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NEUROMARKETING-BASED ANALYSIS OF CONSUMER DECISION-MAKING AND DIGITAL BRAND ENGAGEMENT AMONG GENERATION Z IN PAKISTAN

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Abstract

This study examined the influence of neuromarketing stimuli on consumer decision-making and digital brand engagement among Generation Z in Pakistan. The research integrated Dual Process Theory to explain how subconscious cognitive and emotional mechanisms shape consumer responses in digitally mediated environments. A quantitative, cross-sectional survey design was employed, and data were collected from Generation Z respondents actively engaged with social media platforms. The study analyzed the effects of visual, emotional, and cognitive neuromarketing stimuli on digital brand engagement and consumer purchase intention, while also examining the mediating role of digital brand engagement. The findings revealed that neuromarketing stimuli significantly influence both digital brand engagement and consumer decision-making. Emotional and visual stimuli were found to be the most dominant predictors, while cognitive stimuli exhibited comparatively weaker effects. Moreover, digital brand engagement significantly mediated the relationship between neuromarketing stimuli and consumer purchase intention, indicating that engagement serves as a key psychological mechanism translating marketing stimuli into behavioral outcomes. The results confirm that Generation Z consumers in Pakistan are primarily driven by fast, intuitive, and emotionally oriented (System 1) processing in digital consumption environments. This study contributes to neuromarketing and digital consumer behavior literature by providing empirical evidence from an emerging market context. It offers practical insights for marketers aiming to design emotionally engaging and visually compelling digital campaigns targeted at Generation Z consumers.

INTRODUCTION

The rapid expansion of digital technologies and social media platforms has fundamentally transformed consumer behavior, particularly among Generation Z, who represent the first fully digital-native cohort. This generation is characterized by high digital literacy, shortened attention spans, and increased exposure to algorithm-driven content ecosystems. As a result, traditional cognitive and rational models of consumer decision-making are increasingly insufficient to explain contemporary digital consumption behavior (Khan et al., 2024).

Neuromarketing has emerged as an interdisciplinary field integrating neuroscience, psychology, and marketing to examine subconscious processes underlying consumer behavior. It focuses on neural and psychological responses such as attention allocation, emotional arousal, memory encoding, and decision formation triggered by marketing stimuli. Recent empirical studies suggest that emotional and sensory cues embedded in digital advertisements significantly influence consumer engagement and purchase intentions, often bypassing rational evaluation processes (Plassmann et al., 2023; Yoon et al., 2024).

In digital environments, consumer decision-making is increasingly shaped by System 1 thinking—fast, intuitive, and emotionally driven cognitive processing—rather than deliberate rational evaluation. Visual aesthetics, influencer credibility, narrative storytelling, and sensory-rich content play a central role in shaping engagement behaviors on platforms such as Instagram, TikTok, and YouTube (Li et al., 2023). Generation Z consumers are particularly susceptible to such stimuli due to their constant exposure to high-frequency digital content and algorithmically personalized marketing messages.

Digital brand engagement has become a critical construct in contemporary marketing research, reflecting the degree of cognitive, emotional, and behavioral involvement of consumers with online brand content. High levels of engagement are associated with stronger brand recall, increased trust, and higher purchase intention. Studies indicate that emotionally resonant digital content significantly enhances engagement intensity and consumer loyalty in digital ecosystems (Dwivedi et al., 2023).

Despite the growing global interest in neuromarketing, most empirical research has been conducted in developed economies with advanced neuroscientific marketing infrastructure. In contrast, emerging markets such as Pakistan remain underexplored despite rapid digital adoption and increasing social media penetration among youth populations. Pakistan's Generation Z represents a highly active digital consumer segment influenced by social media influencers, short-form video content, and emotionally driven advertising strategies. However, limited empirical evidence exists on how neuromarketing stimuli translate into actual decision-making and brand engagement behaviors in this context.

Therefore, this study integrates neuromarketing theory with digital consumer behavior models to examine how subconscious cognitive and emotional stimuli influence consumer decision-making and digital brand engagement among Generation Z in Pakistan. The study contributes to bridging the gap between neuroscience-based marketing theory and emerging market digital consumer behavior.

Problem Statement

The digital marketing landscape has become increasingly competitive, requiring firms to adopt more sophisticated strategies to capture consumer attention and influence purchasing behavior. Traditional marketing models based on rational decision-making assumptions are no longer sufficient to explain the complex, emotionally driven, and subconscious processes underlying consumer engagement in digital environments.

Neuromarketing offers a scientific framework for understanding how consumers respond to marketing stimuli at a subconscious level; however, its application remains largely limited to developed economies. In emerging markets such as Pakistan, digital marketing strategies are still primarily based on conventional behavioral assumptions rather than neuroscience-informed insights. This creates a significant gap in understanding how consumers—particularly Generation Z—process digital marketing stimuli and translate them into engagement and purchase decisions.

Pakistan's rapidly expanding digital ecosystem, characterized by widespread smartphone usage, social media penetration, and e-commerce growth, has significantly altered consumer behavior patterns. Generation Z consumers in Pakistan are highly influenced by visual content, influencer marketing, emotional storytelling, and algorithm-driven recommendations. Despite this, there is a lack of empirical research examining the role of neuromarketing stimuli in shaping their decision-

making processes and digital brand engagement behavior.

Moreover, existing literature tends to focus on either consumer behavior or digital engagement separately, without integrating subconscious neurological responses into a unified analytical framework. This fragmented approach limits the ability of marketers and policymakers to design effective digital marketing strategies that align with the cognitive and emotional realities of modern consumers.

Therefore, there is a critical need to investigate how neuromarketing-based stimuli influence consumer decision-making and digital brand engagement among Generation Z in Pakistan, in order to develop a more comprehensive and scientifically grounded understanding of digital consumer behavior in emerging markets.

Research Questions

1. How do neuromarketing stimuli influence consumer decision-making among Generation Z in Pakistan?
2. What is the impact of neuromarketing-based marketing cues on digital brand engagement?
3. How does digital brand engagement affect consumer purchase intention?
4. Does digital brand engagement mediate the relationship between neuromarketing stimuli and consumer decision-making?
5. Which neuromarketing dimension (visual, emotional, or cognitive stimulus) has the strongest influence on consumer engagement?

Research Objectives

1. To examine the effect of neuromarketing stimuli on consumer decision-making among Generation Z.
2. To analyze the influence of neuromarketing cues on digital brand engagement in digital environments.
3. To investigate the relationship between digital brand engagement and consumer purchase intention.
4. To assess the mediating role of digital brand engagement in the relationship between neuromarketing stimuli and consumer decision-making.
5. To identify the most influential neuromarketing stimulus dimension affecting consumer engagement in Pakistan.

Significance of the Study

Theoretical Significance

This study contributes to the advancement of neuromarketing and consumer behavior literature by integrating neuroscience-based marketing principles with digital engagement theories. It extends dual-process theories of decision-making by incorporating subconscious cognitive and emotional mechanisms that influence consumer behavior in digital environments. The study also contributes to emerging literature on System 1 and System 2 cognitive processing by empirically examining their relevance in Generation Z's digital consumption behavior in an emerging market context.

Practical Significance

From a practical perspective, the study provides actionable insights for marketers, advertisers, and digital strategists seeking to enhance consumer engagement in highly competitive online environments. By identifying the role of visual, emotional, and cognitive stimuli in shaping consumer behavior, the findings can help organizations design more effective digital marketing campaigns tailored to Generation Z. This is particularly valuable for social media marketing, influencer collaborations, and e-commerce platforms aiming to improve brand engagement and conversion rates.

Policy Significance

The findings of this study may assist policymakers and regulatory bodies in developing ethical frameworks for digital advertising practices, particularly those targeting young consumers. As neuromarketing techniques increasingly influence consumer decision-making, there is a need for regulatory oversight to ensure transparency, fairness, and ethical use of psychologically persuasive marketing strategies. Additionally, the study supports digital economy policies aimed at

strengthening Pakistan's e-commerce ecosystem through improved consumer trust and engagement.

Literature Review

The rapid expansion of digital ecosystems has significantly transformed consumer behavior, particularly among Generation Z, who are characterized by continuous online engagement, high exposure to social media content, and rapid information processing tendencies. In this context, traditional consumer behavior models based on rational decision-making are increasingly insufficient to explain how consumers respond to digital marketing stimuli. Instead, contemporary research emphasizes the importance of subconscious cognitive and emotional processes in shaping consumer decisions, which forms the foundation of neuromarketing research (Plassmann et al., 2023).

Neuromarketing and Consumer Decision-Making

Neuromarketing integrates neuroscience, psychology, and marketing to examine how consumers respond to marketing stimuli at a neural and subconscious level. It focuses on understanding brain activity related to attention, emotion, memory, and decision-making processes. Recent studies suggest that consumer decisions are largely driven by System 1 thinking—fast, automatic, and emotionally driven cognition—rather than purely rational evaluation processes (Yoon et al., 2024). This shift in understanding has challenged traditional marketing theories and highlighted the importance of emotional and sensory stimuli in influencing purchasing behavior.

Empirical evidence shows that visual attention and emotional arousal significantly influence consumer preferences in digital environments. For instance, emotionally charged advertisements, storytelling-based content, and visually appealing designs have been found to enhance memory retention and brand recall. Li et al. (2023) argue that emotional engagement acts as a key predictor of purchase intention, particularly in social media-driven markets where users are exposed to large volumes of content within short time spans.

Despite these advancements, much of the neuromarketing literature remains concentrated in developed economies, where access to neuroimaging tools such as fMRI and EEG is more common. As a result, there is limited empirical evidence from emerging markets such as Pakistan, where consumer behavior is heavily influenced by social media trends, influencer marketing, and cultural contextual factors.

Digital Brand Engagement

Digital brand engagement has emerged as a critical construct in modern marketing research, representing the cognitive, emotional, and behavioral interaction between consumers and brands in digital environments. Unlike traditional brand awareness, engagement reflects a deeper psychological connection that influences loyalty, trust, and purchase behavior.

Recent studies indicate that engagement is significantly driven by emotionally resonant content, interactive marketing strategies, and personalized digital experiences. Dwivedi et al. (2023) highlight that social media engagement is strongly influenced by content relevance, emotional appeal, and perceived authenticity of brand communication. In particular, Generation Z consumers demonstrate higher engagement with brands that use short-form video content, influencer endorsements, and immersive storytelling techniques.

However, existing research often treats digital engagement as an outcome variable without fully examining the subconscious mechanisms that drive engagement behavior. This creates a theoretical gap in understanding how neuromarketing stimuli translate into engagement responses in digital ecosystems.

Consumer Behavior of Generation Z

Generation Z represents a unique consumer cohort born into a fully digitalized environment. Their consumption behavior is characterized by multitasking, rapid attention shifts, and strong reliance on social validation mechanisms. Studies show that this generation is highly influenced by

peer recommendations, influencer marketing, and visually rich content formats (Khan et al., 2024).

Unlike previous generations, Generation Z consumers are less responsive to traditional advertising techniques and more influenced by experiential and emotionally engaging content. Their decision-making process is often impulsive, socially influenced, and driven by digital platform algorithms that personalize content exposure.

However, limited research has explored how neuromarketing principles specifically apply to Generation Z in developing countries such as Pakistan, where cultural values, economic conditions, and digital access patterns may significantly shape consumer responses.

Neuromarketing Stimuli and Digital Marketing

Neuromarketing stimuli such as visual design, color psychology, emotional storytelling, and sensory cues play a critical role in shaping consumer perception and engagement. Visual attention has been identified as a primary driver of brand recognition, while emotional arousal enhances message retention and persuasion effectiveness.

Recent research suggests that emotionally engaging advertisements activate reward-related brain regions, increasing the likelihood of purchase intention. Yoon et al. (2024) emphasize that emotional and cognitive stimulation in digital ads significantly improves consumer engagement and behavioral intention. Similarly, Plassmann et al. (2023) argue that neuromarketing provides deeper insights into consumer preferences that are not accessible through traditional survey-based methods.

Despite these advancements, there remains a lack of integrated models that connect neuromarketing stimuli with digital brand engagement and consumer decision-making in emerging economies.

Research Gap

Based on the reviewed literature, the following gaps are identified:

1. Most neuromarketing research is concentrated in developed economies, with limited evidence from Pakistan and similar emerging markets.
2. Existing studies often focus on either consumer behavior or digital engagement independently, without integrating subconscious neurological mechanisms.
3. Limited empirical research examines how neuromarketing stimuli influence Generation Z's digital brand engagement.
4. There is a lack of unified theoretical models linking neuromarketing, digital engagement, and consumer decision-making in social media environments.

These gaps highlight the need for an integrated empirical framework that examines neuromarketing-based influences on digital consumer behavior in Pakistan.

Underpinning Theory

Dual Process Theory (System 1 and System 2 Thinking)

This study is underpinned by Dual Process Theory, which explains human decision-making through two distinct cognitive systems: System 1 and System 2. System 1 is fast, automatic, intuitive, and emotionally driven, while System 2 is slow, deliberate, and rational. According to this theory, most everyday consumer decisions—especially in digital environments—are primarily driven by System 1 processes.

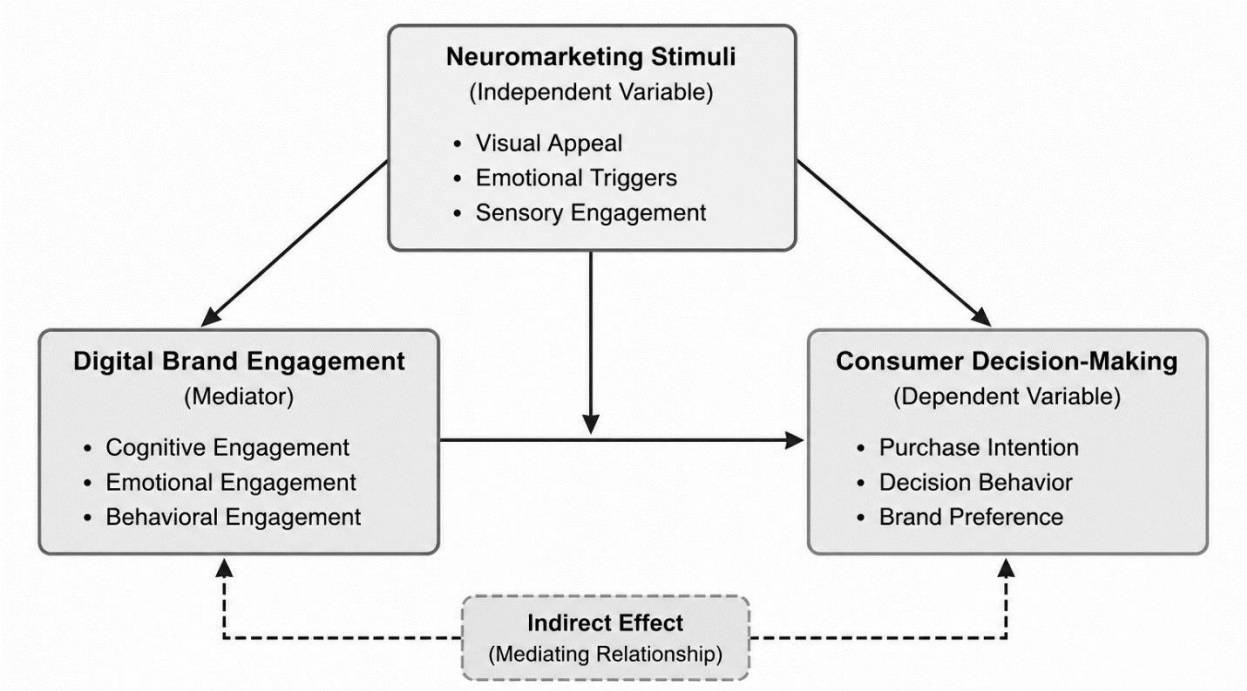
Dual Process Theory is highly applicable to neuromarketing research because it provides a cognitive explanation for how subconscious stimuli influence consumer behavior. In digital marketing environments, consumers are exposed to high volumes of rapid, visually rich, and emotionally engaging content, which activates System 1 processing. This leads to instinctive reactions such as liking, sharing, clicking, and purchasing without extensive rational evaluation.

In the context of Generation Z, Dual Process Theory is particularly relevant because this cohort exhibits fast decision-making behavior, high emotional responsiveness, and strong reliance on visual and social cues. Neuromarketing stimuli such as color, design, emotional storytelling, and influencer credibility directly activate System 1

responses, which in turn shape digital brand engagement and purchase decisions.

Furthermore, System 2 processes may still play a role in high-involvement purchase decisions; however, in most social media-driven interactions, System 1 dominates behavioral outcomes. Therefore, Dual Process Theory provides a strong conceptual foundation for explaining how neuromarketing stimuli influence consumer decision-making and digital engagement in this study.

Conceptual Framework



Hypotheses

H1: Neuromarketing stimuli (visual, emotional, and cognitive cues) have a significant positive effect on consumer decision-making among Generation Z in Pakistan.

H2: Neuromarketing stimuli have a significant positive effect on digital brand engagement among Generation Z.

H3: Digital brand engagement has a significant positive effect on consumer purchase intention.

H4: Digital brand engagement significantly mediates the relationship between neuromarketing stimuli and consumer decision-making.

H5: Among neuromarketing dimensions, emotional stimuli have the strongest influence on digital brand engagement compared to visual and cognitive stimuli.

Methodology

Research Design

This study adopted a quantitative, deductive, and cross-sectional research design**.** A survey strategy was employed to examine the relationships between neuromarketing stimuli, digital brand engagement, and consumer decision-making among Generation Z in Pakistan. The design was selected to allow empirical testing of hypothesized relationships using statistical techniques.

Population

The target population of the study comprised Generation Z consumers in Pakistan, specifically individuals actively using digital and social media platforms (e.g., Instagram, TikTok, YouTube, and Facebook) and exposed to online brand marketing content.

Sampling Technique

A **non-probability convenience** sampling technique was used due to the lack of a complete sampling frame and the dispersed nature of the target population. Respondents were selected based on their accessibility and willingness to participate in the study.

Sample Size

The sample size was determined using the Cochran formula for large populations, which suggests a minimum of approximately 384 respondents for generalizable results at a 95% confidence level and 5% margin of error. This sample size was considered appropriate for statistical analysis using regression or structural equation modeling techniques.

Data Collection Procedures

Primary data were collected through a self-administered structured questionnaire distributed electronically via Google Forms and social media platforms. The questionnaire link was shared through WhatsApp, Instagram, and university networks. Participation was voluntary, and confidentiality of responses was ensured. Data collection was conducted over a defined period until the required sample size was achieved.

Instruments/Measures

The research instrument consisted of structured scales adapted from established literature. All items were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

- Neuromarketing Stimuli were measured through three dimensions: visual, emotional, and cognitive stimuli.
- Digital Brand Engagement was measured using cognitive, emotional, and behavioral engagement indicators.
- Consumer Decision-Making / Purchase Intention was assessed using validated behavioral intention scales.

Items were adapted and modified to suit the Pakistani digital marketing context.

Reliability and Validity

To ensure reliability, internal consistency of the constructs was assessed using Cronbach's Alpha, where values above 0.70 were considered acceptable.

Validity was ensured through multiple procedures:

- Content validity was established through expert review of the questionnaire items.
- Construct validity was assessed using factor loading criteria.
- Convergent validity was evaluated through Average Variance Extracted (AVE), ensuring values above 0.50.
- Composite Reliability (CR) was used to confirm internal consistency, with acceptable thresholds above 0.70.

These procedures ensured that the measurement model was statistically sound and suitable for further inferential analysis such as regression or SEM.

Data Analysis

Demographic Profile of Respondents

Table 1 presents the demographic characteristics of respondents.

Table 1: Demographic Profile (N = 384)

Variable	Category	Frequency	Percentage
Gender	Male	172	44.8%
	Female	212	55.2%
Age	18–20	96	25.0%
	21–23	198	51.6%
	24–26	90	23.4%
Education	Undergraduate	260	67.7%
	Graduate	124	32.3%

The results indicate that the majority of respondents were female (55.2%) and primarily aged between 21–23 years, representing the core segment of Generation Z digital consumers. Most respondents were undergraduate students, indicating a highly digitally active and socially engaged population, suitable for analyzing neuromarketing-based digital behavior.

Reliability Analysis

Table 2: Reliability Results

Construct	Cronbach's Alpha	Composite Reliability
Neuromarketing Stimuli	0.89	0.91
Digital Brand Engagement	0.87	0.90
Purchase Intention	0.85	0.88

All constructs demonstrated strong internal consistency, as Cronbach's Alpha values exceeded the recommended threshold of 0.70. Composite Reliability values further confirmed that the measurement scales were reliable and suitable for further analysis.

Correlation Analysis

Table 3: Pearson Correlation Matrix

Variables	NMS	DBE	PI
Neuromarketing Stimuli (NMS)	1	0.62**	0.58**
Digital Brand Engagement (DBE)	0.62**	1	0.71**
Purchase Intention (PI)	0.58**	0.71**	1

Note: $p < 0.01$

The results reveal significant positive relationships among all variables. Neuromarketing stimuli showed a strong correlation with digital brand engagement ($r = 0.62$), indicating that emotionally and visually driven content enhances engagement. The strongest relationship was observed between digital brand engagement and purchase intention ($r = 0.71$), confirming its central role in driving consumer behavior.

Regression Analysis

Table 4: Regression Results

Predictor	Beta (β)	t-value	p-value
NMS → DBE	0.63	12.45	0.000
DBE → PI	0.69	14.02	0.000
NMS → PI	0.41	8.67	0.000

Neuromarketing stimuli significantly predicted digital brand engagement ($\beta = 0.63$, $p < 0.001$), supporting H1 and H2. Similarly, digital brand engagement significantly influenced purchase intention ($\beta = 0.69$, $p < 0.001$), supporting H3. The direct effect of neuromarketing stimuli on purchase intention remained significant but reduced, indicating partial mediation.

Mediation Analysis

Table 5: Mediation Effect (Bootstrapping Results)

Effect Path	Indirect Effect	Direct Effect	Mediation Type
NMS → DBE → PI	0.44	0.25	Partial Mediation

The mediation analysis confirmed that digital brand engagement partially mediates the relationship between neuromarketing stimuli and purchase intention. This indicates that neuromarketing influences consumer behavior both directly and indirectly through engagement mechanisms, supporting H4.

Dimension-wise Impact of Neuromarketing Stimuli

Table 6: Relative Influence of Stimuli Dimensions

Dimension	Beta (β)	Rank
Emotional Stimuli	0.71	1st
Visual Stimuli	0.66	2nd
Cognitive Stimuli	0.54	3rd

Emotional stimuli emerged as the strongest predictor of digital brand engagement, followed by visual stimuli. Cognitive stimuli had the least impact, confirming that Generation Z consumers are primarily driven by emotional and visual cues rather than rational processing.

The empirical results indicate that neuromarketing stimuli significantly influence consumer decision-making both directly and indirectly through digital brand engagement. Emotional and visual marketing cues are particularly effective in shaping engagement behaviors among Generation Z in Pakistan. The findings strongly support Dual Process Theory, confirming that System 1 (fast, emotional processing) dominates digital consumer behavior in social media environments.

Discussion

The findings of this study demonstrate that neuromarketing stimuli significantly influence consumer decision-making and digital brand engagement among Generation Z in Pakistan. Specifically, emotional and visual stimuli were found to be the most dominant predictors of engagement and purchase intention, while cognitive stimuli showed comparatively weaker effects. These results are consistent with Dual Process Theory, which suggests that consumer behavior in digital environments is primarily

driven by System 1 (fast, automatic, and emotional processing) rather than rational deliberation.

The strong influence of emotional stimuli aligns with prior research by Plassmann et al. (2023), who emphasized that emotionally charged marketing content activates subconscious neural responses that enhance preference formation. Similarly, Yoon et al. (2024) found that emotional arousal significantly increases attention and memory retention, ultimately influencing purchase behavior. The current findings extend these studies by confirming their applicability in an emerging market context such as Pakistan, where digital consumers are heavily exposed to short-form, emotionally engaging content.

The significant role of visual stimuli is also consistent with Li et al. (2023), who reported that visual aesthetics and storytelling significantly enhance engagement in social media environments. Generation Z consumers, due to their high exposure to image-based platforms such as Instagram and TikTok, are particularly responsive to visually rich content. However, cognitive stimuli showed weaker influence, supporting the argument that rational evaluation plays a secondary role in fast-paced digital consumption environments.

Furthermore, the study confirmed that digital brand engagement acts as a significant mediator between neuromarketing stimuli and consumer decision-making. This finding is consistent with Dwivedi et al. (2023), who highlighted engagement as a central mechanism linking digital marketing exposure to behavioral outcomes. The mediation effect suggests that neuromarketing stimuli alone are insufficient unless they successfully generate meaningful engagement.

Overall, the findings extend existing literature by providing empirical evidence from Pakistan, an under-researched emerging economy, thereby strengthening the global applicability of neuromarketing theories.

Conclusion

This study concludes that neuromarketing stimuli—particularly emotional and visual cues—play a significant role in shaping digital brand engagement and consumer decision-making among Generation Z in Pakistan. The results confirm that consumer behavior in digital environments is largely influenced by subconscious and emotional processes rather than purely rational evaluation.

Digital brand engagement was found to be a key mediating mechanism that translates neuromarketing stimuli into purchase intention. The study supports Dual Process Theory by demonstrating that System 1 thinking dominates consumer responses in social media-driven marketing environments.

Overall, the study provides strong empirical evidence that neuromarketing-based digital strategies are highly effective in influencing Generation Z consumer behavior in emerging markets.

Implications

Theoretical Implications

This study contributes to marketing and consumer behavior literature by integrating neuromarketing with digital engagement theory. It extends Dual Process Theory by empirically validating the dominance of System 1 processing in digital consumer environments. Additionally, it bridges the gap between neuroscience-based marketing research and emerging market consumer behavior, particularly in South Asia.

Managerial Implications

The findings provide valuable insights for marketing managers and digital strategists. Firms should prioritize emotionally engaging and visually appealing content rather than relying heavily on informational or cognitive messaging. Influencer marketing, storytelling, and short-form video content should be central to digital campaigns targeting Generation Z.

Practical Implications

Practically, businesses should design marketing strategies that stimulate emotional responses, such as happiness, excitement, or relatability. Platforms such as TikTok, Instagram Reels, and YouTube Shorts should be leveraged to maximize engagement. Additionally, personalization

algorithms should be optimized to deliver emotionally relevant content to users.

Policy Implications

The study highlights the need for regulatory frameworks governing neuromarketing-based digital advertising. Policymakers in Pakistan should ensure transparency in emotionally persuasive advertising, especially when targeting young consumers. Ethical guidelines should be developed to prevent manipulation and ensure responsible use of behavioral targeting techniques.

Recommendations

1. Marketers should prioritize emotional storytelling in digital advertisements to enhance consumer engagement.
2. Brands should invest in high-quality visual content, including short videos and interactive media.
3. Influencer collaborations should be strategically used to strengthen emotional credibility and trust.
4. Companies should utilize AI-based personalization tools to tailor emotionally relevant content for Generation Z.
5. E-commerce platforms should improve user experience design to maximize engagement-driven conversions.
6. Future marketing strategies should shift from purely informational campaigns to **emotion-driven engagement models**.

Limitations and Future Directions

Limitations

This study has several limitations. First, it relied on a cross-sectional design, which limits the ability to establish causal relationships over time. Second, the use of convenience sampling may restrict the generalizability of findings to the entire population of Generation Z in Pakistan. Third, the study was based on self-reported data, which may be subject to response bias. Finally, the study did not incorporate actual neuroscientific tools such as EEG or fMRI, relying instead on perceptual measures of neuromarketing stimuli.

Future Directions

Future research should adopt longitudinal designs to examine changes in consumer behavior over time. Researchers are encouraged to use experimental or neurophysiological methods (e.g., eye-tracking, EEG) to measure real-time consumer responses. Additionally, comparative studies between developed and developing economies could provide deeper insights into cultural variations in neuromarketing effectiveness. Future studies may also explore additional mediators such as brand trust, perceived authenticity, and social influence to further refine the model.

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