

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 between 2010 and 2025, 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 (Mangiaracina, 2013). 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 (Sun et al., 2023; 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 (Banerjee et al., 2025; Hmurovic et al., 2023).

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 (Shahzad et al., 2025; Zamfir, 2024).

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-Organism-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), which 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 (Mehrabian & Russell, 1974). 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 & 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 Sun et al. (2023).

Scarcity cues— whether time-based or quantity-based signal that a product or offer may soon become unavailable, increasing its perceived value and rarity (Cialdini, 2009). 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 markers, linking these affective states directly to choice 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 (e.g., fashion, entertainment) than for utilitarian items (e.g., 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 & 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 & 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

(Cialdini, 2009). 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-term laboratory experiments, with few longitudinal studies examining long-term effects on customer welfare, brand loyalty, or post-purchase regret Sun et al. (2023). Physiological triangulation beyond (Amirpur & Benlian, 2015) 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 (Shahzad et al., 2025; Zamfir, 2024), 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); (Sun et al., 2023). 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 Equation 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 (Sun et al., 2023).

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 (Kahneman, 2011). 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)
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. Ngo et al. (2025) and Lamis et al. (2022) noted that platforms with low transaction friction—one-click checkout, stored payment information, minimal form-fill—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 “organism-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	(Sun et al., 2023)
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

Interpretation Within the S-O-R Framework

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 reliably trigger internal psychological states urgency, emotional arousals, and perceived value which in turn predict impulsive purchase response. 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 clarifies that affective routes (arousal, pleasure, urgency-induced excitement) dominate cognitive routes (deliberative evaluation, price comparison) in mediating time pressure effects. This aligns with dual-process theories suggesting that temporal constraints shift decision-making from System 2 (analytical) to System 1 (heuristic) processing (Kahneman, 2011). The prominence of emotional arousal as a mediator underscores the importance of affective design in digital marketing: platforms that combine countdown timers with visually stimulating, entertaining content (e.g., live-streaming, gamification) amplify urgency-driven impulses.

The organism-to-response pathway is moderated by both individual differences (self-control, regulatory focus) and situational factors (transaction simplicity, product type). This moderation highlights that not all consumers respond uniformly to time pressure, and that contextual affordances must support internal states for behavioral enactment. Marketers seeking to optimize conversion must therefore attend to both

psychological triggers (urgency cues) and environmental facilitators (frictionless checkout).

Theoretical Contributions

By synthesizing studies that measure both arousal and deliberation, the review demonstrates that time pressure primarily operates through affective mechanisms, with cognitive load reduction playing a secondary role. This clarifies the relative importance of emotional versus rational pathways in urgency-driven impulse buying.

The identification of self-control, product type, and transaction friction as key moderators advances understanding of boundary conditions. These moderators explain inconsistencies in prior research and provide a more nuanced picture of when and for whom time pressure is most effective.

The inclusion of physiological evidence (Amirpur & Benlian, 2015) strengthens causal claims about arousal mechanisms, moving beyond self-report data to biological markers of stress and activation. This triangulation enhances the credibility of affective mediation pathways.

The review highlights emerging ethical concerns about consumer manipulation, post-purchase regret, and trust erosion—dimensions that have received limited attention in prior research. By foregrounding these issues, the review calls for a more balanced approach to temporal marketing that considers long-term consumer welfare alongside short-term conversion optimization.

Practical Implications

The findings of this study offer several strategic implications for marketers and digital platform designers seeking to optimize urgency-based persuasion mechanisms. First, the result highlights the superiority of dynamic and visible countdown timers over static textual or quantity-based scarcity cues. Real-time, visually salient countdown displays have been shown to amplify temporal urgency more effectively, making them particularly valuable for time-based promotions that seek to accelerate consumer decision-making. Marketers should therefore prioritize the integration of authentic, real-time countdown mechanisms to maximize perceptual urgency and encourage immediate action.

Second, the effectiveness of time pressure tactics varies considerably across product categories. Temporal scarcity cues tend to exert the strongest influence on hedonic or low-involvement products, where impulsive, emotion-driven behaviors dominate. Conversely, in utilitarian or high-involvement categories, consumers rely more heavily on deliberative evaluation. Thus, urgency cues alone are insufficient; they must be complemented with informational content that addresses cognitive concerns such as product quality, function attributes, or long-term value. This alignment between product type and persuasion strategy increases the likelihood that urgency translates into purchase intention.

Third, the findings underscore the importance of transaction simplification as a mechanism that enhances the behavioral translation of urgency. Features such as one

click checkout, pre-saved payment methods, and simplified purchasing forms help reduce friction at the point of decision. By minimizing procedural barriers between impulse and enactment, platforms facilitate a smoother transition from heightened urgency to completed purchases.

Fourth, the study warns against the overuse of countdown timers and urgency cues. Excessive or repetitive exposure to these stimuli can trigger psychological reactance skepticism, fatigue, and a loss of credibility. To maintain consumer trust and platform integrity, urgency tactics must be applied selectively and transparently, ensuring that “limited-time” messages genuinely reflect time-bound opportunities rather than artificially reset durations. Finally, the results suggest that urgency tactics are differentially effective across segments. Consumers with low self-control and younger demographics, particularly Generation Z, demonstrate heightened sensitivity to time pressure cues. Marketers can leverage these insights to design more precisely targeted campaigns while remaining mindful of ethical boundaries and avoiding exploitative practices.

The study also carries significant implications for policymakers and regulatory bodies concerned with consumer protection in digital markets. First, the findings reinforce the necessity of transparency and disclosure requirements. Regulations should obligate platforms to clearly communicate the authenticity of scarcity claims, prohibit countdown timers that reset indefinitely, and restrict “fake urgency” practices that distort consumer autonomy and violate principles of fair digital choice architecture.

Second, the evidence of physiological stress, emotional arousal, and post-purchase regret associated with heightened time pressure suggests that urgency cues may disproportionately affect vulnerable consumers, particularly those with low self-control, high impulsivity, or elevated FOMO tendencies. Consumer protection frameworks should therefore include guidelines limiting the use of aggressive temporal scarcity tactics toward minors, elderly individuals, or financially vulnerable populations.

Finally, policymakers may consider implementing regulations that mandate cooling-off periods or easy-return mechanisms in high-urgency purchase environments. Since impulsive purchases often occur under reduced deliberation windows, providing consumers with post-transaction flexibility can mitigate regret and enhance long-term trust in digital commerce ecosystems. Such provisions would help balance commercial incentives with consumer well-being by allowing time-pressured buyers an opportunity to reassess their decisions outside the influence of immediate urgency cues.

Ethical Concerns and Responsible Marketing

The review reveals significant ethical tension in the use of countdown timers and flash sales. While these tactics effectively increase conversion rates, they do so by intentionally bypassing rational deliberation and exploiting emotional vulnerabilities (urgency, FOMO, arousal). This raises questions about the balance between legitimate persuasion and manipulative coercion.

Time pressure reduces consumer's capacity for autonomous, informed decision-making by compressing evaluation windows and elevating stress. When urgency cues are designed to override deliberation, they undermine the principle of consumer sovereignty—the idea that purchase decisions should reflect genuine preferences rather than transient emotional states.

Evidence of buyer's remorse, product returns, and negative word-of-mouth following urgency driven purchases suggests that short-term conversion gains may come at the cost of long-term consumer satisfaction and brand loyalty. Marketers pursuing sustainable customer relationships should weigh immediate sales against potential downstream costs.

Deceptive scarcity tactics such as countdown timers that repeatedly reset false claims of “limited stocks” represent a significant ethical concern in digital commerce, as they erode consumer trust and undermine the legitimacy of marketing practices. The review emphasizes that transparent and truthful communication regarding the actual availability of offers and the genuine duration of time-limited promotions is fundamental for maintaining consumer confidence. Responsible implementation of urgency cues therefore requires several important considerations. First, marketers should limit the frequency of time-limited promotions and avoid deploying them continuously, as excessive exposure reduces effectiveness and leads to consumer fatigue or desensitization. Second, urgency-related signals must reflect authentic constraints; countdown timers and scarcity claims should be grounded in real inventory levels or actual temporal limits, rather than being artificially manipulated through perpetual reset or fabricated scarcity. Third, platform interfaces should provide clear exit options that allow consumers to pause, save, or reconsider their decisions, thereby reducing unnecessary pressure and supporting more autonomous purchasing behavior. Additionally, marketers are encouraged to educate consumers about how urgency cues function, promoting more reflective and informed decision-making—particularly in context involving high-value or high-risk purchases. Finally, organizations should systematically monitor welfare-related outcomes, including post-purchase satisfaction return rates, and feelings of regret, to evaluate whether the use of urgency tactics leads to net positive or negative effects on consumer well-being. Collectively, these practices reinforce the importance of transparency and honesty as core principles in ethical digital marketing.

Limitations of Current Research

The literature is dominated by cross-sectional surveys and short-term laboratory experiments. While these designs establish correlations and short-term causal effects, they provide limited insight into long-term dynamics—such as whether repeated exposure to urgency cues leads to habituation, whether impulsive purchases produce lasting satisfaction or regret, and whether brand loyalty is enhanced or eroded over time.

Physiological triangulation is rare. Amirpur & Benlian (2015) stand out for measuring biological arousal, but most studies rely solely on self-report measures of

urgency, arousal, and purchase intentions. Expanding physiological and neurological methods (e.g., fMRI, eye-tracking, heart rate variability) would strengthen causal claims and deepen understanding of affective mechanisms.

The majority of studies were conducted in the Asian market (China, Indonesia, Vietnam), where mobile commerce and live-streaming platforms are highly developed. This geographic concentration limits generalizability to Western or other non-Asian contexts. Systematic cross-cultural experiments are needed to assess whether urgency effects, moderators, and ethical concerns vary across cultures with different consumer protection norms, individualism/collectivism orientations, and digital commerce maturity.

Few studies track consumers overtime to examine whether urgency-driven purchases lead to satisfaction, loyalty, or regret. Longitudinal designs are essential for understanding the full welfare implications of time pressure tactics and for distinguishing between short-term conversion optimization and long-term relationship building.

6. | CONCLUSION

This systematic literature review synthesized 15 years of research (2010-2025) on the role of time pressure in online impulsive buying behaviour, with particular focus on countdown timers and flash sales. The review confirms that temporal marketing cues function as potent stimuli that elevate urgency perceptions, emotional arousal, and perceived value, which in turn drive impulsive purchase responses. These effects are well-explained by the Stimulus-Organism-Response (S-O-R) framework and are mediated primarily through affective pathways (arousal, excitement, FOMO) rather than cognitive deliberation.

Key moderators' self-control, product type (hedonic vs. utilitarian), and transaction simplicity shape the magnitude and direction of time pressure effects, explaining variability across consumers and contexts. Countdown timers with visible, dynamic displays consistently outperform static textual cues or quantity-based scarcity messages, making them the most effective temporal marketing tool in digital commerce.

However, the review also reveals important boundary conditions and ethical concerns. Excessive or deceptive use of urgency cues can produce consumer fatigue, scepticism, post-purchase regret, and trust erosion, undermining long-term brand relationships. The balance between short-term conversion optimization and long-term consumer welfare remains a critical tension in digital marketing practice.

Time pressure, operationalized through countdown timers and flash sales, represents a powerful and pervasive tool in contemporary digital marketing. Its effectiveness in driving online impulsive buying is well-established, grounded in robust psychological mechanisms of urgency, arousal, and reduced deliberation. However, this effectiveness comes with ethical responsibilities. As e-commerce platforms increasingly deploy temporal cues to accelerate purchase decisions, marketers,

policymakers, and researchers must work collaboratively to ensure that these tactics serve consumer interests alongside business objectives.

Responsible marketing requires transparency, moderation, and attention to long-term welfare outcomes. By balancing the legitimate goal of conversion optimization with respect for consumer autonomy and well-being, the digital commerce ecosystem can harness the benefits of time-based persuasion while mitigating its risks. This systematic review provides a foundation for that balanced approach, offering insights that advance both theoretical understanding and practical application in the evolving landscape of online consumer behavior.

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The authors declare that there is no conflict of interest.

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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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