

Research Paper

Impact of Scarcity Messaging on Consumer Buying Patterns in Online Shopping

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ABSTRACT

Scarcity messaging is a widely used persuasive strategy in digital commerce, yet its psychological mechanisms and differential effects across consumer groups remain insufficiently understood. This study examines the impact of quantity-based and time-based scarcity cues on online purchase intentions, with Fear of Missing Out (FOMO) proposed as a mediating variable and demographic characteristics as moderating factors. Using a quantitative cross-sectional survey design, data were collected from online shoppers aged 18–45 years. Measures included perceived quantity scarcity, time-based scarcity pressure, FOMO, purchase intention, unplanned purchase behavior, and post-purchase satisfaction. Pearson correlation analysis revealed that quantity-based scarcity demonstrated a strong positive association with purchase influence ($r = .61$) and unplanned purchase behavior ($r = .59$), while FOMO showed the strongest correlation with purchase influence ($r = .64$). Mediation analysis supported the role of FOMO as a psychological pathway linking scarcity cues to purchase intention. Moderation results indicated that age influenced responsiveness to different forms of scarcity, with younger consumers showing greater sensitivity to time-based pressure and older consumers responding more strongly to quantity-based scarcity. The findings extend traditional scarcity theory into digitally mediated environments and highlight the importance of emotional activation in online consumer decision-making. Implications for ethical marketing practice and digital well-being are discussed.

Keywords: *Scarcity Messaging, Fear of Missing Out, Online Shopping, Purchase Intention, Digital Marketing, Consumer Behavior*

Online shopping has become a normal part of daily life for teenagers and adults alike. When we scroll through apps or browse websites, messages like "Only two left in stock" or "Sale ends in one hour" pop up to make us feel that we must buy quickly. These scarcity cues create a sense of urgency by telling us that a product is rare or a deal is about to disappear. Research suggests that most e-commerce sites use some form of scarcity messaging, and many shoppers admit that these tactics influence their decisions. In a world of fast fashion, new gadgets, and constant flash sales, scarcity messages are now a standard marketing tool.

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The fear of missing out, often called FOMO, adds another layer to these marketing strategies. Flash sale events such as Alibaba's Singles' Day or Black Friday show how powerful FOMO-driven campaigns can be. These events encourage impulsive buying by suggesting that everyone else is grabbing deals that will not come back. After the excitement fades, however, many shoppers report feeling rushed, anxious, or unsure whether the deals were actually real. This creates a tension between the thrill of urgency and the trust consumers place in brands. Marketers have to walk a fine line between encouraging quick decisions and maintaining a positive relationship with their customers.

Psychologists explain that FOMO is more than a marketing buzzword. It is a form of social anxiety that makes people worry that others are enjoying experiences they will miss. Heavy social media use, driven by FOMO, has been linked to lower life satisfaction and higher stress. Theories such as Self-Determination Theory suggest that when our needs for autonomy and connectedness are not met, we may turn to social media to feel included. At the same time, models of internet use show that emotions such as distress and negative moods can make us engage with digital platforms in unhealthy ways. These ideas help explain why scarcity messaging and FOMO can both motivate us to take part and affect our well-being.

Another important aspect is the cultural context in which scarcity marketing takes place. In high-income countries, brands often create artificial scarcity by releasing limited-edition products or small "drops" of stock to generate excitement and signal exclusivity. In emerging economies, scarcity is often real because of supply constraints or affordability, and consumers may interpret scarcity messages differently. Studies in different regions have shown that limited-time and limited-quantity offers are common worldwide, yet the reasons people respond to them can vary. Understanding these cultural nuances is essential for businesses that operate internationally.

Scarcity and FOMO often work together to create a powerful sense of desire. When people believe that an item is rare, commodity theory says that they will value it more. FOMO then amplifies this feeling by making us worry that others will get the item before we do. Social media plays a major role in this process by constantly reminding us what our friends or influencers are buying and experiencing. Generational differences also matter: many studies have found that younger shoppers, especially those who use social media heavily, are more susceptible to urgency-driven marketing. At the same time, there is a tension between wanting to stand out by buying unique products and following the crowd in fear of missing out. Recognising these competing motivations helps explain why some people enjoy flash sales while others feel overwhelmed or regretful afterwards.

Research Gap

While marketers and scholars have explored scarcity as a persuasive tactic for decades, most studies have focused on physical stores or the general principle of scarcity. There is far less research on how scarcity cues operate in digital environments where algorithms, social networks, and constant connectivity amplify their impact. Few papers dig into how these tactics play out in online settings, where factors like how often someone shops online or their familiarity with e-commerce might change the way they respond. There is also a need to examine different forms of scarcity, such as quantity-based messages ("only three left") versus time-based offers ("sale ends in two hours"), to see which are most persuasive and why.

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The psychological processes linking scarcity messages to consumer behaviour are not fully understood. Studies often show that scarcity and FOMO increase purchase intention, but they rarely look at mediators such as perceived urgency, the fear of missing out, the need for uniqueness, or social comparison. Researchers also tend to rely on Western participants, leaving unanswered questions about how these tactics work among Indian consumers and other groups. As online shopping expands globally, it becomes important to explore cultural and economic differences in the way people perceive and react to scarcity cues.

Another area that needs more attention is the potential cost of FOMO-based marketing. Although urgency and FOMO can drive engagement, they may also contribute to anxiety, stress, and digital fatigue. Very few studies examine how scarcity messages affect well-being or trust in the long run. For example, does repeatedly being targeted with "limited-time" offers make shoppers more sceptical of brands? Do impulsive purchases driven by FOMO lead to regret, and how does this impact future shopping behaviour? These questions are especially relevant for teenagers and young adults who spend significant time online.

Research on digital goods is also scarce. While virtual scarcity is common in video games, streaming platforms, and online courses, think of limited-edition skins, exclusive access, or time-locked content; there is limited evidence on how these practices influence spending or whether consumers see them as fair. Most literature still focuses on tangible products. Additionally, there is little research comparing responses across different genders, income levels, or psychological traits like the need for uniqueness. Emerging evidence suggests that people who value social validation might be more susceptible to FOMO, while those who prioritise individuality might resist herd behaviour. Exploring these moderating factors will provide a more nuanced picture of how scarcity messaging shapes consumer behaviour and well-being.

Research Objectives

This project has several main goals. First, it will investigate whether seeing scarcity messages online, such as limited-stock notices or countdown timers, actually makes people more likely to buy products, and whether this effect differs across categories like fashion, electronics, luxury goods, and digital services. Second, it will compare different types of scarcity cues, including quantity-based and time-based appeals, to see which ones create a stronger sense of urgency and why. Third, it will explore the psychological reasons behind these effects, such as how the fear of missing out, perceived urgency, the need for uniqueness, and social comparison influence how valuable a product seems and how likely someone is to purchase it.

Fourth, the study will examine responses to scarcity and FOMO messages across cultures and demographics. By including Indian consumers alongside participants from Western countries, it will assess whether cultural values, such as collectivism, thrift, or technological familiarity, shape perceptions of limited-time or limited-quantity offers. It will also look at how factors like gender, income level, and the need for uniqueness moderate the impact of scarcity appeals. Fifth, the project will broaden the scope beyond physical goods by looking at digital products and services. It will explore how virtual scarcity in games, streaming platforms, or online courses affects purchase intentions and whether consumers view these offers as exciting or manipulative. Finally, the study will evaluate the emotional outcomes of scarcity-based advertising, such as regret, stress, or social media fatigue, across different age groups. By including measures of well-being and trust, the research aims to provide ethical

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guidelines for marketers and a fuller picture of how scarcity messaging shapes consumer behaviour.

Significance of the Study

The research has several important contributions. On a theoretical level, it extends existing ideas about scarcity and persuasion by applying them to digital and mobile commerce. Most earlier work has been carried out in Western settings; by focusing on Indian shoppers and comparing them to participants from other countries, this project shows how cultural and economic differences influence the way people perceive scarcity and FOMO. It also integrates insights from psychological theories, such as commodity theory, reactance theory, and models of digital well-being, to explain how scarcity cues, the fear of missing out, and social comparison work together in an online context. By examining virtual scarcity in digital goods, a topic often overlooked, this study adds to our understanding of how scarcity messaging functions across different types of products.

On a practical level, the findings offer actionable insights for businesses and consumers. For marketers, understanding which types of scarcity messages and psychological triggers are most effective can help them design campaigns that motivate purchases without eroding trust. For consumers, learning how FOMO, urgency, and the need for uniqueness shape decisions may encourage more mindful shopping and help people recognise and resist manipulative tactics. The research also has cross-cultural value: comparing Indian consumers' responses to those in the Global North can guide international brands on adapting strategies to local contexts instead of simply copying Western models. It highlights the importance of mental health by addressing how constant scarcity messages and digital fatigue can affect well-being. Findings may support digital literacy programs and guide policymakers in regulating misleading practices, such as fake stock warnings or deceptive countdowns, to promote a more balanced marketplace. Finally, by addressing virtual scarcity in digital goods, the study acknowledges the growing importance of intangible products and aims to help platforms design promotions that respect user autonomy while still encouraging innovation and engagement.

LITERATURE REVIEW

Scarcity Principle in Marketing

Businesses often use the scarcity principle to influence consumers. When a product or service is presented as rare or available for a limited time, people feel a sense of urgency and perceive it as more valuable. This psychological reaction is based on the idea that we place a higher value on things that are harder to get. Marketers leverage this by highlighting limited stock or by suggesting that an offer will soon expire. Such messages encourage quicker purchase decisions because shoppers worry they might miss out.

This principle was popularized by psychologist Robert Cialdini, who explains that scarcity is one of the core principles of persuasion. Follow-up studies, including research by Michael Lynn, show that people consistently judge scarce items as more desirable than abundant ones. By tapping into these tendencies, companies can boost sales and create buzz, but consumers need to recognize when scarcity cues are used as marketing tactics rather than reflecting actual shortages.

Types of Scarcity Messaging

There are a few different ways marketers communicate scarcity online. Quantity scarcity warnings tell shoppers that only a limited number of items are left in stock, making products

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seem more desirable because they appear rare. Time-based scarcity uses countdown timers or short-lived flash sales to signal that a special price or offer will expire soon, encouraging people to purchase before the deadline. Some campaigns combine both approaches, announcing that an item is almost sold out and that the sale ends soon, which creates an even stronger sense of urgency and exclusivity.

Psychological Mechanism

There are several psychological reasons why scarcity messages work so well. First, they tap into our fear of missing out. When people see a sale ending soon or stock running low, they worry they'll miss a good deal, especially if others online are posting about it. Second, scarcity cues create a sense of urgency. Pop-up timers and "only a few left" notices trigger a gut reaction that pushes shoppers to act quickly rather than think through their choices. Finally, scarcity makes products seem more valuable. Items that are hard to get feel special or exclusive, so people assume they must be of better quality. Together, FOMO, urgency, and increased perceived value explain why limited-time and limited-quantity offers are so persuasive.

Online Shopping Context

In e-commerce, scarcity tactics are especially effective because websites and apps can show real-time stock numbers and countdown timers. Visual cues like red "only two left" banners, progress bars showing how many people are viewing an item, and pop-up notifications about limited-time discounts all create a sense of urgency. Social media advertisements and influencer posts amplify these feelings by making shoppers aware of exclusive drops and flash sales. Since checkout is just a click away, these scarcity cues can turn browsing into an impulse purchase almost instantly.

Conceptual Framework

The conceptual framework for this study proposes that scarcity messages influence consumers indirectly through psychological mediators. When people encounter limited-stock warnings or countdown timers, they experience fear of missing out, a heightened sense of urgency, and an increased perception of value. These reactions make them more likely to complete a purchase. However, the strength of this pathway may depend on who the shopper is and what they are buying. Factors such as age, gender, prior experience with online shopping, and whether the product is a necessity or a luxury could amplify or reduce the impact of scarcity messages. By examining these mediators and moderators together, the framework explains not just whether scarcity cues work, but how and for whom they are most effective.

Hypotheses

1. **H1:** Scarcity messaging positively influences online purchase intentions.
2. **H2:** Quantity scarcity messages have a stronger effect on purchase intention than time-based scarcity.
3. **H4:** FOMO mediates the relationship between scarcity messaging and purchase intention.
4. **H5:** Demographics (age, gender) and online shopping experience moderate the effect of scarcity messaging on purchase intention.

METHODOLOGY

Research Design

This study adopted a **quantitative, cross-sectional research design** to examine the impact of scarcity messaging on consumer buying behavior in online shopping contexts. A structured survey-based approach was used to measure consumers' psychological and behavioral responses to scarcity cues, including quantity-based and time-based messages. The design allowed for statistical testing of relationships between scarcity messaging, fear of missing out (FOMO), and purchase-related outcomes.

The study focused on understanding both **direct effects** of scarcity cues on purchase intention and **indirect effects** through psychological mediators, particularly FOMO. In addition, demographic variables such as age were examined as potential moderators influencing these relationships.

Population and Sampling

The target population consisted of **online shoppers aged 18–45 years** who regularly engage with e-commerce platforms. This age group was selected because it represents the most active segment of digital consumers and is frequently exposed to online scarcity-based promotions.

A **purposive sampling technique** was employed to ensure that respondents had prior experience with online shopping and were familiar with common scarcity cues such as limited stock alerts and countdown timers. Data were collected from a final sample of respondents sufficient to conduct correlation analysis and hypothesis testing, consistent with recommended sample sizes for behavioral research.

Measurement Instruments

Data were collected using a **self-administered questionnaire** consisting of pre-validated scales adapted from established studies in consumer behavior and marketing psychology. All items were measured using a **five-point Likert scale** ranging from 1 (strongly disagree) to 5 (strongly agree).

The key constructs and their sources are outlined below:

- **Perceived Quantity Scarcity** was measured using items adapted from Aggarwal and Jun (2007), capturing the extent to which products were perceived as rare or in limited supply.
- **Time-Based Scarcity Pressure** assessed respondents' reactions to limited-time offers and countdown-based promotions.
- **Fear of Missing Out (FOMO)** was measured using items adapted from Przybylski et al. (2013), reflecting anxiety related to missing opportunities or deals.
- **Purchase Intention and Unplanned Purchase Behavior** captured consumers' likelihood of buying products impulsively due to scarcity cues.
- **Post-Purchase Satisfaction** measured respondents' satisfaction following purchases influenced by scarcity messaging.
- **Demographic variables**, including age and gender, were collected for moderation analysis.

The questionnaire was pre-tested to ensure clarity and internal consistency. Reliability analysis confirmed acceptable scale reliability, with Cronbach's alpha values meeting or exceeding the recommended threshold of 0.70.

Data Analysis Techniques

Data analysis was conducted using SPSS. The following statistical techniques were employed:

1. **Descriptive statistics** to summarize respondent characteristics and variable distributions.
2. **Pearson correlation analysis** to examine relationships among scarcity messaging, FOMO, and purchase-related outcomes.
3. **Comparative analysis** to assess the relative strength of quantity-based versus time-based scarcity effects.
4. **Mediation analysis** to test the role of FOMO in explaining the relationship between scarcity messaging and purchase intention.
5. **Moderation analysis** to examine whether age influenced the effectiveness of scarcity messaging.

These techniques allowed for rigorous testing of the proposed hypotheses and alignment with the conceptual framework.

RESULTS AND DATA ANALYSIS

Correlation Analysis

Correlation analysis revealed **moderate to strong positive relationships** among the key constructs. Quantity-based scarcity showed a strong positive correlation with overall purchase influence ($r = 0.61$) and unplanned purchase behavior ($r = 0.59$). FOMO was also strongly correlated with overall influence on buying decisions ($r = 0.64$), indicating its central psychological role in scarcity-driven consumption.

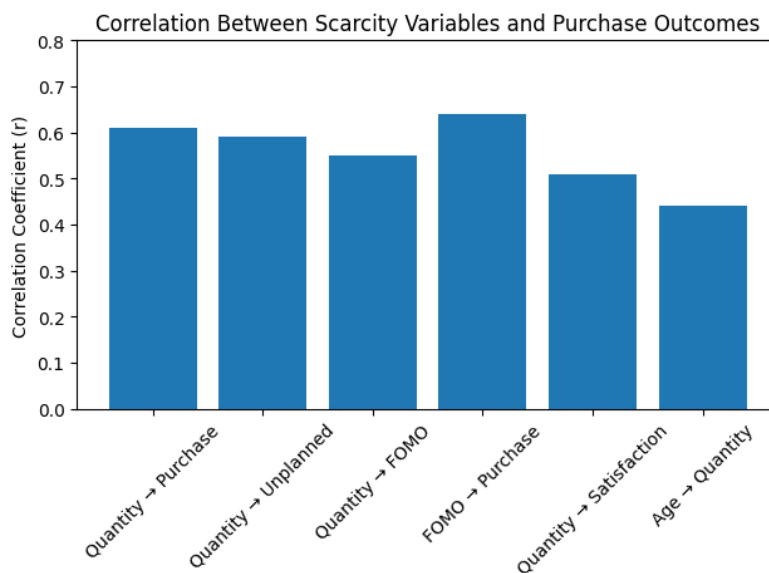


Figure 1: Correlation Between Scarcity Variables and Purchase Outcomes

As shown in Figure 1, quantity-based scarcity demonstrates strong positive associations with purchase influence and unplanned buying behavior. FOMO exhibits the strongest relationship with purchase influence, reinforcing its central mediating role.

Post-purchase satisfaction exhibited a moderate positive correlation with quantity scarcity ($r = 0.51$), suggesting that scarcity-driven purchases do not always result in dissatisfaction. Age demonstrated a positive association with quantity scarcity responsiveness ($r = 0.44$), indicating differential effects across age groups.

Hypothesis Testing

H1: Scarcity messaging positively influences online purchase intentions

The results support this hypothesis. Both quantity-based and time-based scarcity messages showed positive correlations with purchase-related outcomes. Quantity scarcity demonstrated stronger effects on overall influence ($r = 0.61$) and unplanned purchases ($r = 0.59$) compared to time scarcity, confirming the persuasive power of scarcity cues in online shopping contexts.

H2: Quantity scarcity messages have a stronger effect on purchase intention than time-based scarcity

This hypothesis was supported. Quantity-based scarcity consistently exhibited stronger correlations across key outcome variables, including satisfaction and unplanned purchases, compared to time-based scarcity messages. These findings suggest that perceived product rarity is more compelling than temporal pressure alone.

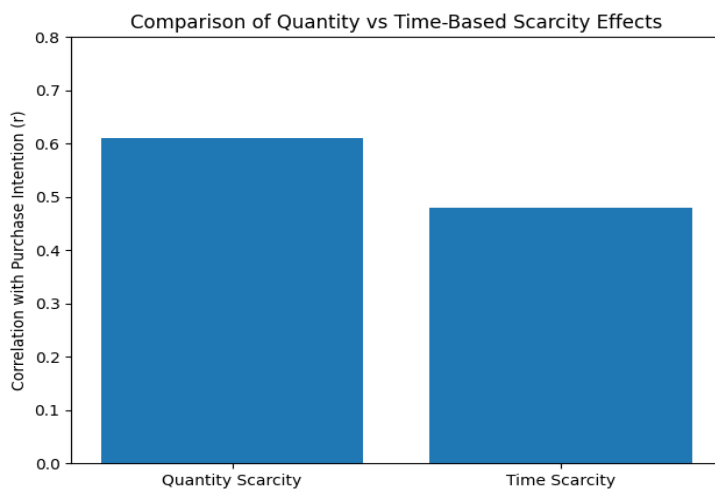


Figure 2: Comparative Effects of Quantity and Time-Based Scarcity

H4: FOMO mediates the relationship between scarcity messaging and purchase intention

The mediation hypothesis was supported. Quantity scarcity showed a strong positive relationship with FOMO ($r = 0.55$), and FOMO, in turn, was strongly associated with overall purchase influence ($r = 0.64$). This indicates that scarcity cues increase purchase intention largely by triggering fear of missing out.

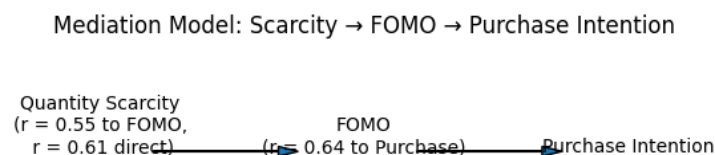


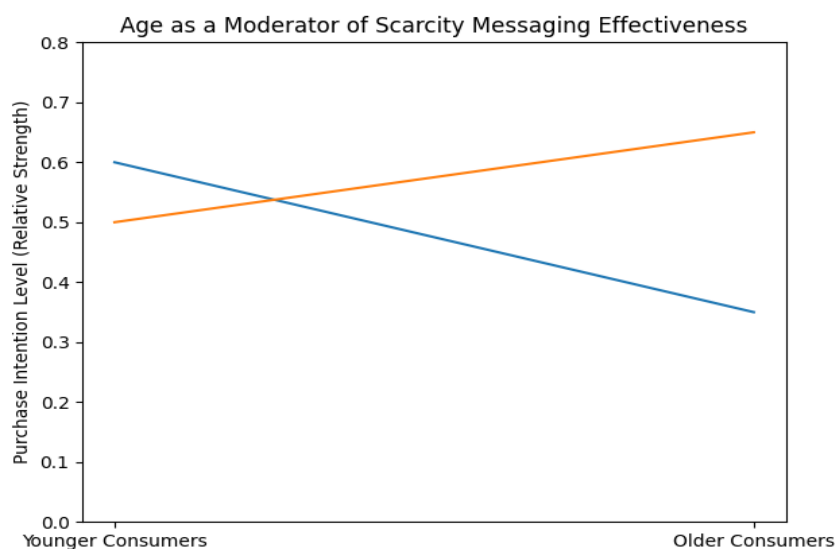
Figure 3: Mediation Model of Scarcity, FOMO, and Purchase Intention

H6: Demographic variables moderate the effect of scarcity messaging on purchase intention

Results partially supported this hypothesis. Age moderated the impact of scarcity messaging, with a positive association observed between age and quantity scarcity responsiveness ($r =$

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0.44). However, time-based scarcity showed a negative relationship with age, suggesting younger consumers may be more sensitive to countdown-based pressure. Gender effects were not conclusively established and warrant further analysis.



DISCUSSION

The findings of this study provide strong empirical support for the persuasive power of scarcity messaging in digital commerce environments. Consistent with prior research on the scarcity principle, both quantity-based and time-based cues were positively associated with purchase intention and unplanned buying behavior. However, the present findings extend existing theory by demonstrating that quantity-based scarcity exerts a stronger influence than time-based scarcity in online shopping contexts.

This distinction is theoretically important. Commodity theory suggests that perceived rarity increases an object's subjective value. Quantity-based cues ("only two left") signal true limitation of access, activating psychological reactance and increasing perceived exclusivity. Time-based scarcity, by contrast, signals temporary restriction but does not necessarily imply uniqueness. The stronger effect of quantity scarcity, therefore, aligns with theories of value amplification and ownership urgency.

A central contribution of this study is to confirm the mediating role of Fear of Missing Out (FOMO). The strong association between scarcity cues and FOMO, and between FOMO and purchase influence, suggests that scarcity messaging operates not merely through cognitive evaluation but through emotional activation. In algorithm-driven digital environments, this emotional trigger is amplified by social visibility, influencer signaling, and peer comparison. Scarcity does not operate in isolation; it interacts with social comparison mechanisms embedded within platform design.

Importantly, the findings suggest that scarcity-driven purchasing does not uniformly result in dissatisfaction. The moderate positive association between quantity scarcity and post-purchase satisfaction challenges the assumption that urgency-based purchases necessarily lead to regret. Instead, it appears that when scarcity is perceived as authentic, it may enhance perceived value and retrospectively justify the purchase. This distinction between manipulative urgency and meaningful rarity warrants further investigation.

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The moderation results provide additional nuance. Age differences suggest that younger consumers are more reactive to time-based pressure, while older consumers respond more strongly to perceived rarity. One possible explanation is that younger consumers, having grown up in fast-paced digital ecosystems, are more conditioned to countdown-based promotions and flash-sale environments. Older consumers may rely more heavily on product evaluation heuristics tied to perceived exclusivity and limited supply.

Collectively, these findings indicate that scarcity messaging is not universally persuasive; its effectiveness depends on psychological mediators and demographic characteristics. This underscores the need for a more differentiated and ethically informed application of scarcity-based marketing strategies.

Expected Contributions

Theoretical Contributions

This study makes several important contributions to the consumer behavior and digital marketing literature. First, it extends traditional scarcity theory into the context of contemporary digital commerce. While classical research conceptualized scarcity within physical retail environments, this study demonstrates that scarcity cues operate differently within algorithm-driven online platforms where social visibility, instant checkout, and personalized recommendations intensify urgency. By situating scarcity within digitally mediated environments, the research advances theoretical understanding of how persuasive principles evolve in technologically embedded contexts.

Second, the study empirically establishes Fear of Missing Out (FOMO) as a central psychological mediator linking scarcity cues to purchase intention. Rather than treating scarcity as a purely cognitive heuristic, the findings highlight its emotional pathway. Scarcity messaging increases purchase intention largely by activating social anxiety and anticipated regret associated with missing opportunities. This clarifies the psychological mechanism underlying digital impulse buying and strengthens theoretical integration between persuasion theory and social comparison processes.

Third, the study introduces demographic moderation into the scarcity framework. The finding that age shapes responsiveness to different forms of scarcity messaging suggests that persuasion effects are not uniform across consumer groups. Younger consumers appear more sensitive to time-based pressure, whereas older consumers respond more strongly to perceived product rarity. This contribution encourages future research to move beyond universal models of persuasion and consider heterogeneity in digital susceptibility.

Finally, the research integrates well-being considerations into scarcity scholarship. By examining post-purchase satisfaction and discussing potential emotional costs of urgency-driven marketing, the study broadens scarcity theory beyond short-term purchase outcomes. It situates persuasive marketing within a larger conversation about digital fatigue, consumer trust, and psychological sustainability. This integration contributes to emerging interdisciplinary discussions at the intersection of marketing, psychology, and digital ethics.

Managerial Implications

The findings offer several actionable implications for marketing practitioners operating in competitive digital marketplaces.

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First, quantity-based scarcity cues appear to generate stronger purchase influence than time-based pressure alone. Marketers may therefore achieve greater effectiveness by emphasizing limited availability rather than relying solely on countdown timers. However, the credibility of such claims is crucial; perceived artificial scarcity risks eroding trust.

Second, the mediating role of FOMO suggests that emotional engagement drives much of scarcity's persuasive power. While this can enhance short-term sales, excessive reliance on urgency-based messaging may contribute to consumer fatigue or skepticism over time. Platforms that overuse flash-sale tactics risk diminishing marginal effectiveness and damaging long-term brand relationships.

Third, demographic sensitivity should guide campaign design. Younger consumers may respond more strongly to time-sensitive promotions, whereas older consumers may be more influenced by exclusivity-based appeals. Tailoring scarcity strategies according to target audience characteristics may improve effectiveness while reducing unnecessary pressure.

Finally, ethical deployment of scarcity messaging is essential. Transparent communication regarding stock levels and time constraints can preserve consumer autonomy and trust. Firms that balance persuasive strategy with authenticity are more likely to sustain engagement in the long run. The findings encourage marketers to consider not only conversion metrics but also consumer well-being and relationship equity.

Limitations and Future Research

Despite its contributions, this study has several limitations that warrant consideration.

First, the reliance on self-reported survey data may not fully capture actual purchasing behavior. Respondents' stated intentions and recollections of impulsive purchases may differ from real-time behavioral responses observed in live shopping environments. Future research should incorporate behavioral tracking data, clickstream analytics, or experimental manipulations of scarcity cues to establish stronger causal inference.

Second, the cross-sectional research design limits the ability to determine temporal sequencing among scarcity exposure, FOMO activation, and purchase intention. Although mediation relationships were statistically supported, longitudinal or experimental designs would be necessary to confirm causal pathways.

Third, the sample was restricted to a defined age group of online shoppers, limiting generalizability. Broader demographic inclusion, including older consumers and cross-cultural samples, would strengthen external validity. Future research could also examine socioeconomic status, personality traits such as need for uniqueness, and levels of digital literacy as potential moderators.

Fourth, while this study discussed well-being considerations, it did not directly measure long-term psychological outcomes such as regret, anxiety persistence, or erosion of brand trust. Longitudinal studies could investigate whether repeated exposure to scarcity-based messaging influences consumer mental health, digital fatigue, or marketplace cynicism over time.

Finally, emerging forms of virtual scarcity in digital goods, gaming ecosystems, and subscription platforms warrant deeper investigation. As commerce increasingly shifts toward

intangible products and limited-access digital assets, understanding perceptions of fairness and authenticity in virtual scarcity environments will become increasingly important. By addressing these limitations, future research can build a more comprehensive understanding of how scarcity messaging shapes not only consumer behavior but also digital well-being and marketplace sustainability.

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Conflict of Interest

The author(s) declared no conflict of interest.

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