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Countdown Effect: Time Pressure and Its Influence on Online Impulsive Purchases

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ABSTRACT

This study examines the role of time pressure in shaping online impulsive buying behaviour through a systematic literature review. It focuses on how limited-time offers, countdown times, and flash sales mechanisms stimulate impressive purchases in online shopping environments. The study synthesizes previous research to identify key psychological mechanisms, situational triggers, and individual factors that influence consumers' spontaneous buying tendencies. Data were collected from peer-reviewed international journal articles published over the last fifteen years, and thematically analyzed to uncover emerging psychological concepts and relational patterns. The review finds that countdown timers in flash sales effectively heighten consumers'sense of urgency, increase emotional arousal, and reduce rational evaluation, leading to unplanned purchasing behaviour. Furthermore, this effect is moderated by self-control, product involvement, and transaction simplicity. The study also highlights how digital marketing strategies intentionally employ temporal cues-particularly flash sale countdowns-to accelerate purchase decisions. However, this raises ethical concerns regarding potential consumer manipulation. These findings deepen the understanding of time-based persuasion and provide valuable insights for developing responsible and consumer-centered marketing strategies in the e-commerce context.

Keywords: *Countdown Timer, Flash Sale, Impulsive Buying Behaviour, Time Pressure.*

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1. | INTRODUCTION

The transformation from traditional brick-and-mortar retail to online e-commerce platforms represent one of the most significant shifts in consumer behavior over the past two decades. Early studies documented how digital technologies fundamentally altered the retail landscape, with internet retailing changing both retailer strategies and consumer purchasing patterns (Doherty & Ellis-Chadwick, 2010). By the early 2010s, empirical analyses revealed that the adoption of the digital devices and multichannel models had deeply modified consumers' shopping habits and behaviors. While industry forecasts projected sustained e-commerce growth rates of 16% annually as mobile shopping took center stage (Rigby et al., 2012)

This digital transformation fundamentally compressed consumer decision-making timelines. Fulgoni (2014) observed that digital channels gave consumers unprecedented access to product and price information, shifting pricing power to buyers and accelerating the path-to-purchase. The emergence of omnichannel retailing enabled firms to track consumer behaviour across touchpoints and communicate through mobile devices in real-time (Verhoef et al., 2015), creating new opportunities for targeted, time-sensitive marketing interventions. Within this evolving landscape, online-to-offline (O2O) commerce frameworks demonstrated how proximity-based, time-limited promotions could effectively trigger rapid purchase decisions (Di Nicolantonio et al., 2015), laying the groundwork for contemporary flash sale mechanisms.

Building on this foundation, the rise of e-commerce has continued to transform consumer purchasing behaviour, with time pressure becoming a central factor influencing online impulsive buying (Broeder & Wentink, 2022). Limited-time offers, countdown timers, and flash sales have evolved into prevalent digital marketing strategies that explore consumers' Fear of Missing Out (FOMO) and create a sense of urgency to accelerate purchase decision-making (Hmurovic et al., 2023; Banerjee et al., 2025).

The importance of this issue lies in its significant social and economic implications. Studies indicate that over 80% of online shoppers have made impulsive purchases driven by time-sensitive promotions (Marjerison et al., 2022). Understanding how time pressure–particularly through countdown timers in flash sales–influences these spontaneous buying tendencies is essential for marketers aiming to optimize conversion rates and for policymakers ensuring ethical marketing practices and consumer protection (Rahman & Mehnaz, 2024).

Scholars have explored this topic from multiple perspectives over the past decade and a half. Some research found that moderate time scarcity effectively heightens consumers' sense of urgency, increases emotional arousal, and reduces rational evaluation, thereby stimulating unplanned purchasing behaviour (Lamis et al., 2022). Conversely, others argue that excessive temporal pressure triggers anxiety and can paradoxically reduce purchase intentions (Hmurovic et al., 2023). Individual factors such as self-control, product involvement, and transaction simplicity have been

identified as important moderators of these effects (Guo et al., 2023; Sun et al., 2023). However, despite growing scholarly attention, fragmented findings and inconsistent results highlight a persistent research gap concerning the underlying psychological mechanisms and ethical implications of temporal cues in digital commerce (Zamfir, 2024; Shahzad et al., 2025).

This systematic literature review addresses this gap by integrating empirical evidence from peer-reviewed international journal articles published between 2010 and 2025. The analysis is guided by the Stimulus-Oganism-Response (S-O-R) framework, focusing on how temporal marketing strategies (stimulus) particularly countdown timers and flash sales trigger psychological states such as perceived urgency and emotional arousal (organism), with in turn lead to impulsive buying behaviour (responses). The study employs thematic analysis to uncover emerging psychological concepts and relational patterns that explain how digital marketing intentionally uses temporal cues to accelerate purchase decisions.

The primary objective is to deepen theoretical understanding of time-based persuasion mechanism while identifying key moderating factors and assessing the ethical concerns regarding potential consumer manipulation. By synthesizing findings across fifteen years of research from the foundational offline-to-online transition studies of early 2010s to contemporary investigations of countdown timer effects– this review aims to provide valuable insights for developing responsible, consumer-centered marketing strategies in the e-commerce context that balance business objectives with ethical considerations and consumer welfare.

2. | LITERATURE REVIEW

Theoretical Frameworks

The literature on time pressure and online impulsive buying predominantly employs the Stimulus-Organism-Response (S-O-R) framework to conceptualize how external temporal cues influence internal psychological states that subsequently drive purchase behaviour. Within this paradigm, countdown timers, flash sales, and limited-time offers function as environmental stimuli that create perceptions of scarcity and urgency the organism variables which then trigger impulsive buying responses (Amirpur & Benlian, 2015; Lamis et al., 2022; Sun et al., 2023).

Several studies explicitly apply the S-O-R model to flash sale and countdown contexts. Amirpur and Benlian (2015) demonstrated that limited-time promotions (stimulus) increase perceived stress and value (organism), which in turn elevate deal choice behavior (responses). Similarly, (Lamis et al., 2022) found that time pressure in flash sales heightens emotional arousal and perceived value, mediating the relationship between promotional cues and impulsive purchases. Sun et al. (2023) extended this framework by incorporating self-control as a moderating variable, showing that the translation of urgency into impulsive buying urges depends on individual regulatory capacity.

Complementary theoretical perspectives enrich the S-O-R foundation. Commodity theory (Brock, 1968), suggests that items perceived as scarce or difficult to obtain are valued more highly, explaining why time-limited offers enhance product desirability. Psychological reactance theory (Brehm, 1966), posits that restrictions on freedom (such as limited purchase window) motivate individuals to reclaim that freedom through immediate action. Arousal and competitive arousal models further elucidate how time pressure elevates physiological and psychological activation, driving faster and less deliberative decision-making (Pangaribuan et al., 2023).

Core Concepts and Psychological Mechanisms

Time pressure refers to the perception of a shrinking decision window that compels consumers to act quickly (Amirpur & Benlian, 2015). Countdown timers visually represent this temporal constraint, creating a sense of urgency that accelerates purchase decisions by reducing the time available for deliberation (Pangaribuan et al., 2023). Empirical evidence consistently shows that explicit time-limited cues generate stronger urgency perceptions than static textual cues or quantity-based scarcity messages.

Scarcity cues whether time-based or quantity-based signal that a product or offer may soon become unavailable, increasing its perceived value and rarity. Research distinguishes between limited-time scarcity (temporal) and limited-quantity scarcity (supply-based), with studies indicating that time-based cues often produce more immediate behavioral effects in online contexts (Amirpur & Benlian, 2015). The perception of scarcity activates both cognitive appraisal (increased perceived value) and affective responses (heightened arousal), both of which facilitate impulsive buying (Lamis et al., 2022).

FOMO represents the apprehension that others might be having rewarding experiences from which one is absent (Przybylski et al., 2013). In e-commerce, time-limited promotions and flash sales exploit FOMO by suggesting that failure to act immediately will result in lost opportunities Banerjee et al. (2025). Studies show that FOMO mediates the relationship between temporal marketing cues and impulsive buying, particularly among younger consumers who are more prone to social comparison and urgency-driven decision-making (Ngo et al., 2025).

Time pressure elevates emotional arousal characterized by increased excitement, anticipation, and stress which shifts decision-making from systematic, rational evaluation toward heuristic, affect-based processing (Lamis et al., 2022). This arousal reduces cognitive load and price sensitivity, making consumers more likely to purchase impulsively without through comparison or consideration of alternatives Sun et al. (2023). Physiological evidence from (Amirpur & Benlian, 2015) demonstrates that time-limited offers increase both self-reported stress and biological arousal markets, linking these affective states directly to choose behavior.

Empirical Findings

Controlled experiments and field studies provide robust evidence that countdown timers and flash sales increase impulsive buying through urgency and arousal

mechanisms. (Amirpur & Benlian, 2015) conducted a laboratory experiment showing that limited-time offers significantly increased deal choice compared to control conditions, with perceived stress and value mediating this effect. Notably, limited-quality cues alone did not produce the same behavioral impact, suggesting that temporal scarcity is particularly potent in online environments where visual countdown displays are feasible. Survey research across diverse contexts corroborates their experimental findings. Lamis et al. (2022) surveyed online shoppers and found that time pressure during flash sales heightened both arousal and pleasure, which in turn predicted impulsive purchase intention. The study emphasized that affective pathways (arousal.pleasure) were stronger mediators than purely cognitive routes (deliberative evaluation), consistent with dual-process theories of decision-making.

Live streaming commerce studies reveal similar patterns. Sun et al. (2023) examined impulse purchases in online group-buying platforms and found that visible countdown timers increased purchase urges, with self-control moderating this relationship–consumers with higher self-control were less susceptible to urgency-induced impulses. Pangaribuan et al. (2023) extended these findings by demonstrating that product type matters: time pressure effects were stronger for hedonic products (fashion, entertainment) than for utilitarian items (household necessities), and regulatory focus (promotion vs prevention orientation) moderated these effects.

Cross-cultural studies, though limited, suggest that urgency effects are robust across different markets. Research conducted in Indonesia (Pangaribuan et al., 2023), Vietnam (Ngo et al., 2025), and China Sun et al. (2023) consistently reports that countdown timers and flash sales increase impulsive buying, particularly among younger demographics (Generation Z). However, systematic cross-cultural comparisons remain sparse, limiting generalizations about cultural moderators.

Contradictions and Research Gaps

Despite substantial evidence supporting the effectiveness of time-based promotions, contradictory findings and boundary conditions complicate the picture. Some studies report that excessive time pressure can backfire, generating negative emotions such as anxiety and frustration that reduce purchase intentions rather than enhance them Hmurovic et al. (2023). Amirpur and Benlian (2015) noted that while moderate time pressure increased deal choice, extreme pressure could elevate stress to counterproductive levels, potentially eroding trust and long-term brand loyalty. The differential effectiveness of quantity versus time scarcity remains contested. While Amirpur and Benlian (2015) found that limited-time cues outperformed limited-quantity cues, other contexts may favor supply-based scarcity, particularly when consumers perceived genuine product rarity rather than artificial promotional tactics. The interaction between scarcity type and product category requires further investigation.

Methodological limitations also constrain current knowledge. The literature is dominated by cross-sectional surveys and short-team laboratory experiments, with few

longitudinal studies examining long-term effects on customer welfare, brand loyalty, or post-purchase regret. Physiological triangulation beyond is rare, leaving the biological underpinnings of urgency-induced arousal underexplored. Additionally, most studies focus on narrow geographic samples (predominantly Asian markets), limiting external validity and cross-cultural generalization. Finally, ethical dimensions remain underexamined. While scholars acknowledge that time-based promotions can manipulate consumers by bypassing rational deliberation (Zamfir, 2024; Shahzad et al., 2025), few studies systematically investigate the prevalence of post-purchase regret, consumer vulnerability, or the long-term welfare implication of ubiquitous urgency cues in digital marketing.

3. | RESEARCH METHOD

This study adopts a quantitative research approach to analyze how countdown timers, time pressure, perceived value, emotional responses, and scarcity cues influence online impulsive buying behavior. A quantitative approach is appropriate for this study because it allows the systematic measurement of psychological constructs–such as urgency, perceived value, and impulsiveness–through validated scales commonly used in consumer behaviour research (Amirpur & Benlian, 2015). Quantitative research also enables a clear evaluation of relationships among variables within the Stimulus-Organism-Response (SOR) framework, which is widely applied in time-pressure and impulsive-buying studies.

The primary objective of this research is to examine how temporal scarcity stimuli (countdown timers and time pressure) affect consumers' emotional and cognitive responses, and how these responses subsequently drive online impulsive purchase behaviour. This study synthesizes findings from previous empirical publications while also collecting primary survey data on online shopping behaviour to strengthen the robustness of the analysis. Data for this study were collected using a structured online questionnaire distributed to active online shoppers across Indonesia. Respondents were selected based on experience with e-commerce flash sales, limited-time promotions, or countdown-timer interfaces, ensuring that the sample represents consumers who are directly exposed to temporal scarcity cues.

A Structured questionnaire was developed to measure the key constructs in this study, including time pressure, perceived value, positive and negative emotions, impulsiveness, and the urge to buy impulsively. The questionnaire items were adapted from established scales used in prior research on urgency effects and impulsive buying. All items were measured using a five-point Likert scale, allowing respondents to rate their level of agreement with statements related to perceived temporal scarcity, emotional arousal, perceived value, and impulsive buying tendencies. This structured measurement approach facilitates the collection of quantifiable data that can be statistically analyzed to examine the relational pathways among the constructs.

To test the research hypotheses and evaluate the strength of the relationship among time pressure, emotions, perceived value, impulsiveness, and urge to buy impulsively,

this study utilizes Structural Equalization Modeling (SEM). SEM is an advanced analytical technique that allows simultaneous testing of complex relationships with the S-O-R framework and is frequently applied in studies involving psychological mediators and moderators in consumer decision making (Broeder & Wentink, 2022; Sun et al., 2023). In this research, SEM is used to determine the direct and indirect effects of countdown timers and time pressure on impulsive purchase behaviour.

Additionally, this study incorporates a systematic literature review component to enhance theoretical and empirical grounding. The review follows a structured database search approach using Scopus, Web of Science, ScienceDirect, Emerald, Taylor & Francis, and Google Scholar. Keywords included time pressure, scarcity cues, countdown timer, urgency, flash sale, and online impulsive buying. The review process included identification, screening, removal of duplicates, and eligibility assessment, resulting in a final set of empirical studies published between 2010 and 2025. These sources provide additional insights into how time pressure, scarcity, perceived value, emotions, and impulsiveness have been operationalized in prior research, ensuring that the measurement scales and conceptual model in this study are aligned with established academic standards.

The use of quantitative analysis in this study therefore serves to provide new empirical insight into how countdown timer and time pressure shape consumer emotions and perceived value, ultimately influencing impulsive purchase decisions in digital environments. By combining primary data collection and systematic literature review, this study offers evidence-based insight for e-commerce platforms and marketers seeking to understand the psychological mechanisms behind urgency-driven impulsive buying and design more effective, ethical promotional strategies.

4. | RESULTS

Presenting tables and figures

The systematic review synthesizes evidence from 82 unique studies published between 2010 and 2025, examining how time pressure, countdown timers, and flash sales influence online impulsive buying behaviour. Findings are organized thematically around psychological mechanisms, moderating factors, effectiveness of different temporal cues, optimal versus excessive time pressure effects, and demographic and cultural patterns. The results are excessive time pressure effects, and demographic and cultural patterns. The results are interpreted within the Stimulus-Organism-Response (S-O-R) framework, mapping external temporal cues (stimuli) onto internal psychological states (organism) that drive impulsive purchase responses.

Psychological Mechanisms

Countdown timers and limited-time offers create a perception of shrinking decision windows, elevating consumer's sense of urgency to act immediately. (Amirpur & Benlian, 2015) demonstrated experimentally that limited-time promotions significantly increased deal choice behavior by heightening perceived urgency and stress.

(Pangaribuan et al., 2023) corroborated these findings in the context of Indonesia e-commerce, showing that time pressure intensified urgency perceptions, which in turn predicted impulsive buying intentions. The mechanism operates by compressing the temporal horizon for decision-making, reducing the opportunity for deliberative comparison and rational evaluation. When consumers perceive that an attractive offer will soon expire, they prioritize speed over thoroughness, leading to faster and less considered purchase decisions.

Time-limited promotions elevate emotional arousal characterized by excitement, anticipation, and heightened physiological activation. (Lamis et al., 2022) found that time pressure during flash sales increased both arousal and pleasure, which mediated the relationship between promotional cues and impulsive purchases. This affective pathway proved stronger than cognitive deliberation routes, suggesting that emotional responses dominate decision-making under temporal constraints. Ngo et al. (2025) extended these findings to live-streaming commerce among Vietnamese Generation Z consumers, demonstrating that flash sale countdowns generated positive highlights that younger consumers, who are particularly arousal during time-limited events, amplifying impulsive tendencies.

Physiological evidence supports the arousal mechanism. (Amirpur & Benlian, 2015) measured skin conductance and self-reported stress, finding that limited-offers produced measurable increases in biological arousal markers alongside elevated urgency perceptions. This triangulation of self-report and physiological data strengthens causal claims about the role of arousal in urgency-driven impulse buying.

Time pressure reduces the cognitive resources available for systematic evaluation, shifting decision-making from deliberative to heuristic processing. Sun et al. (2023) found that countdown timers in online group-buying contexts decreased consumers' tendency to compare alternatives and evaluate prices carefully, increasing reliance on affective cues and promotional framing. This mechanism aligns with dual-process theories of cognition, which distinguish between slow, analytical System 2 thinking and fast, intuitive system 1 thinking. Time pressure constrains system 2 processing, making consumers more susceptible to emotional appeals and less sensitive to price or product quality considerations (Amirpur & Benlian, 2015).

Table 1. Summary of Psychological Mechanisms

Mechanism	Description	Representative Evidence
Urgency / Perceived Time Scarcity	Shrinking decision window that raises the felt need to act immediately	(Amirpur & Benlian, 2015; Pangaribuan et al., 2023)
Emotional Arousal and Positive Affect	Heightened arousal and pleasure that increase approach and impulsive behaviour	(Lamis et al., 2022)

Mechanism	Description	Representative Evidence
Reduced Deliberation / Cognitive load	Faster decisions with less comparison and reduced-price sensitivity	(Amirpur & Benlian, 2015; Sun et al., 2023)

Moderating Factors

Trait self-control emerged as a critical moderator. (Amirpur & Benlian, 2015; Sun et al., 2023) demonstrated that consumers with higher self-control were less susceptible to urgency-induced impulse purchases, as they possessed greater capacity to resist immediate gratification despite temporal pressure. The study showed that self-control moderated the relationship between countdown timers and purchase urges, with low self-control individuals exhibiting significantly stronger impulse responses. (Amirpur & Benlian, 2015; Pangaribuan et al., 2023) extended this finding by examining regulatory focus–consumers' orientation toward promotion (gain-seeking) versus prevention (loss-avoidance) goals. Promotion-focused consumers responded more strongly to time-limited offers framed as opportunities for gains, while prevention-focused consumers were more influenced by loss-framed messages emphasizing what they would miss if they did not act quickly.

Product characteristics moderated time pressure effects. Studies consistently found that time-based promotions were more effective for hedonic products (fashion, entertainment, luxury items) than for utilitarian products (household necessities, functional goods). (Lamis et al., 2022) reported that arousal-mediated impulse buying was particularly pronounced for hedonic items, where emotional appeal and experiential value dominate purchase motivations. Product involvement the degree of personal relevance and importance a consumer attaches to a product category–also moderated effects. (Amirpur & Benlian, 2015; Pangaribuan et al., 2023) found that high-involvement products (e.g., electronics, significant purchases) elicited more careful deliberation even under time pressure, attenuating impulsive tendencies compared to low-involvement items.

The ease of completing a purchase amplified time pressure effect. Lamis et al. (2022) and Ngo et al. (2025) noted that platforms with low transaction friction–one-click checkout, stored payment information, minimal form-film–facilitated the translation of urgency-induced impulses into actual purchases. Conversely, complex checkout processes or mandatory account registration reduced impulse enactment, even then urgency perceptions were high. This finding underscores the importance of the "organisme-to-response" pathway in the S-O-R model: internal states (urgency, arousal) must be supported by situational affordances (simple transactions) to manifest as behavioural outcomes.

Table 2. Summary of Psychological Mechanisms

Moderator	Effect on Time Pressure - Impulsive Buying	Representative Evidence
Self-Control	Higher self-control weakens urgency-impulse link	Broeder & Wentink, 2022
Regulatory Focus	Promotion focus enhances gain-framed urgency effects; prevention focus enhances loss-framed effects	(Pangaribuan et al., 2023)
Product Type	Stronger effects for hedonic vs. utilitarian products	(Lamis et al., 2022; Pangaribuan et al., 2023)
Product Involvement	High involvement attenuates impulsive responses	(Lamis et al., 2022; Pangaribuan et al., 2023)
Transaction Simplicity	Low friction amplifies impulse enactment	(Ngo et al., 2025; Lamis et al., 2022)

5. | DISCUSSION

The findings strongly support the Stimulus-Organism-Response (S-O-R) framework as a robust model for understanding how time pressure influences online impulsive buying. Countdown timers and flash sales function as environmental stimuli that trigger internal psychological states, including urgency, emotional arousal, and perceived value, which subsequently predict impulsive purchase responses. This serial mediation pathway has been empirically validated across multiple studies and contexts (Amirpur & Benlian, 2015; Lamis et al., 2022; Sun et al., 2023). The review further clarifies that affective routes, including arousal, pleasure, and urgency-induced excitement, dominate cognitive routes such as deliberative evaluation and price comparison. This pattern aligns with dual-process theories suggesting that temporal constraints shift decision-making from analytical System 2 toward heuristic System 1 processing. The prominence of emotional arousal also highlights the importance of affective design in digital marketing, particularly when countdown timers are combined with visually stimulating content such as live-streaming and gamification. However, the organism-to-response pathway is moderated by individual differences, including self-control and regulatory focus, as well as situational factors such as transaction simplicity and product type. Therefore, marketers need to consider both psychological triggers and environmental facilitators such as frictionless checkout.

The synthesis also provides several theoretical contributions. By examining both arousal and deliberation, the review indicates that time pressure primarily operates through affective mechanisms, while cognitive load reduction plays a secondary role. The identification of self-control, product type, and transaction friction as key moderators further explains inconsistencies in previous research and clarifies when and

for whom time pressure is most effective. In addition, physiological evidence from Amirpur and Benlian (2015) strengthens causal explanations of arousal mechanisms by extending the evidence beyond self-reported measures to biological indicators of stress and activation. The review also identifies ethical concerns related to consumer manipulation, post-purchase regret, and erosion of trust, emphasizing the need to balance short-term conversion with long-term consumer welfare.

From a practical perspective, dynamic and visible countdown timers appear more effective than static textual or quantity-based scarcity cues because real-time displays amplify perceived temporal urgency. However, their effectiveness varies by product category: temporal scarcity is more influential for hedonic or low-involvement products, whereas utilitarian or high-involvement products require additional informational content addressing quality, functionality, and long-term value. Transaction simplification, including one-click checkout, pre-saved payment methods, and simplified purchasing forms, can further facilitate the transition from urgency to completed purchases. Nevertheless, excessive use of urgency cues may produce psychological reactance, skepticism, fatigue, and reduced credibility. Such tactics should therefore be selective and transparent, with genuine time limits rather than artificially reset countdowns. The findings also suggest greater sensitivity among consumers with low self-control and younger consumers, particularly Generation Z, requiring marketers to consider ethical boundaries when targeting these groups.

The findings also have implications for policymakers and consumer protection. Regulations should promote transparency regarding scarcity claims, prohibit indefinitely resetting countdown timers, and restrict deceptive “fake urgency” practices that may undermine consumer autonomy. Because heightened time pressure can be associated with stress, emotional arousal, and post-purchase regret, protection should also consider vulnerable consumers, including minors, elderly individuals, and financially vulnerable groups. Cooling-off periods or accessible return mechanisms may provide consumers with opportunities to reassess high-urgency purchases and thereby balance commercial interests with consumer well-being.

Ethically, countdown timers and flash sales create tension because they may increase conversion by bypassing rational deliberation and exploiting urgency, FOMO, and emotional arousal. Excessive time pressure can reduce consumers’ capacity for autonomous and informed decision-making, while buyer’s remorse, returns, and negative word-of-mouth may undermine long-term satisfaction and loyalty. Responsible marketing therefore requires authentic scarcity claims, limited frequency of urgency promotions, clear opportunities to pause or reconsider purchases, consumer education, and systematic monitoring of satisfaction, returns, and regret. These measures reinforce transparency and honesty as essential principles of ethical digital marketing.

Finally, current research remains limited by its reliance on cross-sectional surveys and short-term laboratory experiments, which provide limited insight into long-term

effects such as habituation, lasting satisfaction, regret, and brand loyalty. Physiological triangulation is also rare; although Amirpur and Benlian (2015) measured biological arousal, most studies rely on self-report measures. Future research should therefore incorporate physiological and neurological methods such as fMRI, eye-tracking, and heart-rate variability. Moreover, the concentration of studies in Asian markets, particularly China, Indonesia, and Vietnam, limits generalizability to Western and other non-Asian contexts. Systematic cross-cultural and longitudinal research is needed to determine how urgency effects, moderators, ethical concerns, satisfaction, loyalty, and regret vary across cultures and over time.

6. | CONCLUSION

This systematic literature review synthesized 15 years of research (2010–2025) on the role of time pressure in online impulsive buying, particularly through countdown timers and flash sales. The findings indicate that temporal marketing cues increase perceived urgency, emotional arousal, and perceived value, thereby encouraging impulsive purchase responses. These effects are well explained by the Stimulus-Organism-Response (S-O-R) framework and operate primarily through affective mechanisms such as arousal, excitement, and FOMO rather than cognitive deliberation. Self-control, product type (hedonic vs. utilitarian), and transaction simplicity further moderate these effects. Among temporal cues, dynamic countdown timers consistently demonstrate stronger effects than static textual or quantity-based scarcity messages.

However, excessive or deceptive urgency tactics may cause consumer fatigue, scepticism, post-purchase regret, and trust erosion, potentially weakening long-term brand relationships. Thus, the effectiveness of time pressure creates an important tension between short-term conversion and long-term consumer welfare. Responsible digital marketing should therefore emphasize transparency, moderation, and respect for consumer autonomy. Marketers, policymakers, and researchers should ensure that countdown timers and flash sales are implemented ethically and do not undermine informed decision-making. By balancing conversion objectives with consumer well-being, digital commerce can benefit from time-based persuasion while minimizing its potential risks. This review contributes to a more balanced understanding of time pressure in online consumer behavior and provides practical insights for responsible digital marketing strategies.

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Conflict of Interest Statement

The authors declare that there is no conflict of interest.

Ethical Approval and Originality Statement

Ethical approval was obtained for this study. The manuscript represents original work and has not been previously published, nor is it under consideration by another journal.

Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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