The Neural Palette: Exploring Emotional Triggers in Packaged Food Buying Decisions Through AI and Neuromarketing

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Abstract: This paper examines how Artificial Intelligence (AI) and neuromarketing tools contribute to understanding consumer purchasing decisions in the packaged food industry. Traditional market research often fails to capture the subconscious influences that drive consumer behavior, making AI and neuromarketing essential for deeper insights. Understanding buying behavior in this sector is crucial due to its economic impact.
Using a descriptive research design, the study analyzes factors influencing purchasing decisions when AI and neuromarketing tools are applied. Both primary and secondary data are used, with the primary data gathered through a questionnaire targeting individuals aged 18 to 55 in Bhopal, Madhya Pradesh. A random sampling method ensures diverse representation, and data is analyzed using both statistical and thematic approaches. Ethical considerations like informed consent and confidentiality are maintained. The findings suggest that AI and neuromarketing play a significant role in emotionally influencing consumers to buy packaged foods, helping businesses not only predict what consumers want but also understand their motivations. A positive correlation between AI in neuromarketing and emotional drivers supports the industry's growth and economic contribution.
As the packaged food sector continues to expand, especially among younger consumers, understanding the effects of AI and neuromarketing can help marketers, advertisers, and the ready-to-eat industry better identify the factors driving consumer behavior.

Keywords: Artificial Intelligence (AI), Neuromarketing, Consumer Buying Behavior, Emotional Drivers, Packaged Food Industry.

1. Introduction

In today's highly competitive marketing scenario, understanding consumer behaviour has become the most important aspect. Consumer behaviour is vial and considered as an asset especially in the food packed industry. Traditional methods of marketing are more and more supplemented by advanced technological tools like Artificial Intelligence(AI) and neuromarketing methods like EEG (electroencephalogram), Eye-tracking (gaze and pupillometry), Biometrics, Facial coding etc to decode the complex decision making processes of consumes. In a subconscious mind, the consumer's purchasing decisions are mostly influenced by the colour, design and various other emotional and psychological drivers. Neuromarketing strives in the brain's response to stimuli and allows marketers to measure emotional activity or reaction, whereas AI deepens this understanding via forecasting , machine learning and modelling of data. This emerging field of study highlights that consumers' perception of product quality, taste expectations and brand loyalty are influenced deeply by the visual cues like colour palettes, package shapes etc.

The Indian Packaged Food Market, which stood at approximately USD 76.28 billion in 2023, is set to grow at a compound annual growth rate (CAGR) of 6.2% over the coming period and is estimated to reach USD 116 billion by 2030. The growth is led by several major factors.

- Changing Consumer Preferences: It is one of the main drivers in the increase of demand for convenient meal solutions because an increasing number of consumers opt for ready-to-eat or pre-packaged food products.

S. Gupta et al. (eds.), *Proceedings of the 5th International Conference on the Role of Innovation, Entrepreneurship and Management for Sustainable Development (ICRIEMSD 2024)*,
Advances in Economics, Business and Management Research 310,
https://doi.org/10.2991/978-94-6463-612-3_31

- Advanced food preservation methods: The improvement of the shelf life and the safety for most packaged food products supports the growth of the market through the adoption of advanced food preservation techniques.
- Positioning of India: India happens to be the world's second-largest food-producing country; so it can very well be a global leader in food. The food processing industry currently ranks sixth globally and has concrete opportunities in production, consumption, and exports.
- Urbanization and Lifestyle Changes: The ever-increasing process of urbanization, also coupled with the increasing income, and the mushrooming number of working women, have created a huge market demand for pre-packaged foods. This shift towards 'convenience' is led by the urban middle class.
- Demographic Changes and Speciality Foods: The rising consumption demand for specialty and value-added processed foods parallels the demographic transition of India; this reflects the way Indians increasingly are seeking healthier, more premium food choices.
- Snack Food Market: It is a fast-moving high-profile market that has enormous untapped potential, especially in urban markets. The propensity for packaged snacks, along with growing consumer awareness and lifestyle transitions, has put the snack market in position for great growth.

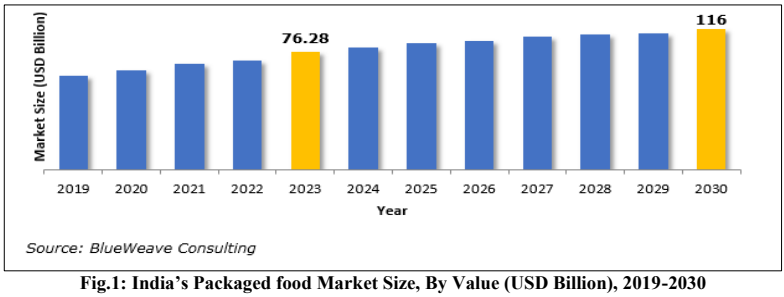

Fig.1: India's Packaged food Market Size, By Value (USD Billion), 2019-2030

By understanding the nuances of how AI and neuromarketing tools affect consumer purchasing decisions, a link can help identify factors that influence consumers buying and spending(purchasing) decisions in the packed food industry that will help the marketers, the ad makers and the ready to eat industry. The study also aims to offer valuable insights for both industry practice and academic research. This paper explores how AI and neuromarketing together can gather to unleash the emotional drivers that persuade the consumer choices in the packed food industry.

1.1 AI Technology in Marketing:

- *Deep(Profound) Hunting:* AI simplifies customers' ability to find what they are hunting for in the appropriate search in Google and Bing, and marketers study the patterns of what is being searched, thereby concentrating on certain areas.

- *Genius Ads:* AI produces ads unique to specific customers' search and social profiles, which companies like Amazon, Starbucks, and Nike utilize for making their ads more effective.

- *Filtered Content:* AI screens customer search results to create content that is tailored and relevant to a potential customer.

- *AI Bots:* The more effective use of AI-powered bots boosts customer retention with regular opportunities for customer support 24/7 and live, human-like conversations that save marketers some time and the actual client some effort.
- *AI in the food industry:* AI is changing the food industry, and efficiency and sustainability are at its forefront. In agriculture, precision farming by AI makes accurate use of GPS and IoT sensors to monitor crops, optimize water use, predict yields, and hence increase productivity and reduce waste. In the supply chain management, AI predicts demand and adjusts the supply, thus minimizing spoilage. Robotics and automation stream-line food processing and packaging with reduced labor costs and high safety levels.

1.2 Research Questions

RQ1- How do different demographic factors respond emotionally through AI and neuromarketing in consumer buying behaviour?

RQ2- Do AI and marketing tools trigger emotions that lead to compulsive (impulse) buying among consumers?

RQ3- What neural responses are activated when consumers are exposed to various elements of food packaging (colour, texture, shape)

1.3 Objectives of the Study

1.To interpret how AI-driven neuromarketing influences consumer purchase behaviour.

2.To Analyze the emotional responses of consumers from different demographics (age, gender, incomes) through AI and neuromarketing techniques in understanding how demographics are influencing buying behaviour.

3.To identify the neural responses that are triggered by different elements of food packaging, such as colour and texture, using neuromarketing and AI analysis, and assess how different elements of food packaging make consumers decide.

1.4 **Significance:**

Understanding the emotional triggers in packaging is a competitive play in the presently overcrowded market. This study helps amalgamate AI technology, neuromarketing, and studies related to consumer behaviour, resulting in new avenues of research and applicability in practice for the food industry. In the Consumer Packaged Goods industry, neuromarketing and AI align in the following to influence consumer behaviour and add a sale:

- *Product design and packaging:* According to techniques in neuromarketing, such as eye-tracking and EEG, the performance of packaging at the consumption level is analysed, and AI optimizes the design elements for emotional response from consumers, which therefore results in attractive packaging.
- *Personalized Marketing:* AI analytics separates audiences based on their behaviour and preferences, taking neuromarketing insights to enhance customized marketing messages and product recommendations to ensure a customized shopping experience.

- *Dynamic Pricing and Promotions:* AI predicts the potential demand of the consumer and varies the price in real-time through neuromarketing research showing the effects of price on perceived value and purchasing decision.
- *Improving In-Store Experience:* AI solutions provide facial recognition and sentiment analysis, where it analyses the emotions that customers carry, with neuromarketing research helping in making the usage of environmental stimuli which helps in shopping experience.
- *Product Innovation and Development:* By gathering insights from neuromarketing and AI predictive abilities, creating market gaps by giving new products that will solve the needs of consumers toward actual successful product launch.

2. Review of Literature

The practical application of AI and neuromarketing tools together has gained much validation in the packaged food industry. They help in understanding emotional and psychological factors that trigger consumers in purchasing decisions. This review explores the existing literature available on how AI and neuromarketing tools provide information about the emotional factors influencing consumer decisions.

2.1. Neuromarketing and Consumer Decision-Making

The study of learning consumers' brains with response to marketing stimuli is neuromarketing, it focuses on recognizing how the subconscious affects judgment of consumers (Morin, 2011)[1].

Studies on food packaging have demonstrated that visual factors including color, form, and typography provoke feelings in consumers that influence their opinions of flavor and quality (Schifferstein et al., 2013)[2]. For instance, a study conducted in 2015 by Velasco et al.[3] found that product choice and taste expectations might be influenced by container hue. In particular, feelings of freshness and healthiness are created by cooler shades like blue, whereas warm hues like red and yellow are linked to feelings of sweetness and energy. Reimann et al. (2010) [4] also looked into how packaging aesthetics activated pleasure-related brain regions using functional magnetic resonance imaging (fMRI).

2.2 AI and Predictive Analytics in Consumer Behaviour

According to Davenport & Harris, 2017, [5]AI has become an important tool in analysing consumer choices and anticipating buying behaviour. Machine learning frameworks procedures large amounts of data to identify or predict styles in consumer preferences, segment audiences and maximise marketing strategies. Using AI methods that include NLP and image recognition, consumer feedback and social media behaviour regarding food products have been scrutinized to help brands in their businesses gain real-time insights into consumer sentiment (Bhatnagar et al., 2020) [6].

Recently, AI tools have also been employed in package design to evaluate the feasibility of different design elements before a product enters the market. Jiao et al. (2021) [7]. demonstrated the use of AI in simulating consumer response to packaging designs. The researchers simulated consumer responses to particular types of packages, including emotional reactions such as excitement, trust, and novelty. The ability of AI to analyse massive data sets can help in predicting those designs that are likely to attract the demographic populations; then, brands can focus on developing packaging that will specifically appeal to those certain populations.

Integrating AI and Neuromarketing for Packaged Food Branding

Recent studies identify the importance of incorporating neuromarketing methods into AI to better understand consumer behaviour in the packaged food industry. According to Plassmann et al. (2015)[8], neuroimaging tools can be integrated with AI algorithms in order to analyse the response of consumers at diverse levels- individual and aggregate. Such integration can make their designs for packaging more personalized as it would align with the leading emotional and cognitive triggers that determine the moment of choice when goods or services are being purchased.

For instance, by using AI in processing data such as eye-tracking and galvanic skin responses from neuromarketing experiments, it can be taken as an example. Chandon et al.(2020) in his research demonstrated the application of AI in the prediction of which designs of packaging would stimulate the emotion of the consumer. This sort of method, therefore, outlined a new boundary in precision terms with regard to how such visual stimuli delivered by food packaging affect the way consumers buy[9].

Emotional Triggers and Sensory Marketing

However, it is well established that sensory marketing, especially the stimuli visual and tactual, affects consumer behaviour: the case of food packaging cannot be ignored. In this sphere, it is critical that sensory attributes determine the consumer's expectations and emotional response to the product. For example, the type of materials, textures, and shapes of packaging can affect certain associations and emotions, such as premium quality or healthiness, (Spence & Velasco, 2018)[10]. With AI and neuromarketing tools, most probably, a brand would know the parts of sensory elements reaching out to their targeted audience and thus optimize the design of the packaging to achieve greater emotional involvement.

A very interesting contribution to this field is that by Ares and Deliza (2010)[11], who discussed the way consumer emotional responses to food packaging would affect their purchasing decisions. They emphasized that consumers want a packaging which would appeal to their needs-emotional, above all, like convenience, trust, or indulgence. Neuromarketing integrated with AI lets the fine-tuning of those emotional triggers to predict better which sensory elements will evoke the desired emotional response.

Challenges and Future Directions

Even with the promising futures of AI and neuromarketing in deciphering consumer behaviour, various challenges exist. Among them is the ethical sensitivity in manipulating a consumer's choices through neuroimaging and AI-driven data. This concern is highlighted by Stanton et al. (2017) regarding excessive manipulation of consumers, particularly those concerning health decisions, such as food and beverage companies[12]. This also has a limitation in the accuracy level of AI in predicting complex human emotions and behavior, especially in culturally diverse markets, according to Kietzmann et al. (2018)[13].

Neuromarketing Concepts and Techniques: -

The work of the brain is based on the interaction of neurons, which electrochemical processes perform. Techniques of neuroscience for capturing these energy-expensive changes consist of two kinds. One way measures them directly by tracing changes of electric and magnetic fields of the brain (EEG, MEG and TMS), and others trace them indirectly by following their metabolic manifestations expressed through energy expenditure. (PET, fMRI, biometric methods) -

1.The Electroencephalography (EEG) measures the activity of the brain by using electrodes on the scalp, with up to 16-256 electrodes. The time resolution in EEG is excellent at around 1-3 milliseconds, though it has a very poor spatial resolution of approximately 1 cm and cannot capture the activity of neurons that are not perpendicular to the electrode. While it has spatial limitations, EEG is useful when dealing with the right-left spectrum of activity in the brain, especially trying to measure emotional responses to marketing message content.

2.Magnetoencephalography (MEG) measures neural activity through changes in magnetic fields. Although it provides much better spatial resolution than EEG, it has similar temporal resolution. It, however, needs a magnetically isolated room and sophisticated equipment, which makes it quite more expensive-around $2 million-and less natural for subjects. Still, MEG is recommended to use for studying purchasing decisions.

3.Transcranial magnetic stimulation (TMS) alters brain activity via electromagnetic induction, either stimulating or suppressing it, as noted by Zurawicki (2010).[14] This helps identify brain regions involved in specific thought processes.

4.Positron emission tomography (PET) measures glucose, oxygen consumption, and neurotransmitter binding by injecting subjects with a radioactive substance that binds to those elements.

5.fMRI in neuromarketing monitors the activity of brain areas through the level of oxygen. It has high spatial resolution but low temporal resolution and demands the immobility of the subjects in a noisy environment. Its high cost and reliability issues. Alternatives like near-infrared spectroscopy offer cheaper options.

6.Biometric techniques in neuromarketing track physiological responses like eye movement, heart rate, skin conductance, and facial expressions to measure attention and emotions. Each method has its own strengths, and combining them provides a more accurate understanding of consumer behavior, as noted by Hubert and Kenning (2008)[15].

2.3 Hypothesis

Here are some hypotheses developed on the basis of the research questions. These hypotheses are testable statements of the research question and focus on the influence of AI, neuromarketing, and packaging elements on the emotions and behaviour of the consumers.

H1: Varying demographic factors like age, gender, and cultural background influence emotional responses as measured by AI and neuromarketing and significantly impact consumer buying behaviour.

H2: AI methods, when combined with neuromarketing strategies, are more powerful at understanding the preference of the customers than traditional consumer research.

H3: Neural responses related to stimulation in the areas that perceive pleasure and execution are triggered when consumers are exposed to specific characteristics of food packaging, for example, colour, texture, and shape, which may drive purchasing.

3. Research Methodology

3.1 Research Design: This study uses the descriptive type of research design for exploring influencing factors on consumer purchasing decisions by the packaged food industry. The study focuses on the application of AI and neuromarketing tools. This type of research is chosen because descriptive research can do in depth study of attitudes, perceptions, and behavior that the consumers depict within a defined population.

3.2 Research location: Research has conducted in Bhopal City, Madhya Pradesh (MP), neither a metropolitan town nor a rural town, thus being a broad cross-section of the general public.

3.3 Target Population: Target population is composed of individuals aged between 18 to 55 years both male and female from different socioeconomic strata of life. This age group has been chosen as it represents all potential active consumers in the packaged food industry.

3.4 Sampling Method
1. Sampling Technique: The study used a simple random sampling technique which will ensure the representation of various demographic groups, such as age, gender, and socioeconomic status, among the sample.
2. Sample Size: The sample size for the study was 150 respondents to ensure adequate data to achieve statistical analysis with feasibility limits within the given time frame.

3.5 Data Collection: The study collected the data with the help of a structured questionnaire, which was used to gather quantitative and qualitative insights. The questionnaire will contain closed-ended questions for demographic information, and specific answers and use a Likert scale of questions (ranging from 1 to 5) to measure attitudes, perceptions, and behaviours in regards to consumer purchasing decisions, the emotional impact generated through neuromarketing, and opinions about AI applications in marketing. Research was sourced from already existing literature from previous researches, like research papers, market reports , industry analysis to support the findings from the primary data.

3.6 D**ata Analysis**: Analysis of data encompasses Descriptive statistics to describe the data will be mean, median, and mode. Chi-square test, helped to identify relations or check hypotheses. All the qualitative understanding generated through open-ended questions was distributed through thematic analysis to show topical themes, patterns, and insights about emotional responses and consumer preferences. AI tools and Microsoft Excel were employed for data analysis, enabling efficient processing of data and providing deeper insights into consumer behavior patterns and purchasing decisions.

Table 1: Formulation of Search String

Keywords	Associated Terms
Neuroscience	Brain Function, Cognitive Processes, Neural Pathways
Neuromarketing	Consumer Neuroscience, Marketing Psychology, Behavioral Economics
Consumer Behaviors	Buying Patterns, Decision-Making Processes, Shopping Trends
Neuroimaging	fMRI, EEG, PET Scans, Brain Mapping
Emotional Triggers	Affective Responses, Psychological Stimuli, Mood Induction
Packaged Food	Processed Food Products, Convenience Foods, Food Aesthetics
Impulse Buying	Spontaneous Purchases, Unplanned Buying, Urgency in Decision-Making
Consumer Insights	Market Research, Buyer Behavior Analysis, Consumer Preferences

(authors own compilation)

4. Findings & Data Analysis

4.1 Demographics (Gender, Age, Household Income, Educational Background)

In this study, a total of 150 respondents were surveyed to assess consumer behavior in the context of packaged food purchases. The demographic profile, with 72 males (48%) and 78 females (52%).

Table 2: Demographic Profile

GENDER	FREQUENCY	PERCENTAGE
Female	78	52
Male	72	48
TOTAL	150	100

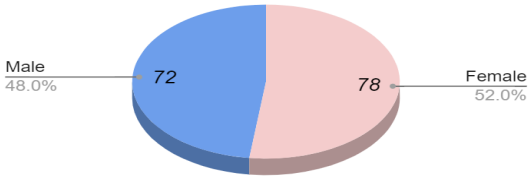

Fig 2: Demographic Profile (Gender)

The age distribution of respondents was diverse, with the largest group falling within the 18-25 age range (52 respondents, 34.67%). Other age groups were represented as follows.This diverse age range facilitated a comprehensive examination of consumer preferences across different life stages.

Table -3: Age Distribution of Respondents

AGE GROUPS	FREQUENCY	PERCENTAGE
Under 18	19	12.67
18-25	52	34.67
25-35	44	29.33
35-45	22	14.67
45-55	13	8.67
TOTAL	150	100.00

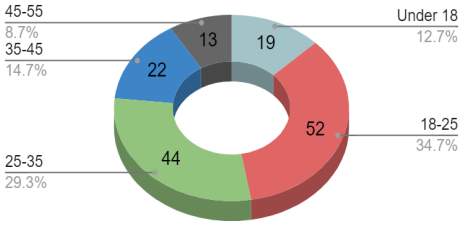

Fig 3: Demographic Profile (Age Group)

In terms of household income, the majority of respondents earned between 40,000-60,000 (36 respondents, 24%), followed by those in the 60,000-80,000 bracket. Other income groups included:

Table-4: Household Income of the Respondents

INCOME GROUPS	FREQUENCY	PERCENTAGE
Under 20000	11	7.33
20000-40000	33	22
40000-60000	36	24
60000-80000	35	23.33
80000-1 lakh	22	14.67
Above 1 lakh	13	8.67
TOTAL	150	100.00

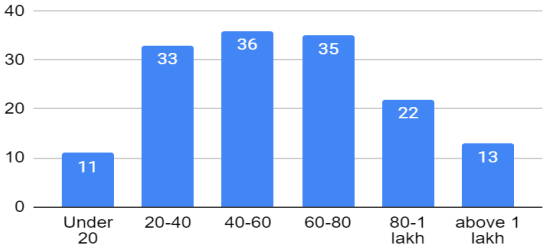

Fig 3: Demographic Profile (Age Group)

Educational background was also diverse, with most respondents holding a graduation degree (62 respondents, 41.33%). Other educational levels included higher secondary (34 respondents, 22.67%), post-graduation (22 respondents, 14.67%), secondary (17 respondents, 11.33%), and professional degrees (15 respondents, 10%). This demographic profile provided a crucial foundation for analysing consumer behavior related to packaged food purchases. It offered valuable insights into how factors such as age, gender, income, and educational background influence consumer preferences and decision-making processes.

4.2 Statistical Analysis: Chi-Square Test

The Chi-Square tests were conducted to assess the relationships between various pairs of variables related to consumer responses in the context of personalized marketing and AI-driven shopping.

Table 5 : Chi Square Test Statistics

Cross-Tabulated Variables	Chi-Square Statistic	p-Value	Statistical Significance
Personalized Content vs. Purchase Positive Emotion	4.830	0.0288	Significant ($p < 0.05$)
Aware of Personalized Packaging vs. Desire for More Personalization	0.343	0.5790	Not Significant ($p > 0.05$)
Openness to AI Driven Shopping vs. Willingness to Pay More for Emotionally Aligned Product	31.746	1.91e-10	Highly Significant ($p < 0.001$)

The results are summarized as follows:

1. Personalized Content vs. Purchase Positive Emotion:
   - The Chi-Square statistic was found to be 4.830, with a corresponding p-value of 0.0288. Since the p-value is less than the conventional threshold of 0.05, this indicates a statistically significant relationship between receiving personalized content and experiencing positive emotions during purchasing. This suggests that consumers who are exposed to personalized marketing are more likely to report positive emotions associated with their purchasing decisions.
2. Aware of Personalized Packaging vs. Desire for More Personalized Packaging:
   - For this pair, the Chi-Square statistic was 0.343, with a p-value of 0.5790. Given that the p-value exceeds 0.05, there is no statistically significant relationship between being aware of personalized packaging and the desire for more personalized packaging.
3. Openness to AI Driven Shopping vs. Willingness to Pay More for Emotionally Aligned Product:
   - The results indicated a Chi-Square statistic of 31.746 and a highly significant p-value of 1.91e-10. This strong statistical significance ($p < 0.001$) demonstrates a robust relationship between openness to AI-driven shopping and the willingness to pay a premium for products that resonate emotionally with consumers. This finding suggests that consumers who are receptive to AI technologies in shopping are more inclined to invest in products that align with their emotional preferences.

Descriptive Analysis of Packaging elements

The analysis of respondents' ratings of packaging elements on a scale of 1 to 5 is presented here.

Table 6: Respondents' ratings of Packaging Elements

Elements	1	2	3	4	5	Total Responses
Colour	28	34	25	29	34	150
Design	33	22	34	26	35	150
Texture	40	34	27	24	25	150
Size	27	22	39	27	35	150
Packaging	19	33	32	34	32	150
Brand name	32	28	29	31	30	150
Labels (e.g., "organic", "gluten-free")	26	32	27	32	33	150

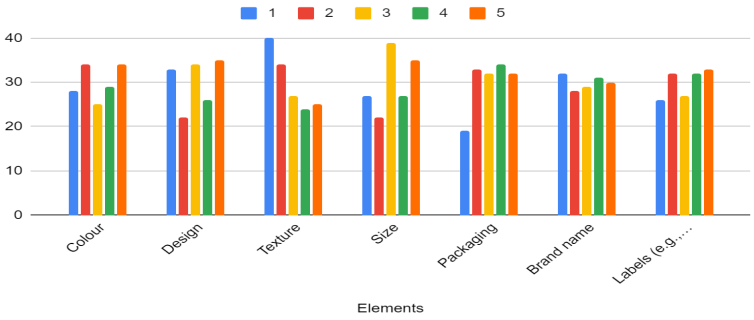

Fig 4: Influence of Packaging Elements

To gain a clearer understanding of how each element was evaluated, the weighted average for each packaging element was calculated using the following formula:

$$\textbf{Average} = \frac{(1\times\text{Count of 1's}) + (2\times\text{Count of 2's}) + (3\times\text{Count of 3's}) + (4\times\text{Count of 4's}) + (5\times\text{Count of 5's})}{\text{Total Responses}}$$

Table 7: Statistical Analysis of Packaging Elements

Packaging Element	Mean	Variance	Standard Deviation
Colour	3.05	2.07	1.44
Design	3.05	2.13	1.46
Texture	2.73	2.05	1.43
Size	3.14	1.96	1.4
Packaging	3.18	1.77	1.33
Brand Name	2.99	2.05	1.43
Labels	3.09	1.99	1.41

The analysis of the ratings given by respondents for various packaging elements reveals significant insights into consumer preferences and their influence on buying decisions. Following are the interpretations of the mean, variance, and standard deviation of each packaging element, and correlation of these findings with existing literature on consumer behavior and packaging effectiveness.

Summary of Results

1. Colour (Mean: 3.05, Variance: 2.07, SD: 1.44)
   The average rating of Colour indicates that it holds moderate significance in purchasing decisions. The variance suggests a moderate level of disagreement among respondents, which aligns with research by Labrecque and Milne (2013)[16], who emphasize that color not only captures attention but also influences emotional responses and brand perceptions. This variability in responses may reflect differing personal preferences and cultural interpretations of color.
2. Design (Mean: 3.05, Variance: 2.13, SD: 1.46)
   Similar to Colour, Design also achieved a mean score of 3.05, indicating its perceived importance. The variance here is slightly higher, which may suggest that consumers have diverse opinions about what constitutes effective design. According to Kahn et al. (2013)[17], a well-executed design can enhance the consumer's emotional connection to the product, thereby affecting their buying behavior.
3. Texture (Mean: 2.73, Variance: 2.05, SD: 1.43)
   Texture received the lowest mean rating of 2.73, indicating it is perceived as less influential in decision-making processes. This finding resonates with studies by Krishnan et al. (2018)[18], which suggest that while tactile experiences can enhance product evaluation, they may not significantly sway purchase decisions in the context of packaged goods.
4. Size (Mean: 3.14, Variance: 1.96, SD: 1.40)
   The mean rating for Size is 3.14, suggesting it plays a moderately strong role in influencing purchasing decisions. The lower variance indicates that respondents generally agree on its

importance. Research by Bock et al. (2015) supports this notion, highlighting that size can affect perceptions of value and suitability, especially in food packaging.[19]

5. Packaging (Mean: 3.18, Variance: 1.77, SD: 1.33)
With a mean of 3.18, Packaging emerges as the most influential element. Its low variance underscores a strong consensus among respondents regarding its significance. This is consistent with findings from Underwood et al. (2001), who argue that packaging serves not only as a container but also as a crucial marketing tool that conveys brand identity and influences consumer choices at the point of sale.[20]
6. Brand Name (Mean: 2.99, Variance: 2.05, SD: 1.43)
The Brand Name received a mean rating close to neutral at 2.99, indicating it is somewhat influential but not overwhelmingly so. The moderate variance suggests varied opinions among respondents. Previous research by Aaker (1991)[21] shows that while brand names can impact consumer choice, their effectiveness often depends on brand recognition and trust, which may not be universally established among all respondents.
7. Labels (Mean: 3.09, Variance: 1.99, SD: 1.41)
Labels garnered a mean score of 3.09, indicating a moderate influence on purchasing decisions. The variance here suggests some disagreement, possibly reflecting differing views on the importance of claims like "organic" or "gluten-free." According to Grunert et al. (2010)[22], informative labeling can significantly affect consumer preferences, especially among health-conscious buyers.

The analysis of consumer ratings for various packaging elements illustrates the nuanced ways in which these factors influence buying decisions. Notably, Packaging and Size emerged as the most influential elements, while Texture received the lowest ratings.

Table 8: Correlation Between Packaging, Emotions, and Buying Decisions

Emotions	Male	Female	Total
Happiness	14	24	38
Excitement	19	20	39
Comfort	7	11	18
Nostalgia	19	8	27
Curiosity	10	9	19
Indifference	3	6	9
Total	72	78	150

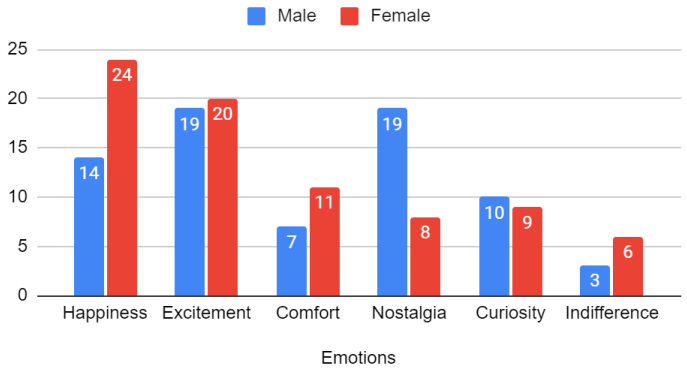

Fig 5: Influence of Packaging on Emotional Engagement (Gender Based)

The analysis demonstrates that packaging is a critical element influencing consumer buying decisions, as evidenced by the emotional responses elicited by various packaging designs. The following points illustrate this correlation, supported by numerical data from the emotional responses dataset:

Happiness as an Important Factor: The dataset indicates that Happiness was reported by 14 males and 24 females, highlighting that a total of 38 consumers felt joy upon seeing appealing packaging. This positive emotional response is crucial because research shows that happiness can lead to increased purchase intention and brand loyalty (Thompson et al., 2005).[23]

Excitement as a Driving Factor: Excitement was noted by 19 males and 20 females, totaling 39 consumers. The almost equal levels of excitement suggest that both genders are motivated by appealing packaging, which can stimulate curiosity and engagement with the product (Underwood & Klein, 2002).[18] This excitement is often a precursor to making a purchase decision.

Comfort and Emotional Attachment: The findings reveal that 7 males and 11 females reported feeling comfortable with the packaging, resulting in 18 consumers overall. This emotional response aligns with consumer behavior theories that emphasize the importance of comfort and emotional connection in decision-making (Brumbaugh & Carpenter, 2007).[24]

Nostalgia's Impact on Males: Notably, 19 males experienced nostalgia compared to just 8 females, indicating that a total of 27 consumers connected emotionally with nostalgic elements in packaging. This is significant because nostalgia can evoke strong positive emotions, influencing male consumers' preferences and increasing the likelihood of purchase (Holbrook & Schindler, 2003). [25]

Curiosity as an Engagement Tool: Curiosity levels were similar, with 10 males and 9 females expressing interest, totaling 19 consumers. This suggests that effective packaging design can capture attention and prompt consumers to explore the product further, reinforcing its potential to drive sales (Hsee et al., 2009). [26]

Low Indifference Rates: The data also show that 3 males and 6 females felt indifferent towards the packaging, with a total of 9 consumers exhibiting this response. This low level of indifference suggests that well-designed packaging generally captures consumer interest and emotional engagement, aligning with research on effective packaging strategies (Chandon et al., 2009).[27]

Gender v/s Emotions

Table- 9: Chi Square test between two variables - Gender and Emotions triggered

Total Chi square Statistic (ΣX^2)	8.85439
Degree of Freedom	5
P Value (p)	0.115014954

Based on the Chi-Square test results, the total Chi-Square statistic is 8.85 with a corresponding p-value of 0.115 and 5 degrees of freedom. Since the p-value exceeds the conventional significance level of 0.05, we fail to reject the null hypothesis. This indicates that there is no statistically significant association between gender and the emotions triggered by well-designed food packaging in the sample.

While the results of the Chi-square test indicate that the relationship between gender and emotional responses to packaging is statistically insignificant (with a p-value greater than 0.05), this does not diminish the theoretical implications of the findings. The emotional responses observed, such as happiness, excitement, and nostalgia, logically support the notion that packaging significantly influences buying decisions. Even if the statistical evidence does not show a strong correlation, the underlying principles of consumer behavior suggest that emotions play a crucial role in shaping purchasing preferences.

Factors Influencing Purchase Decision

Factors	1	2	3	4	5	Total Responses
Price	26	37	37	30	20	150
Brand recognition	37	26	22	29	36	150
Packaging design	27	30	36	30	27	150
Health claims (e.g., "low sugar," "high protein")	31	28	34	32	25	150
Ethical production practices (e.g., "sustainably sourced," "organic")	35	31	30	30	24	150

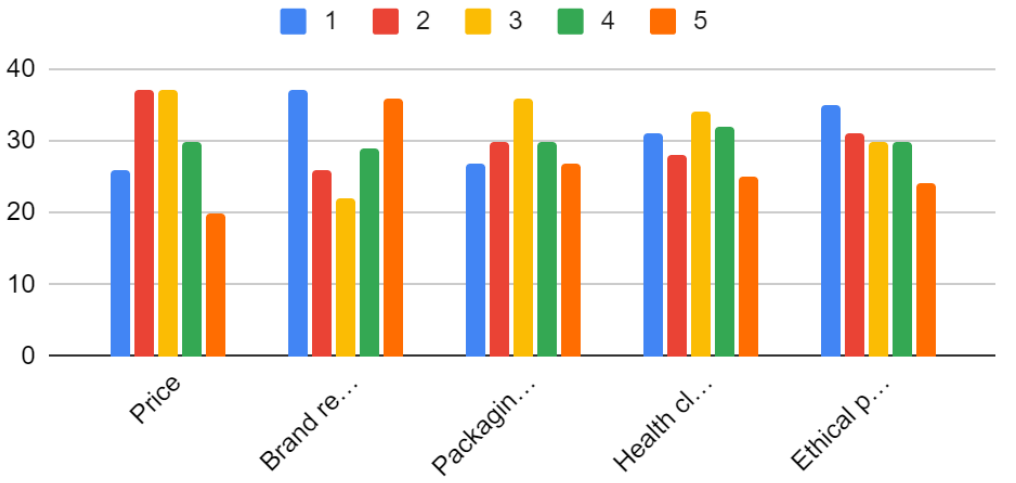

Fig 6: Factors Affecting Buying Decisions

Table 11: Mean and Standard Deviation of Factors

Factors	Mean Rankings	Standard Deviation
Price	3.13	1.29
Brand Recognition	2.99	1.52
Packaging Design	3	1.36
Health Claims	3.05	1.37
Ethical Production practises	3.15	1.4

Understanding the factors that influence consumer purchasing decisions for packaged food is essential for marketers and businesses in the industry. The summary of results is as follows:

1. Price: Price is the most significant factor in consumer decision-making, reflecting a strong consensus among respondents regarding its importance. A mean rank of 3.13 indicates that consumers place a high value on cost when purchasing packaged food. The low standard deviation of 1.29 suggests that this opinion is widely shared among respondents, demonstrating consistent price sensitivity across different demographics. Research indicates that price often serves as a critical cue for quality and value, influencing consumers' perceptions and purchase behavior (Ailawadi et al., 2001). This aligns with the notion that consumers typically weigh price heavily against their budget constraints and expectations of product quality.[28]

2. Brand Recognition: With a mean rank of 2.99, brand recognition is a significant yet slightly less critical factor than price. The standard deviation of 1.52 indicates a broader range of opinions about its importance, suggesting that while many consumers value familiar brands, there is a notable segment that is more willing to explore lesser-known alternatives. Established brands often evoke trust and reliability, which can lead to a willingness to pay a premium (Erdem & Swait, 2004). However, the variability in responses underscores that some consumers may prioritize quality or health over brand loyalty, reflecting changing consumer behaviors.[29]

3. Packaging Design: Packaging design received a mean rank of 3.00, indicating its importance in attracting consumers' attention and influencing their purchasing decisions. The standard deviation of 1.36 shows moderate variability, suggesting that while many consumers recognize the impact of packaging, preferences may differ based on individual tastes and experiences. Effective packaging serves not just as a container but as a crucial marketing tool that communicates brand identity and product benefits (Underwood & Klein, 2002). This highlights the necessity for brands to invest in appealing designs that resonate with their target audience.[18]

4. Health Claims: Health claims are crucial, with a mean rank of 3.05, indicating that consumers are increasingly aware of health-related information in their food choices. The standard deviation of 1.37 suggests that attitudes toward health claims vary among consumers, with some placing a higher emphasis on nutritional benefits than others. The growing trend towards health consciousness influences purchasing behavior, as consumers seek products that align with their dietary preferences and wellness goals (Grunert et al., 2010) [22]. This indicates a shift in consumer priorities towards healthier eating habits.

5. Ethical Practices: Ethical practices, with a mean rank of 3.15, highlight a rising consumer interest in sustainability and ethical sourcing. The standard deviation of 1.40 suggests moderate variability,

indicating that while some consumers prioritize ethical considerations, others may not view them as crucial in their purchasing decisions. As awareness of ethical consumption increases, consumers are more inclined to support brands that demonstrate social responsibility and sustainable practices (Gobé, 2010). This reflects a broader trend toward ethical consumerism, suggesting that brands should communicate their ethical practices effectively to engage this audience.[30]

In this research, the data strongly supports the notion that AI combined with neuromarketing tools is more effective than traditional marketing methods in triggering emotional responses and influencing compulsive buying behaviors.

Congruence of AI and Neuromarketing

- *AI's Ability to Understand Preferences:* The survey results revealed that 100% of respondents (150 out of 150) believe AI with neuromarketing is more effective than traditional methods in understanding their preferences and choices. This underscores how consumers view AI as more capable of accurately predicting their behavior and needs. McKinsey & Company (2020) echoes these findings, reporting that AI's capacity to analyze large data sets allows for deeper insights into consumer behavior, surpassing traditional marketing methods in terms of efficiency and accuracy.[31]

- *Increased Trust and Loyalty with AI-Driven Recommendations:* In the survey, 76% of respondents (114 out of 150) indicated that they would trust a brand more if it used AI to suggest products based on past purchases and emotional preferences. This is consistent with Accenture's (2018) report, which found that 91% of consumers prefer brands that offer personalized experiences, leading to increased loyalty. Accenture's research highlights how AI can integrate emotional and transactional data to deliver highly relevant product suggestions, creating a stronger bond between consumers and brands.[32]

- *Influence of Emotionally Targeted AI Ads on Purchase Intentions:* In terms of purchase intentions, over half (53.3%) of respondents (80 out of 150) are "very likely" to purchase a product if AI-driven ads address their emotional needs, such as comfort or excitement. This finding aligns with research by Plassmann et al. (2015), which demonstrates that neuromarketing techniques, particularly those focused on emotional triggers, stimulate the brain's decision-making areas, increasing the likelihood of impulsive purchases.[33] The use of AI further enhances this by delivering tailored messages at the right emotional moments, making these campaigns more effective than generic, traditional ads.

- *Broader Implications for Impulse Buying:* While a minority (30 respondents, 20%) indicated they are either neutral or unlikely to purchase AI-driven products, the majority supports the claim that AI and neuromarketing can enhance impulse buying behavior. Studies in the Journal of Consumer Research (2013) affirm that emotionally charged advertising—particularly when personalized—can lead to compulsive buying by creating stronger neural connections and emotional engagement with the product. AI's ability to personalize these emotional triggers adds a new dimension to traditional marketing strategies.[34]

The data collected in this study, alongside secondary literature, demonstrates that AI's ability to integrate emotional insights with predictive analytics makes it superior to traditional marketing in triggering emotional responses. KPMG's (2019) findings further corroborate this, showing that AI-driven personalization significantly improves customer engagement and loyalty, as it allows brands

to respond more effectively to the emotional and cognitive cues that drive consumer behavior, particularly in impulsive buying situations.[35]

5. Conclusion

The synergy between AI and neuromarketing provides an extremely powerful method of gaining insights into emotional triggers behind packaged food purchase decisions. Brands are, therefore, using neuroscience insights with the help of data analytics to craft even more effective packaging designs, which leverage more power from consumers, and in return, generate higher engagement and sales. As this research is happening continuously, it's a challenge to use the tools responsibly in a way that they improve consumer experiences without compromising the margins of ethics.

Businesses, by integrating AI, are streamlining operations and constructing new benchmarks for safety and quality. The possible scope of using AI for addressing the critical challenges relating to food security and environmental sustainability is vast, and it looks at a bright future ahead. As the use of AI keeps growing, so would its role in the food industry, shaping everything related to the cultivation, processing, distribution, and consumption of food. This wave of technology is imperative for stakeholders within the industry to stay competitive and responsive to such a dynamic global market. This exploration of AI impact on food is more than just a glimpse into the future: it is a roadmap for a successful and innovative industry.

6. Practical Implications

This study underscores the vital role of combining neuromarketing with AI to build lasting relationships with consumers, offering valuable insights for marketers and advertisers. Understanding emotional triggers is key to crafting effective advertising. When advertisers balance factual information with emotional connections, they can create messages that resonate more powerfully with audiences.

Moreover, neuromarketing plays a critical role in generating organic word-of-mouth, enhancing customer loyalty, and ensuring long-term brand engagement. Emotional content significantly boosts memory recall, helping consumers remember and associate positively with a brand over time. AI-driven systems take personalization a step further by recommending products that cater to individual emotions and preferences based on past behavior. By analyzing previous purchases and shopping habits, these systems deliver tailored suggestions, making the shopping experience more relevant and enjoyable for customers. Additionally, insights into emotional triggers can guide the development of new food products that resonate with consumers' emotional needs, ultimately leading to better alignment with their desires and expectations.

7. Ethical Consideration

Along with the advancements of these neuromarketing techniques, comes ethical concerns and questions of privacy and consent issues and manipulation of subconscious consumer behavior. Critics tend to dramatize the need for ethical marketing practices that preserve consumer autonomy and have transparent and respectful requirements for explicit consent and robust data protection. In contrast, proponents of neuromarketing argue that this technique actually helps personalize marketing messages so that things can get better for consumers. This naturally requires companies not to exploit weaknesses in consumer psychology. Interactive content marketing is further underscored as an

effective ethical alternative in that engagement is not done subconsciously but to promote a responsible approach to understanding and catering for what customers prefer.

Disclosure of Interest: The authors declare no financial or personal relationships with individuals, organizations, or companies that could inappropriately influence or bias the research presented in this paper, "The Neural Palette: Exploring Emotional Triggers in Packaged Food Buying Decisions Through AI and Neuromarketing." There has been no financial support from entities involved in the packaged food industry, AI, or neuromarketing that could affect the outcomes or interpretation of this research. The research has been conducted independently without any influence from commercial sponsors or vested interests. Any data or insights drawn from external sources are cited accordingly, and any potential conflicts of interest have been managed transparently and in accordance with ethical guidelines.

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