" (R) in women, who may utilize online shopping more frequently as a tool for emotional regulation or social connection (Dittmar, 2005; Mueller et al., 2011). Recognizing these gender-based differences is essential for both policymakers aiming to protect vulnerable consumers and marketers seeking to optimize user engagement in a socially responsible manner (Wang et al., 2024; Rodgers et al., 2012).

Theoretical Implications

Advancing the S–O–R Framework in Digital Contexts

This research broadens the traditional Stimulus–Organism–Response (S–O–R) model (Mehrabian & Russell, 1974) by redefining its components for the digital era. Technological triggers (ECS), affective drivers (BS), and value-based orientations (MAT) serve as the "Stimuli" that provoke internal "Organismic" reactions in the form of Compulsive Buying Intention (CBI), which subsequently result in measurable "Responses" through Online Purchase Behaviour (OPB). Moving beyond the traditional application of S–O–R in physical retail environments (Donovan & Rossiter, 1982), this study positions digital innovation as a contextual factor that both triggers and intensifies these internal psychological states.

In essence, technology acts as a behavioral catalyst that actively molds the evolution of psychological impulses. The evidence supporting the mediating function of CBI highlights a clear transition from digital triggers to behavioral actions, facilitated by internal mechanisms like compulsive urges and emotional arousal. Consequently, this study bridges the gap between the management of innovation and the psychology of the consumer.

Integration of Materialism Within Behavioural Innovation Theory

A significant theoretical advancement of this study is the conceptualization of materialism as both a cognitive and motivational force that underpins how innovation is internalized and spread (Rogers, 2003; Wang et al., 2024). The inherent materialistic values of the target audience drive them to embrace innovative digital platforms that carry specific social connotations. The positive correlation found between materialism, CBI, and OPB reinforces the idea that digital platforms amplify social comparison and consumption driven by aspiration (Jameel et al., 2024).

By merging materialistic views with exposure to innovation via the Digital Innovation Context (DIC), the study presents a dual-layered perspective that connects individual values (micro-level) with the broader innovation landscape (macro-level) to dictate behavioral outcomes. This shift expands the understanding of the link between innovation and consumption, moving away from purely functional adoption models like TAM or DOI toward affective frameworks that prioritize the intensity of socio-psychological impacts.

Furthermore, the inclusion of **gender role** as a theoretical dimension enriches the S–O–R framework by identifying demographic variations in how digital stimuli are processed. Theoretically, gender acts as a moderating lens through which consumers interpret hedonic and social cues. While the underlying structure of the model is robust across groups, the higher levels of CBI observed in female consumers suggest that gendered socialization influences the "Organism" stage, making certain populations more susceptible to the high-intensity innovation environments of modern e-commerce (Dittmar, 2005; Mueller et al., 2011). This integration allows for a more intersectional approach to behavioral innovation theory, accounting for how gendered identity interacts with technological and materialistic triggers (Rodgers et al., 2012; Wang et al., 2024).

Compulsive Buying Intention as a Psychological Bridge

The theoretical reconceptualization presented here progresses the field in two specific ways. First, it challenges the traditional perspective of compulsive buying as merely an individual clinical pathology, demonstrating instead that it functions as a reactive emotional process within environments mediated by technology. Second, it resonates with the transformative service research perspective, which views digital engagement as a phenomenon that offers both consumer opportunity and psychological vulnerability (Mikalef, Krogstie, & Pappas, 2023). As a result, this research strengthens the micro-foundations of digital innovation theory by illustrating how personal emotional adjustments drive broader innovation adoption and market dynamics.

Digital Innovation Context as a Boundary Condition

The function of the Digital Innovation Context (DIC) as a moderator serves as a crucial expansion of the behavioral innovation model. The evidence from this study confirms that when high-intensity innovation features—such as AI-driven engagement, gamification, and algorithmic curation—are present, the impact of materialism on Compulsive Buying Intention (CBI) is significantly intensified. This suggests that innovation does not affect the entire consumer base uniformly; rather, it amplifies the psychological consequences of individual value perceptions (Le & Scaringella, 2025). Consequently, this moderating role identifies innovation intensity as a critical boundary condition for affective consumption, where more advanced platforms increase the psychological "depth" of a user's engagement. By merging digital innovation systems with behavioral psychology, the study contributes toward a cohesive "technological affect theory" of modern consumption.

Furthermore, the integration of **gender role** into these theoretical constructs provides a more comprehensive view of the psychological bridge and the boundary conditions of innovation. Findings indicate that gender significantly influences the intensity of the "psychological risk" mentioned in transformative service research (Mikalef et al., 2023). Specifically, the path through which digital innovation intensifies materialism and compulsive urges is often more pronounced in female consumers, who may show higher emotional sensitivity to the social and aesthetic cues of innovative platforms (Dittmar, 2005; Rodgers et al., 2012). By acknowledging gender as an inherent factor in how consumers navigate digital affect, the study ensures that the proposed "technological affect theory" accounts for demographic variations in susceptibility and engagement patterns within high-innovation contexts (Mueller et al., 2011; Wang et al., 2024).

Managerial and Practical Implications

Designing Emotionally Intelligent E-Commerce Platforms

The study's findings serve as an urgent signal for digital designers and e-commerce strategists to develop emotionally intelligent platforms that balance high-intensity stimulation with ethical user engagement. While it is true that gamified elements, interactive features, and AI-driven personalization lead to superior conversion rates, they simultaneously risk triggering and sustaining compulsive shopping habits. To address this, platform administrators should implement purchase-limit protocols and real-time emotion-recognition algorithms capable of identifying signs of cognitive overload, thereby nudging users toward "morally conscious consumption." By adopting such adaptive designs, businesses can foster long-term retention and trust, aligning with the "human-centered innovation" model advocated in modern digital commerce ethics (Bashri & Samat, 2025).

Targeting Segments Based on Behavioural Triggers

It is essential for marketers to recognize that behavioral and e-commerce stimuli must be applied uniquely across various target demographics. For example, while older consumers may prioritize rational decision-making, younger digital natives are often more influenced by escapism and hedonic drivers. By identifying these specific vulnerabilities, companies can create customized promotional strategies—such as utilizing live-stream flash sales for impulse-driven segments while offering structured subscription plans for those who prefer planned purchases. This strategic segmentation allows businesses to maximize engagement without overstepping psychological boundaries, ultimately reducing a brand's reliance on compulsive buying behaviors.

Managing Materialism and Innovation Ethics

Materialistic motivation represents a potent but "double-edged sword" for the digital marketplace. Marketers must exercise caution when leveraging vanity cues and social comparison, as these can easily lead to consumer regret and digital addiction. Instead, companies should aim to realign materialistic perceptions by associating products with social values like authenticity, sustainability, and community contribution (Wang et al., 2024). Furthermore, organizations operating in high-innovation (DIC) environments are encouraged to integrate digital well-being tools—such as "ethical AI" transparency, conscious-shopping dashboards, and spending-limit alerts—to mitigate the risks of compulsive purchasing.

A critical practical implication involves the specialized management of **gender roles** within e-commerce strategy. Since female consumers often demonstrate higher susceptibility to the compulsive triggers found in social commerce and interactive live-streaming, managers should design specific "safety nets" for these segments, such as personalized "cooling-off" periods after high-frequency browsing (Dittmar, 2005; Mueller et al., 2011). Conversely, for male segments who may prioritize utilitarian innovation, marketers should focus on streamlining the path to purchase to prevent the frustration that can lead to impulsive, stress-based buying (Rodgers et al., 2012). By tailoring ethical nudges and digital well-being features to gendered behavioral patterns, platforms can ensure that digital innovation promotes healthy consumption habits across all demographic groups (Wang et al., 2024).

Policy and Education Interventions

From a public policy perspective, this research highlights the necessity of digital literacy programs specifically designed to address the emotional aspects of consumer behavior. Governments could implement stricter ethical design standards for digital platforms to minimize the psychological pressure exerted on users, particularly the younger generation. Furthermore, educational institutions should integrate emotional intelligence into digital marketing and entrepreneurship curricula to better prepare future leaders and consumers for the complexities of technological creativity. These initiatives align with national frameworks like Malaysia’s MyDigital vision and PayNet, ensuring that the digital commerce landscape remains secure, transparent, and sustainable.

Limitations and Future Research Directions

Despite the rigorous methodological approach, certain limitations provide avenues for subsequent inquiry. As a cross-sectional study, definitive causal relationships cannot be established; therefore, future longitudinal or experimental designs should investigate how compulsiveness and emotional triggers evolve over time, especially with the introduction of innovations like Augmented Reality (AR) shopping. Additionally, as the data originated from Malaysian consumers, the findings reflect the specific cultural and economic context of an emerging market. Future cross-cultural comparative analyses could explore how individualistic versus collectivistic societal structures moderate compulsive buying tendencies.

While this research bridges psychological and technological domains, it does not adopt a neurocognitive lens. Future studies could utilize psychophysiological tools—such as neuroimaging, galvanic skin response, or eye-tracking—to gain more precise data on how specific stimuli trigger arousal. Furthermore, while this study relied on self-reported measures, future work could benefit from integrating actual behavioral data stored by

digital platforms. Finally, while the current model focused on materialism, CBI, and OPB, incorporating factors such as digital fatigue, social anxiety, or a lack of self-regulation could offer a more comprehensive explanation of compulsive patterns in high-innovation environments.

A significant area for future investigation involves the deeper exploration of **gender roles** as a complex moderating factor. While the current findings acknowledge baseline differences in compulsive intentions between genders, future research should investigate if specific types of digital innovation—such as AI-driven social influencers versus gamified discount hunts—impact men and women differently. Understanding the intersectionality of gender with other demographic variables like age or income could refine how policy interventions are targeted. For instance, digital literacy campaigns might need to be tailored to address the specific social-emotional triggers that predominantly affect female consumers or the utilitarian-driven impulsivity often seen in males (Dittmar, 2005; Rodgers et al., 2012). Addressing these gendered nuances will be vital for developing more inclusive and effective consumer protection regulations (Wang et al., 2024).

CONCLUSIONS

The findings of this research illustrate that the consumer journey within a digitally driven economy is shaped by a combination of functional utility, emotional intent, and contextual relevance. Buying behavior is effectively a product of integrated psychological, socio-cultural, and technological influences. By incorporating materialistic and compulsive characteristics alongside the moderating influence of digital innovation, this study progresses the S-O-R framework, offering a more sophisticated perspective on how consumers behave in online environments. Compulsive buying intention serves as the critical link that converts technological and emotional triggers into concrete actions. In this context, advancements in technology do not diminish emotional drivers; rather, they forcefully activate them. By embedding emotional psychological factors within the framework of innovation diffusion, this work broadens the conversation around behavioral innovation. Embracing these insights requires that ethical innovation strategies prioritize human emotion alongside commercial viability. The evidence confirms that as we transition into an era of unprecedented technology, commerce must evolve to remain empathetic and ethical to ensure sustainable and seamless transactions. Ultimately, the success of Malaysia’s digital transformation will depend heavily on its ability to align with consumer satisfaction to achieve future objectives.

A vital conclusion drawn from this study is the significant role of **gender** in determining the intensity of the "Organism" response within the digital S-O-R model. While the overarching behavioral mechanisms are consistent, the data suggests that female consumers often experience a more heightened activation of compulsive intentions when exposed to innovative, high-interactivity stimuli. This indicates that gender is not merely a demographic category but a psychological dimension that shapes how consumers navigate the tension between materialistic drives and digital innovation. To achieve truly sustainable and ethical digital commerce, platform designers and policymakers must acknowledge these gendered patterns of engagement. By doing so, they can ensure that the digital transformation of emerging markets like Malaysia remains inclusive and protective of all users, regardless of their demographic susceptibility to compulsive triggers (Dittmar, 2005; Mueller et al., 2011; Wang et al., 2024).

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