

How Neuromarketing Stimuli Drive Purchase Behaviour: The Role of Emotional Engagement as a Mediator

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Abstract

This research investigates the impact of Neuromarketing Stimuli on Consumer Purchase Behavior, focusing specifically on the intermediary function of Consumer Emotional Engagement. Neuromarketing stimuli are analyzed via visual appeal, emotional advertisement, brand experience, and sensory marketing. The research employs a quantitative methodology and utilizes Structural Equation Modelling to analyse the suggested correlations. The results indicate that Neuromarketing Stimuli have a favorable impact on Consumer Emotional Engagement and Consumer Purchase Behavior, while Consumer Emotional Engagement likewise positively affects Consumer Purchase Behavior. The mediation analysis additionally confirms that Consumer Emotional Engagement plays a substantial mediating role in the connection between Neuromarketing Stimuli and Consumer Purchase Behavior. The research enhances the expanding body of neuromarketing literature by elucidating the emotional processes that drive the impact of marketing cues on consumer purchase behavior. The research includes S-O-R theory and offers a more thorough insight into the psychological mechanisms driving consumer purchasing choices by amalgamating sensory, visual, emotional, and experience aspects with consumer emotional involvement. This approach underscores the significance of emotional involvement in transforming consumers' reactions to marketing

stimuli into positive buying actions. Contemporary neuromarketing studies also underscore the significance of emotional and cognitive reactions in comprehending client choices.

Keywords: Neuromarketing stimuli, Consumer Purchase behaviour, Visual appeal, Emotional Advertisement, Brand Experience, Sensory Marketing, Consumer Emotional Engagement.

1 Introduction

Neuromarketing is an emerging field in marketing. The term “Neuromarketing” was first presented in 2002 by Dutch marketing professor Ale Smidts. Human decision is both a conscious and non-conscious process in the brain. Non-conscious information plays a huge importance in the decision-making process and ultimately for the purchasing process. In the true sense the neuromarketing is a combination of neuroscience, psychology and marketing. These include Electroencephalography (EEG), Magnetoencephalography (MEG) and Functional Magnetic Resonance Imaging (fMRI), Eye Tracking, Electrodermal Responses and other neuro-technologies (Banerjee, 2023). Neuromarketing is a promising and developing field with wonderful potential for application in the functional areas of marketing, brand management, advertising etc. Neuromarketing is the application of neuroscience in marketing. It includes the direct use of brain imaging, scanning, or other brain activity measurement technology to measure a subject’s response to specific products, packaging, advertising, or other marketing elements.

One of the core strengths of neuromarketing lies in its ability to uncover the emotional drivers behind consumer choices. Emotions play a pivotal role in shaping preferences and loyalty, often overriding rational analysis. Traditional marketing research tends to emphasize conscious reasoning, but neuromarketing brings to light the implicit emotions that significantly impact buying behavior. This insight helps businesses craft messages that resonate emotionally, enhancing engagement and brand connection (Siva, 2025). The integration of neuromarketing into consumer behavior analysis also advances personalization efforts. By understanding the specific neural triggers for different consumer segments, marketers can tailor experiences that better meet individual needs and preferences. This level of customization improves customer satisfaction and loyalty, driving long-term business growth in an era where consumers expect highly relevant and personalized interactions.

Consumers are exposed to an unprecedented volume of marketing stimuli across digital platforms. In such saturated environments, only a limited number of messages successfully capture attention and influence decision-making (Alsharif et al., 2023). Growing evidence indicates that consumer responses to marketing communications vary, individuals process information differently, i.e., some are primarily emotionally driven, others rely on structured cognitive evaluation, and some respond to sensory cues embedded within marketing content. Understanding these psychological differences has therefore become central to contemporary consumer research (Nagpal et al., 2026). Neuromarketing has emerged as an interdisciplinary domain integrating neuroscience and consumer psychology to investigate subconscious drivers of behaviour (Bhardwaj et al., 2023). Through tools such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking, researchers have examined activation of emotional and attentional systems through marketing stimuli.

The importance of emotions in decision-making is one of the main takeaways from neuromarketing. Emotional reactions are frequently the main factor influencing customer behavior since the human brain processes emotions more quickly than logical reasoning. In order to develop more successful marketing efforts, neuromarketing aims to comprehend how various marketing stimuli elicit emotional reactions (Bhushan & Ravindra, 2025). The rapidly emerging multidisciplinary field of neuromarketing, which lies at the intersection of marketing, psychology, and neuroscience, aims to assess consumers' emotional and cognitive reactions to different marketing stimuli.

The relationship between neuromarketing stimuli and consumer purchase behaviour is also important because the ultimate objective of many marketing activities is to influence consumers' purchase-related decisions. Marketing stimuli may affect consumers' product choices, purchase intentions, brand preferences, and other forms of purchasing behaviour by attracting attention, creating favourable perceptions, and generating emotional responses.

This study has the following variables:

Neuromarketing stimuli: "Neuromarketing" is part of the "Neuroscience" research domain that aims to anticipate the consumer's behavior through the cerebrum's basic actions and responses. Moreover, neuromarketing is a newly evolving field in the marketing domain that judges consumers' brain responses using marketing actions over diverse medical instruments. It ensures an effective marketing process for sustainable development (Singh, 2023).

Neuromarketing stimuli followed by four variables:

Visual Appeal: Visual appeal plays a critical role in enhancing consumer attention and emotional engagement. Visual appeal encompasses the aesthetic and sensory elements of marketing content, such as product images, colors, layout, and design that attract attention and influence perception (Madiawati & Tambunan, 2025).

Emotional Advertisement: Emotional advertisements strategically manipulate consumers feelings and stimulate the emotional triggers that influence how we make decisions. An emotional ad might be designed to incite anger, sadness or joy all are targeted towards the brands end goal. Emotionally charges advertisements create a very powerful impact on peoples minds. Strong emotions may drive us to make an expensive purchase or donate money to a cause. It is essential to understand the role emotion plays in communication, to correctly understand advertising effectiveness (Kamra, 2017).

Brand Experience: The concept of 'brand experience' which is different from other brand constructs in literature such as brand involvement, brand attitudes, customer delight, brand attachment and brand personality. The experience dimensions in the context of a brand were established in contrast to the consumer experience framework. Brand experiences as defined are 'subjective, internal consumer responses, sensations, feelings, cognitions and behavioural responses evoked by brand-related stimuli that are part of a brand's design and identity, packaging, communications and environments (Beig & Nika, 2019).

Sensory Marketing: Marketing makes use of sensory features to stimulate one or more of the five senses to impact a customer's feelings, sentiments, and reactions [1]. Rather than relying too much on rational marketing, it focuses on appealing to more emotional, peripheral, or subconscious processing (Mohamad Kheireddine, 2025).

Consumer emotional engagement: Consumer emotional engagement refers to the degree to which consumers become emotionally involved with a brand, product, advertisement, or marketing experience and experience affective responses that influence their subsequent attitudes and behaviours. In the context of neuromarketing, emotional engagement is important because marketing stimuli do not influence consumers only through rational evaluation; they can also generate emotional reactions that affect attention, memory, preferences, and decision-making. Emotional engagement can therefore be viewed as a psychological mechanism

through which marketing stimuli are translated into favourable consumer responses and purchase-related behaviour (Hollebeek et al., 2024).

Consumer purchase behavior: consumer purchase behaviour represents the behavioural consequence of consumers' exposure to marketing stimuli. Visual, emotional, sensory, and experiential marketing cues can attract attention, generate emotional responses, influence preferences, and consequently contribute to purchase-related decisions. Recent research among Indian consumers also demonstrates the relevance of neuromarketing constructs such as attention, emotion, technology, and social factors in understanding consumer buying behaviour (Traymbak, 2024).

Against this background, the present study investigates how neuromarketing stimuli drive consumer purchase behaviour and the extent to which consumer emotional engagement mediates this relationship. The study develops a hierarchical model in which Neuromarketing Stimuli are represented through Visual Appeal, Emotional Advertisement, Brand Experience, and Sensory Marketing, while Consumer Emotional Engagement functions as the mediating construct and Consumer Purchase Behaviour represents the outcome. Using Structural Equation Modelling (SEM), the study evaluates the measurement and structural relationships among these constructs and examines both direct and indirect effects. The study consequently contributes to a better understanding of how sensory, visual, emotional, and experiential marketing stimuli can influence consumer decision-making through emotional engagement.

2 Literature review and Hypothesis development

• Neuromarketing Stimuli and Consumer Emotional Engagement

A study by (Traymbak, 2024) explored neuromarketing, a discipline merging consumer behavior research and neurology, to analyze Indian consumers' purchasing decisions through constructs such as attention, social influence, technology, and emotions. A sample of 191 individuals from various age groups was used, employing random sampling and a self-designed questionnaire to measure neuromarketing constructs and consumer buying behavior. Data analysis was performed using SPSS and AMOS. Findings indicated an adequate sample for factor analysis, with the Kaiser-Meyer-Olkin (KMO) value at 0.784. The constructs—Attention, Social, Technological, Emotion, and Consumer Buying Behavior—achieved Cronbach's alpha values above 0.7, indicative of good reliability. Confirmatory Factor

Analysis (CFA) showed an average variance explained value of 0.5 and composite reliability above 0.7, confirming excellent construct validity. The model fit indices supported the established measurement model. The study concluded that the validity and reliability of neuromarketing constructs are strong, suggesting their effectiveness for understanding consumer behavior patterns by marketers. This qualitative study was conducted by (Amer et al., 2025) that investigated how neuromarketing and emotional branding can enhance customer retention for Malaysian startups. Highlighting the challenges of limited resources and brand recognition, it posits that emotional connections are key to fostering loyalty. Grounded in Emotional Branding and Neuromarketing Theory, the research revealed that emotional stimuli such as storytelling, visual design, and personalized interactions significantly influence customer retention. Through semi-structured interviews with 20 participants, three primary emotional drivers emerged: authentic storytelling, sensory appeal, and personalized experiences. The findings underscored the relationship between psychological mechanisms and neuroscientific insights, providing actionable strategies for startups, including effective storytelling and sensory marketing. Additionally, the study stressed the importance of ethical considerations and cultural relevance in branding, and suggests future research directions involving mixed-method approaches and cross-cultural studies. Similarly, (Zeng et al., 2023) investigated how neuroscience, particularly through neuromarketing, enhances marketing management and consumer understanding in the tea brand “Guanding Teahouse.” Utilizing neuroscientific tools like Galvanic Skin Response (GSR) sensors, eye-tracking, and facial expression analysis, the research aims to analyze consumer purchase intentions and preferences based on responses to two advertisement videos. An experiment with 40 participants indicated that 76.2% maintained consistency in product choice across two surveys. The first advertisement generated 60 GSR peaks, while the second garnered 55 peaks, with both ads achieving a similar attention percentage of 76%. Despite ad 1 achieving a higher engagement time of 11.1% compared to ad 2’s 9.6%, greater numbers of respondents engaged with ad 2. Consequently, ad 2 demonstrated superior marketing effectiveness. This study filled a research gap by employing neuroscientific methods to analyze tea brand advertising and offers insights for marketers to refine advertisements and campaigns based on consumer emotional responses and behavior. Therefore, the following hypothesis is accepted,

H1: Neuromarketing Stimuli has a significant positive effect on Consumer Emotional Engagement.

- **Consumer Emotional Engagement and Consumer Purchase Behaviour**

(Uddin et al., 2026) utilized the Stimulus – Organism – Response (S–O–R) theory to investigate the impact of neuromarketing on purchasing decisions, emphasizing emotional responses as a critical intermediary. A quantitative cross-sectional research design was employed, collecting data from 425 consumers through a structured questionnaire. Structural equation modeling (SEM) analysis indicated that neuromarketing stimuli have a positive effect on consumers' emotional responses and purchasing decisions. The research highlights a significant relationship between emotional responses and the effect of neuromarketing stimuli on buying behavior, suggesting that positive emotional responses are key in influencing purchase decisions. This study enriches the neuromarketing literature by providing empirical evidence within the context of a developing economy and validating the S–O–R framework's effectiveness in consumer decision-making. The findings suggest essential implications for marketers, retailers, and brand managers, emphasizing the need for marketing campaigns that evoke emotional appeal through visual, auditory, and sensory elements to boost consumer purchasing behavior.

(Dwivedi & Sharma, 2024) explores the emerging field of neuromarketing, which combines neuroscience principles with marketing strategies to better understand consumer decision-making processes. It utilizes techniques like brain imaging, biometric measurements, and implicit association tests to uncover subconscious influences on consumer behavior. Key findings emphasize the significance of emotional engagement, memory recall, and decision fatigue in shaping purchasing decisions. The study illustrates how emotional connections can enhance brand loyalty and the critical role of memory in brand preference. It highlights the challenges presented by decision fatigue in today's complex marketplace, advocating for simplified choices to aid consumer decision-making. Ultimately, the research aims to deepen our understanding of how neuromarketing can enhance marketing strategies and foster meaningful connections between brands and consumers while promoting ethical considerations in the use of neuroscience within marketing practices. Therefore, the following hypothesis is accepted;

H2: Consumer Emotional Engagement has a significant positive effect on Consumer Purchase Behaviour.

- **Neuromarketing Stimuli and Consumer Purchase Behaviour**

Neuromarketing is a burgeoning field that merges behavioral psychology, economics, and consumer neuroscience, yet it remains significantly underutilized. The diverse technologies available in neuromarketing highlight the complexity of consumer behavior and purchasing

intentions, challenging the outdated notion of consumers as purely rational actors an idea often propagated by economists who relied on superficial adaptations of traditional economic models. For businesses to thrive in the global market, it is essential to have a profound understanding of consumer decision-making processes. (Devaru, 2024) emphasizes the importance of neuromarketing research methodologies in advancing neuroscience, demonstrating how these techniques enhance market research. A key challenge for neuromarketing service providers is maintaining ethical standards during research, as insights from examining the brain can significantly inform knowledge of consumer behavior. Established at the intersection of consumer psychology and neuroscience, neuromarketing showcases substantial potential. This article aims to clarify the interconnection between these disciplines, explaining the methods used in neuromarketing and their practical implications for comprehending consumer buying behavior. The study titled "A Study on Selected Neuromarketing Stimuli Affecting Consumers' Purchase Intention" examined how specific neuromarketing stimuli impact consumers' purchase intentions through multiple regression analysis. Utilizing a quantitative approach, data were gathered from 186 respondents via a structured questionnaire comprising 28 Likert scale statements across seven constructs: consumer attention, emotional response, brand recall, visual appeal of advertisement, trust in brand, perceived product value, and consumer purchase intention. The results demonstrated acceptable reliability across all constructs. The regression analysis revealed that the selected stimuli explained 44% of the variance in purchase intention, with the model being statistically significant. Notably, perceived product value, trust in brand, and emotional response were identified as the strongest contributors to purchase intention. The study emphasizes the importance of crafting advertisements that integrate visual appeal, emotional engagement, brand credibility, and value communication to enhance consumer willingness to purchase advertised products.

H3: Neuromarketing Stimuli has a significant positive effect on Consumer Purchase Behaviour.

- **Consumer Emotional Engagement as a mediation**

This study uses consumer emotional engagement variable as a mediating variable. This study's novelty is found in its exploration of Consumer Emotional Engagement as a mediating element linking Neuromarketing Stimuli to Consumer Purchase Behavior. While neuromarketing investigations generally concentrate on the direct impact of marketing stimuli on customer behavior, this study clarifies the process by which these stimuli are transformed into buying

actions through emotional involvement. By consolidating esthetic attractiveness, emotional promotion, brand interaction, and sensory marketing into one framework, the study delivers a more holistic understanding of the emotional processes that drive consumer buying behavior. Therefore, the following hypothesis is proposed:

H4: Consumer Emotional Engagement significantly mediates the relationship between Neuromarketing Stimuli and Consumer Purchase Behaviour.

2.1 Theoretical Framework

The theoretical framework of this study is grounded in the Stimulus–Organism–Response (S-O-R) model (Mehrabian & Russell, 1974) and is further supported by insights from neuromarketing and consumer behaviour literature.

According to the S-O-R framework:

Stimulus (S) refers to the external marketing cues that influence consumers. In this study, Neuromarketing Stimuli—comprising Visual Appeal, Emotional Advertisement, Brand Experience, and Sensory Marketing—represent the stimulus.

Organism (O) refers to the internal emotional and cognitive processes of the consumer. Here, Consumer Emotional Engagement (characterized by pleasure, arousal, attention, and memory) serves as the organismic state.

Response (R) refers to the behavioural outcomes of the consumer. Consumer Purchase Behaviour (including purchase intention, product choice, and brand preference) represents the response.

The framework posits that Neuromarketing Stimuli (Stimulus) evoke Consumer Emotional Engagement (Organism), which subsequently leads to Consumer Purchase Behaviour (Response). In addition, Neuromarketing Stimuli are also expected to exert a direct influence on Purchase Behaviour. Thus, Consumer Emotional Engagement acts as a partial mediator in the relationship between Neuromarketing Stimuli and Consumer Purchase Behaviour.

This integrated framework provides a comprehensive understanding of how neuromarketing cues shape consumers' emotional responses and, ultimately, their purchasing decisions.

2.2 Research gap

Although previous research has confirmed that neuromarketing stimuli can impact consumers' emotional reactions and their buying decisions, the literature continues to be fragmented in its explanation of how emotional involvement facilitates the conversion of these stimuli into consumer purchasing behavior. Prior investigations have mainly analyzed the direct correlations between neuromarketing stimuli, emotional responses, or purchase intentions, neglecting the intermediary function of consumer emotional involvement within an integrated model. Furthermore, earlier studies have scrutinized particular stimuli or specific situations, but fewer investigations have synthesized visual appeal, emotional advertisements, brand experience, and sensory marketing as elements of a unified neuromarketing stimulus architecture. As a result, the present investigation fills this gap by assessing the mediating role of Consumer Emotional Engagement in the association between Neuromarketing Stimuli and Consumer Purchase Behavior, thereby providing a more nuanced interpretation of the emotional dynamics that underpin consumer purchasing actions and includes S-O-R theory.

3 Research methodology

3.1 Research design

This study utilizes a quantitative, cross-sectional research design to explore the connection among neuromarketing stimuli, consumer emotional engagement, and consumer purchase behavior. This study uses empirical evidence collected from 384 respondents using a structured research design to explore the conceptual connections among the variables of this study. Neuromarketing Stimuli has been conceptualized as a second order multidimensional construct consisting of Visual Appeal, Emotional Advertisement, Brand Experience, and Sensory Marketing, while Consumer Emotional Engagement and Consumer Purchase Behavior have been conceptualized as first order constructs. The gathered data are examined via Structural Equation Modeling (SEM) utilizing AMOS, which encompasses first-order Confirmatory Factor Analysis (CFA), second-order CFA, reliability assessment, evaluation of convergent and discriminant validity, model-fit analysis, structural model examination, hypothesis testing, and mediation analysis. The study meticulously investigates if neuromarketing stimuli affect consumer emotional involvement and purchasing behavior, as well as whether emotional involvement serves as a mediator in the connection between neuromarketing stimuli and purchasing behavior. The mediation relationship is evaluated through a bootstrapping method,

offering an empirical foundation for analyzing the suggested direct and indirect associations among the constructs.

3.2 Conceptual framework

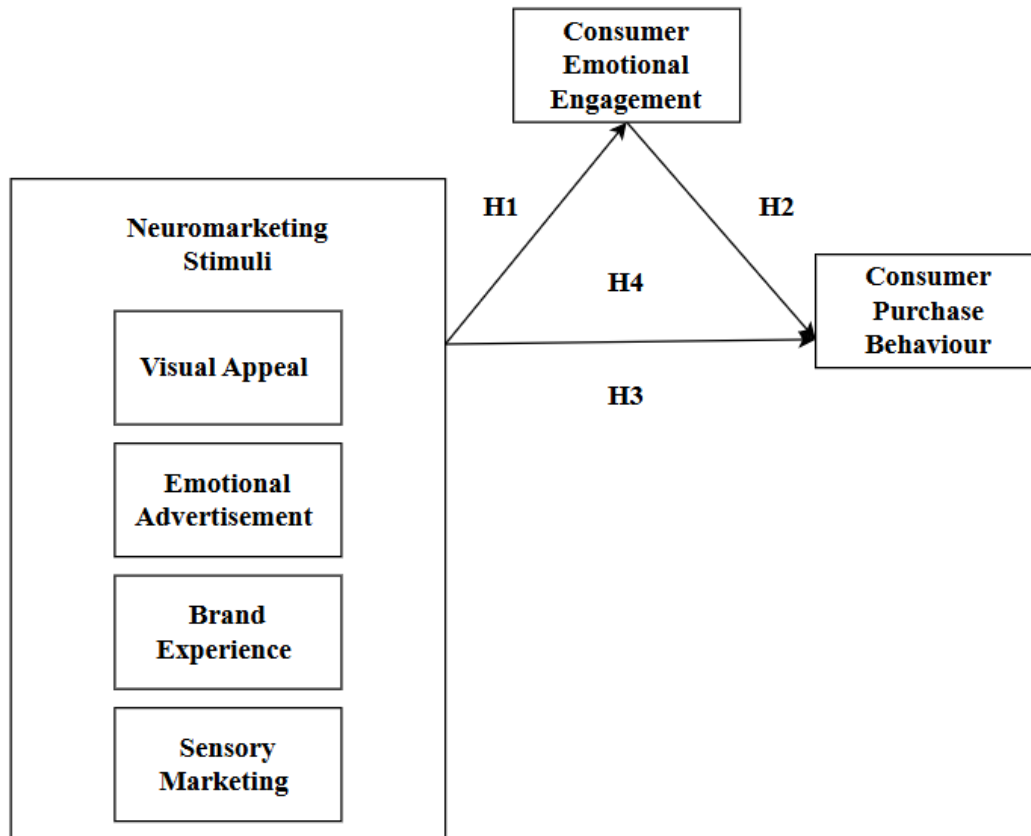


Figure 1 Conceptual framework

3.3 Sample selection and Data collection

The research utilizes a quantitative survey methodology and chooses 384 customers as the sample to investigate the impact of neuromarketing stimuli on purchasing behavior via emotional involvement. The participants are chosen among consumers familiar with marketing communications and brand-related purchase choices, guaranteeing their ability to assess visual attractiveness, emotional advertising, brand interactions, and sensory marketing cues. Primary data is gathered by a systematic questionnaire featuring items that assess Neuromarketing Stimuli, Consumer Emotional Engagement, and Consumer Purchase Behavior. The survey is distributed to the chosen participants, and the finalized answers are evaluated for thoroughness prior to examination. The dataset of 384 valid replies is examined by Structural Equation Modeling (SEM) in AMOS, encompassing first-order and second-order Confirmatory Factor Analysis (CFA), reliability and validity evaluation, structural model assessment, hypothesis

testing, and mediation analysis. The sample size and the ensuing analytical method align with the empirical analysis of the study, which is based on 384 participants.

3.4 Measures

A systematic research questionnaire is used to gather data. All research questions in this survey use a 5-point Likert scale, which consist of "Strongly Disagree" to "Strongly Agree." toward allow Participants to definite their opinions. There are a lot of closed-ended research questions that make up the research questionnaire. Every one of the research enquiries has been crafted to efficiently gather data pertaining to the study variables. This study uses the following variables: Consumer emotional engagement has 6 items; Consumer purchase behaviour has 6 items and Neuromarketing stimuli followed by 4 sub variables that has 3 items each.

4 Results

This chapter presents the findings of the study in terms of empirical evidence gathered from 384 respondents to explore the impact of neuromarketing stimuli on consumers' buying behavior via the mediating effect of emotional engagement. The study seeks to prove the proposed conceptual framework through an examination of relationships between the variables such as Neuromarketing Stimuli, Consumer Emotional Engagement, and Consumer Purchase Behavior, by means of Structural Equation Modelling (SEM) using AMOS. The collected data were analyzed using a systematic procedure of SEM involving measurement model evaluation, first order Confirmatory Factor Analysis (CFA), second order CFA, reliability and validity evaluation, structural model evaluation, hypothesis testing and mediation analysis. This analysis was carried out to investigate how aspects such as visual appeal, emotional advertisement, brand experience and sensory marketing affect neuromarketing stimuli, and how these stimuli impact emotions and buying behavior of consumers. These results offer insight on the role of emotions in consumer decision making by investigating whether consumer emotional engagement serves as a mediator in the impact of neuromarketing on purchase behavior. The following chapters present the demographic characteristics of respondents, measurement model validation, structural relationships and hypotheses' outcomes.

Table 1 Measurement Model Results (Factor Loadings, Reliability & Convergent Validity)

Construct / Dimension	Items	Loadings	Cronbach's	CR	AVE
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			α		
Neuromarketing Stimuli (2nd-order)			0.902	0.852	0.590
Visual Appeal	VA1– VA3	0.76– 0.85	0.858	0.859	0.671
Emotional Advertisement	EA1– VA3	0.79– 0.81	0.847	0.847	0.649
Brand Experience	BE1– VA3	0.81– 0.82	0.858	0.858	0.668
Sensory Marketing	SM1– VA3	0.76– 0.81	0.843	0.843	0.642
Consumer Emotional Engagement	EE1–EE6	0.80– 0.85	0.941	0.941	0.728
Consumer Purchase Behaviour	PB1–PB6	0.80– 0.85	0.941	0.941	0.727

The findings of the measurement model presented in the table below show that all constructs and dimensions have satisfactory reliability and convergent validity. For the second-order construct of Neuromarketing Stimuli, the overall Cronbach's alpha is 0.902, CR is 0.852, and AVE is 0.590, which is sufficient enough in terms of internal consistency and convergent validity. At the first-order level, all the four dimensions of Neuromarketing Stimuli also have high psychometric properties. Visual Appeal has factor loadings between 0.76 and 0.85, Cronbach's alpha = 0.858, CR = 0.859, and AVE = 0.671. Emotional Advertisement has factor loadings between 0.79 and 0.81, Cronbach's alpha = 0.847, CR = 0.847, and AVE = 0.649. The factor loadings of Brand Experience range between 0.81 and 0.82, Cronbach's alpha = 0.858, CR = 0.858, and AVE = 0.668. Lastly, the factor loadings of Sensory Marketing range between 0.76 and 0.81, Cronbach's alpha = 0.843, CR = 0.843, and AVE = 0.642. All the figures above are above the required standards of factor loadings of 0.70, Cronbach's alpha and CR of 0.70, and AVE of 0.50. Similar to the Neuromarketing Stimuli dimensions, the first-order constructs of Consumer Emotional Engagement and Consumer Purchase Behaviour also have high reliability and convergent validity. Consumer Emotional Engagement (EE1-EE6) has factor loadings of 0.80-0.85, Cronbach's alpha = 0.941, CR = 0.941, and AVE = 0.728. Consumer Purchase Behaviour (PB1-PB6) has factor loadings between 0.80 and 0.85, Cronbach's alpha

= 0.941, CR = 0.941, and AVE = 0.727. Therefore, these results confirm that the measurement items reliably and validly represent their respective constructs, providing a robust foundation for subsequent structural model analysis.

Table 2 Discriminant Validity (Fornell-Larcker Criterion)

	Consumer Emotional Engagement	Neuromarketing Stimuli	Consumer Purchase Behaviour
Consumer Emotional Engagement	0.853		
Neuromarketing Stimuli	0.491	0.768	
Consumer Purchase Behaviour	0.536	0.434	0.853

Discriminant validity is measured through the use of Fornell-Larcker criterion. As can be seen from the table below, the square root of the Average Variance Extracted ($\sqrt{\text{AVE}}$) of each construct (values on the diagonal) is larger than the correlation with other constructs (values off the diagonal). In particular, the $\sqrt{\text{AVE}}$ of Consumer Emotional Engagement is 0.853, while the correlation between it and Neuromarketing Stimuli is 0.491 and between it and Consumer Purchase Behavior is 0.536. The $\sqrt{\text{AVE}}$ of Neuromarketing Stimuli is 0.768, which is larger than its correlation with Consumer Emotional Engagement (0.491) and Consumer Purchase Behavior (0.434). Lastly, the $\sqrt{\text{AVE}}$ of Consumer Purchase Behavior is 0.853, which is larger than its correlation with the other two constructs. This shows that the amount of variance shared between a construct and its indicators is more than the amount of variance shared between a construct and other constructs in the model.

Table 3 Model fit Summary

Variable	Value
CMIN/DF	0.96
GFI	0.953
NFI	0.965
RFI	0.961

RMR	0.045
RMSEA	0.03

The goodness of fit indices suggest that the postulated measurement model provides an excellent fit for the observed data. The ratio of CMIN/DF is 0.96 and this is significantly lower than the threshold values of 3.0 (and even 2.0). This is an indication of an excellent absolute fit of the model. The goodness of fit index (GFI = 0.953), normed fit index (NFI = 0.965) and relative fit index (RFI = 0.961) are all greater than the threshold value of 0.90 and they are even close to the stringent value of 0.95. This is a reflection of excellent incremental fit of the model. Moreover, the root mean square residual (RMR = 0.045) is less than the threshold value of 0.08 (even the preferable value of 0.05). The root mean square error of approximation (RMSEA = 0.03) is significantly low compared to the threshold value of 0.06, thereby providing a good approximate fit. Collectively, these indices confirm that the measurement and structural model adequately represents the observed data and is suitable for further hypothesis testing.

4.1 Hypothesis Implementation

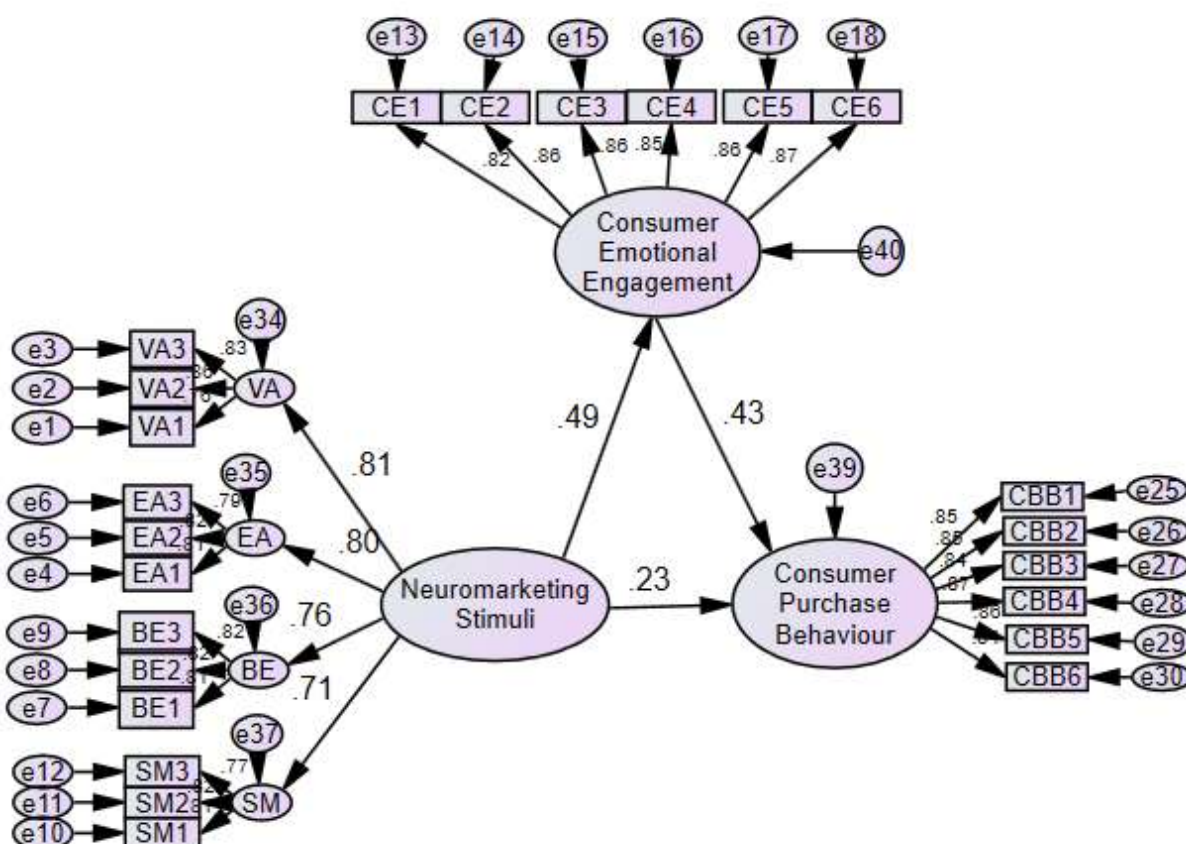


Figure 2 SEM Model

Table 4 Second-Order Factor Loadings of Neuromarketing Stimuli

Second-Order Construct	First-Order Dimension	Standardized Loading	Unstandardized Estimate	S.E.	C.R.	P
Neuromarketing Stimuli	Visual Appeal (VA)	0.81	1.000	—	—	—
	Emotional Advertisement (EA)	0.8	1.049	0.102	10.332	p<0.01
	Brand Experience (BE)	0.76	0.978	0.097	10.099	p<0.01

	Sensory Marketing (SM)	0.71	0.905	0.094	9.617	$p < 0.01$
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Note: The loading of Visual Appeal was fixed to 1.000 for model identification. All second-order loadings are significant at $p < 0.001$.

The second-order CFA was performed to ascertain if the first-order dimensions sufficiently captured the higher-order construct of Neuromarketing Stimuli. As can be seen from the results, all four dimensions have significantly contributed to the construction of the second-order construct. The standardized loadings for factors have shown that Visual Appeal (VA) has the highest contribution with a loading of 0.81, and Emotional Advertisement (EA) is the second with a loading of 0.80. It means that visual stimuli and emotional advertisement are the dimensions which most significantly impact the perceptions of neuromarketing-based marketing strategies. Additionally, Brand Experience (BE) made a significant positive contribution with a standardized loading of 0.76. This means that experiences of consumers with the brand significantly affect the performance of neuromarketing stimuli. In addition, Sensory Marketing (SM) made a significant contribution with a loading of 0.71, confirming that sensory elements such as visual, auditory, and experiential cues also influence consumer responses toward marketing stimuli. All the C.R. ratios of the paths were found to be greater than 1.96 and all the relationships were statistically significant at $p < 0.001$ level. The significant results provide evidence of the validity of the first order constructs as indicators of the higher order construct. Out of the four dimensions of Neuromarketing Stimuli, Visual Appeal and Emotional Advertisement were found to be the dominating factors of Neuromarketing Stimuli. This shows that consumers are more attracted towards visually pleasing stimuli and emotionally appealing advertisement contents. Though Brand Experience and Sensory Marketing had relatively lower loadings, the significance of the loadings showed their supportive nature in making the neuromarketing process more effective. In summary, the second order CFA analysis provides evidence of Neuromarketing Stimuli as multidimensional construct having the dimensions of Visual Appeal, Emotional Advertisement, Brand Experience and Sensory Marketing.

Table 5 Structural Model Results and Hypothesis Testing

Hypothesis	Path	Standardized β	Unstandardized Estimate	S.E.	C.R.	P	Result
H1	Neuromarketing Stimuli → Consumer Emotional Engagement	0.49	0.381	0.049	7.739	$p < 0.01$	Supported
H2	Consumer Emotional Engagement → Consumer Purchase Behaviour	0.43	0.452	0.062	7.3	$p < 0.01$	Supported
H3	Neuromarketing Stimuli → Consumer Purchase Behaviour	0.23	0.308	0.084	3.68	$p < 0.01$	Supported

The structural model was tested through SEM analysis using the AMOS software. It sought to determine the proposed relationship between Neuromarketing Stimuli, Consumer Emotional Engagement and Consumer Purchase Behaviour. As evidenced from the results, all proposed hypotheses were statistically significant and therefore confirmed. The first hypothesis (H1) determined the relationship between Neuromarketing Stimuli and Consumer Emotional Engagement. As can be seen from the results below, there is a significant positive relationship between these variables ($\beta = 0.49$, C.R. = 7.739, $p < 0.01$). This implies that the use of neuromarketing stimuli including visual stimuli, emotional advertisement, brand experience and sensory marketing leads to increased emotional engagement of consumers with brands. In other words, the use of marketing stimuli based on consumers' perceptions and emotions successfully contributes to influencing consumers' emotions towards brands.

The second hypothesis (H2) was tested for its role in the impact of Consumer Emotional Engagement on Consumer Purchase Behavior. Results indicate a significant positive impact ($\beta = 0.43$, C.R. = 7.300, $p < 0.01$) that suggests that consumer with high levels of emotional engagement are more inclined towards exhibiting positive purchase behaviors. It can be concluded from these findings that the emotions such as pleasure, arousal, attention and memory play an important role in influencing purchase intention, choice and brand preferences. Therefore, H2 is supported. The third hypothesis (H3) was tested for its significance in the relation of neuromarketing stimuli and consumer purchase behavior. Results indicate that there is a significant direct positive impact of neuromarketing stimuli on consumer purchase behavior ($\beta = 0.23$, C.R. = 3.680, $p < 0.01$). Even though the direct impact is relatively smaller than the indirect impact through emotional engagement but still it indicates the independent contribution of neuromarketing stimuli to decision making processes, thus, H3 is supported. Overall, from the structural model outcomes, it is clear that Neuromarketing Stimuli have significant impacts on Consumer Purchase Behaviour either directly or indirectly via Consumer Emotional Engagement. The greater impact of Neuromarketing Stimuli on Emotional Engagement ($\beta = 0.49$) relative to the direct effect on Purchase Behaviour ($\beta = 0.23$) implies that emotions serve as vital factors when turning marketing stimuli into consumer behavior. These results prove the viability of the theoretical approach and show that emotions of consumers represent a vital pathway through which neuromarketing techniques impact consumer behavior. Therefore, it can be said that the application of the SEM model proves the viability of the assumption that emotional engagement represents a behavioral factor that connects neuromarketing stimuli with purchase behavior of consumers.

Table 6 Mediation Analysis Results (H4)

Relationship	Direct Effect (β)	Indirect Effect (β)	Total Effect (β)	Bootstrap 95% CI	Mediation Type	Result
Neuromarketing Stimuli → Purchase Behaviour via	0.23 ($p < 0.01$)	0.21 ($p < 0.0$)	0.44	Significant	Partial Mediation	Supported

Emotional Engagement						
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The impact of Consumer Emotional Engagement in the link between Neuromarketing Stimuli and Consumer Purchase Behaviour was analyzed using the mediation analysis with the help of bootstrapping method. The findings reveal that Consumer Emotional Engagement significantly mediates the effect of Neuromarketing Stimuli on Consumer Purchase Behaviour.

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The direct impact of Neuromarketing Stimuli on Consumer Purchase Behaviour is still significant even when the mediating variable is included ($\beta = 0.23$, $p < 0.01$), which suggests that the use of neuromarketing stimuli affects consumers' purchase behavior directly. In addition, the impact through Consumer Emotional Engagement was also significant ($\beta = 0.21$), which means that emotional engagement is an important mediator in the impact of neuromarketing stimuli on consumer behavior.

The total impact of Neuromarketing Stimuli on Consumer Purchase Behaviour is $\beta = 0.44$, and this is the sum of direct and mediated effects of neuromarketing stimuli on consumers' purchasing behavior. The bootstrap confidence interval confirmed the significance of the indirect effect, as the confidence interval did not include zero, indicating the presence of a statistically significant mediation effect. As both the direct effect (Neuromarketing Stimuli → Consumer Purchase Behaviour) and the indirect effect (Neuromarketing Stimuli → Consumer Emotional Engagement → Consumer Purchase Behaviour) were significant, the mediation effect was classified as partial mediation.

Thus, H4 is confirmed since Consumer Emotional Engagement partially mediates the effect of Neuromarketing Stimuli on Consumer Purchase Behaviour. It means that consumers' purchasing decisions are affected through neuromarketing approaches in two ways: through direct perception and through the creation of emotional engagement. The result emphasizes the importance of emotional processes in transformation of marketing stimuli into positive purchase behaviour of consumers.

In general, the results of mediation analysis make the proposed SEM model even more convincing since emotional engagement is not only a consequence of neuromarketing stimuli but also an important behavioral mechanism for explaining purchasing decisions of consumers.

4.2 Discussion

The results of the current research indicate that Neuromarketing Stimuli have a substantial and favorable effect on Consumer Emotional Engagement ($\beta = 0.49$, C.R. = 7.739, $p < 0.01$), hence validating H1. This outcome suggests that esthetic attractiveness, emotive advertising, brand engagement, and sensory marketing might enhance consumers' emotional reactions to marketing stimuli. The discovery aligns with (Traymbak, 2024), who investigated neuromarketing elements among 191 Indian consumers, revealing that emotion, attention, technology, and social influences are significant factors linked to consumer purchasing behavior; their emotional construct attained AVE = 0.501 and CR = 0.744, whereas the buying-behavior construct reached AVE = 0.541 and CR = 0.821. In a similar vein, (Uddin et al., 2026), utilized data from 425 customers using SEM to demonstrate a significant beneficial influence of neuromarketing stimuli on emotional reactions and purchasing choices, suggesting that emotional responses serve as a crucial link between marketing stimuli and consumer behavior. These results align with the current study's second-order Confirmatory Factor Analysis, indicating that Visual Appeal ($\beta = 0.81$) and Emotional Advertisement ($\beta = 0.80$) are the most significant dimensions of Neuromarketing Stimuli, succeeded by Brand Experience ($\beta = 0.76$) and Sensory Marketing ($\beta = 0.71$). Consequently, the current findings bolster prior neuromarketing data indicating that emotionally and perceptually captivating marketing stimuli can enhance customers' emotional engagement.

This investigation further confirms that Consumer Emotional Engagement markedly affects Consumer Purchase Behavior ($\beta = 0.43$, C.R. = 7.300, $p < 0.01$), thereby supporting H2, whereas Neuromarketing Stimuli also demonstrate a significant direct impact on Consumer Purchase Behavior ($\beta = 0.23$, C.R. = 3.680, $p < 0.01$), affirming H3. This conclusion is largely in agreement with (Uddin et al., 2026), whose examination of 425 customers revealed positive associations between neuromarketing stimuli, emotional responses, and buying decisions, with emotional response functioning as a crucial intermediary mechanism. Supported by the 2026 research on chosen neuromarketing stimuli and purchase intention, which included 186 respondents, it was determined that neuromarketing stimuli collectively elucidated 44% of the variance in purchase intention, with emotional response, perceived product value, and trust

recognized as predominant influences (Ankita & Punjabi, 2026). This study advances these results by directly investigating the mediating influence of Consumer Emotional Engagement. The mediation analysis indicates a direct effect of $\beta = 0.23$, an indirect effect through emotional involvement of $\beta = 0.21$, and a total effect of $\beta = 0.44$, with the bootstrap confidence interval excluding zero, so affirming partial mediation. This holds particular significance since recent neuromarketing investigations have increasingly identified emotional responses as a route to buying behavior; however, the present study synthesizes the four-dimensional Neuromarketing Stimuli construct and Consumer Emotional Engagement into one SEM framework, thereby clarifying how neuromarketing stimuli translate into purchasing behavior through emotional engagement.

5 Conclusion

The current study investigated the effect of neuromarketing based stimuli on consumer purchase behavior by mediation of consumer emotional engagement through the application of structural equation modeling. Three major constructs of the hierarchical model used in this study are neuromarketing stimuli, consumer emotional engagement, and consumer purchase behavior. The results of the study showed that emotional and psychological reactions created through marketing stimuli play an important role in shaping the consumer decision process.

As a result of the second order CFA analysis, neuromarketing stimuli was identified as a multivariate construct with the dimensions of visual appeal, emotional advertisement, brand experience and sensory marketing. In this context, visual appeal and emotional advertisement were shown as the most influential dimensions since consumers were strongly affected by visually appealing marketing stimuli and emotionally engaging advertisement. The same goes for consumer emotional engagement, which was measured with the dimensions of pleasure, arousal, attention and memory. In this study, the impact of Neuromarketing Stimuli on Consumer Purchase Behaviour was investigated using Consumer Emotional Engagement as a mediator. It has been found that there is strong empirical evidence in support of the hypothesized relationships. Neuromarketing Stimuli positively contribute towards Consumer Emotional Engagement which in turn positively affects Consumer Purchase Behaviour. Moreover, there exists a direct positive impact of Neuromarketing Stimuli on Purchase Behaviour of the consumers. Therefore, partial mediation has been found to exist in this case. The study reveals that the sensory, visual, emotional and experiential aspects of neuromarketing not only attract the attention of consumers and evoke emotions within them

but also turn their reactions into favorable behavior including purchase intention, product selection and brand preference. With its contribution to validation of mixed order structural model, the study has added to the existing literature on neuromarketing and consumer behavior. In practice, marketers and brand managers should devise neuromarketing strategies involving multi-sensory experience in order to increase the emotional connection between consumers and brands. In the future research, the model can be extended by adding moderators such as brand familiarity, consumer involvement or culture among others, and using neuroscientific methods for measuring consumer emotional engagement. These results will help advance the field of marketing psychology and neuromarketing in the sense that the results have shown how a SEM model can help us understand how marketing stimuli lead to emotional response and finally to consumer behavior of purchasing. This is in contrast with the normal marketing approach which focuses more on functional aspects of products.

In terms of management implications, the results indicate that organizations should try to employ effective marketing strategies based on emotional appeal. The organization needs to employ visual communication, advertisements through storytelling, brand experience and sensory aspects in their marketing activities. While this research gives useful information, future researchers might be able to add on to the current theory by using objective neuromarketing measures like eye tracking, EEG analysis, facial expressions, and biometrics in addition to surveys. Differences between different demographics, products, cultures, and platforms in digital environments could also be considered in future research for neuromarketing strategies.

In conclusion, the research shows that neuromarketing stimulation is a significant factor influencing consumer purchase behavior, with consumer emotional involvement being a key mediator. The developed structural equation modeling framework proves that emotional experience is a vital factor linking the marketing stimulus with the consumer decision process.

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