The Impact of Packaging Visual Design Elements on Impulse Buying Behavior in E-Commerce: A Study of Cosmetic Products

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Abstract— **This study investigates the impact of visual packaging design elements specifically color and graphics, shape, material, and product information on impulse buying behavior among Generation Z consumers in the Western Province of Sri Lanka within e-commerce settings. Using a quantitative approach, data were collected via a structured online questionnaire from 461 respondents. The data were analyzed using SPSS software, employing descriptive statistics, correlation analysis, regression modeling, and reliability and validity tests. The results reveal that packaging color and graphics, shape, and material have a significant positive influence on impulse buying, whereas product information does not show a significant effect. The findings highlight that emotionally engaging and visually appealing packaging elements are more effective in stimulating unplanned purchases than rational, information-based cues. Grounded in the Stimulus-Organism-Response (SOR) model, the study demonstrates that external visual stimuli evoke internal emotional responses, which lead to impulsive buying decisions. These results emphasize the strategic importance of integrating attractive and sustainable packaging features in digital retail to appeal to Generation Z consumers, who are highly responsive to aesthetic and emotional stimuli. This research contributes to the limited literature on consumer behavior in South Asian online markets and offers practical insights for e-commerce marketers and product designers seeking to enhance impulse purchase rates through packaging design.**

Keywords— e-commerce, impulse buying, packaging design

I. INTRODUCTION

In the context of a competitive and dynamic global market, marketing has been acknowledged as essential to shaping consumer perceptions and influencing purchasing decisions. It encompasses strategic communication efforts aimed at promoting products both directly and indirectly [1]. Among the various elements of marketing, packaging has gained prominence as a critical component, functioning both as a protective container for products and as an influential communication and branding instrument [2]. Since packaging is the first element customers encounter before making a purchase, it plays a crucial role in marketing and significantly influences product choice [3]. Furthermore, Packaging enhances product attractiveness and draws customer attention, which has a substantial impact on purchase intention [4]. Moreover, packaging functions as a heuristic cue, shaping customers' perceptions and choices while assisting them in rapidly identifying and choosing brands [5]. The visual components of packaging often dominate over other informational cues during the purchase process, highlighting their importance in influencing consumer behavior [6]. This is particularly evident in the cosmetics industry, where packaging design plays a pivotal role in attracting consumers.

The word "Cosmetics" was first used in the 1600s to describe the practice of decorating, anointing, or embellishing the human body [7]. Over time, the demand for cosmetic products has seen significant growth, with younger consumers increasingly prioritizing safety and high quality in their purchasing decisions [8]. In Sri Lanka, cosmetics market is expected to reach US$201.70 million in 2025, growing at a 4.79% CAGR [1]. Simultaneously, technological innovations continue to transform the retail environment, establishing e-commerce as a preeminent medium for consumer transactions, including cosmetic products [9].

E-commerce has grown in popularity among consumers and business people because of its individualized customer care, seamless purchasing experience, and visually appealing product displays [10]. As e-commerce grows, brands of cosmetics and personal care items need to use a variety of marketing and advertising techniques to draw in and keep consumers [11]. In this context, E-commerce customers depend on visual packing signals to sway decisions and evoke feelings, but little study has been done in this area [3],[12]. Moreover, impulsive purchasing, which is unplanned, rapid, emotional, and situational, and is motivated by emotional triggers, planned purchases are impacted by the quantity of information and the amount of time spent making decisions. Despite limited data on consumer behavior,

the rising demand for cosmetics highlights the need for effective marketing strategies [13].

Studies on packaging and impulsive purchases are conducted worldwide, however there is a dearth of research that particularly addresses the Sri Lankan e-commerce business. Also, little is known about how visual package components affect consumers' feelings when they purchase online, especially in developing nations like Sri Lanka. This offers a chance to examine the ways in which visual design affects customer feelings and purchase choices in the context of Sri Lankan e-commerce [3],[12],[14]. Therefore, it is crucial to study how visual packaging elements—color, graphics, shape, product information, and materials—impact impulse buying behavior in e-commerce. This paper aims to answer four key research questions about how packaging visual design elements impact impulse buying in e-commerce. (1) What is the influence of packaging color and graphics on impulse buying in e-commerce?, (2) what is the impact of package shape on consumers' impulse purchase decisions in online shopping?, (3) to what extent does product information displayed on packaging affect impulse buying behavior in e-commerce?, (4) what role does the choice of packaging material play in influencing consumer impulse buying behavior in e-commerce?. In addressing the above research questions, this paper makes several key contributions. This study examines how packaging visual design influences Gen Z's impulse buying of cosmetics in Sri Lanka's Western Province and provides insights for improving cosmetic promotion strategies on e-commerce platforms to boost organizational performance.

The paper is organized as follows. First, it provides the literature review on previous studies of packaging elements and graphics impulse buying in e-commerce. Next, the methodology covering data collection and analysis in detail. Then, research findings are presented. Finally, the paper concludes with key insights, practical implications, limitations, and suggestions for future research.

II. LITERATURE REVIEW

A. Packaging color and graphics impulse buying in e-commerce

In marketing, creative visual design is essential for capturing consumer attention [15]. Container design has a direct impact on buying behavior [16], and visual design plays a key role in conveying product identity [17]. Packaging color and graphics enhance product appeal, influencing impulse purchases online [3]. Graphics also support brand communication, ensuring clarity and recognition, particularly in unfamiliar markets [18]. Color serves the purpose of drawing in customers while they make decisions about making a purchase [19]. As mentioned, through the use of visual signals as color and graphics to draw attention and convey meaning, packaging design and color have an influence on consumers' intents to make purchases [20].

Using these findings to examine the effects of container color and images on impulse buying in online e-commerce, the study's first hypothesis proposes that,

H1: Packaging color and graphics have a positive relationship with impulse buying on e-commerce.

B. Packaging shapes and impulse buying in e-commerce

Packaging shape and size maximize the efficacy of relational or aggressive marketing by drawing in customers, improving engagement, and influencing perceptions through attractive designs [3]. Packaging shape has an important effect on consumers' intent to purchase when product quality is unable to determine from packaging appear [4]. Packaging shape influences purchases, aiding recognition and attention without label reading [21]. Further, studies reveal that package shape and transparency influence purchase intent and increase interaction [22], [23]. Moreover, packaging size and shape, affect consumers' intent to purchase [4]. Customer purchasing intentions are significantly influenced by packaging design of shape.

These indicators suggest a connection between package shape and impulsive purchases in e-commerce. Applying these results to the research yields a hypothesis that suggests,

H2: Packaging shape has a positive relationship with impulse buying in e-commerce.

C. Product information in packaging and impulse buying in e-commerce

Packaging details like contents, origin, and expiration date influence purchase decisions by building consumer confidence. Product information shapes buyer focus and emotions, while font size, style, color, and spacing create visual hierarchy [21]. Labels provide transparency and raise customer knowledge by clearly stating product facts [19]. Consumers' decision making process and, ultimately, their purchasing behavior can be influenced by product information [24]. Since it reflects the tone of the product and improves its visual appeal, information is crucial in packaging [25]. In packaging design, information is essential for drawing customers in and communicating vital product information [26]. The consumer will boost their trust in the product by reading the package information on the package before making a purchase [27]. Visually appealing images and clear product information help e-commerce platforms boost impulsive sales. Customers are encouraged to purchase a range of goods without planning attributable to this combination. These research findings serve as a frame for the concept that suggests,

H4: Packaging information have a positive relationship with impulse buying in e-commerce.

D. Packaging materials in packaging and impulse buying in e-commerce

Packaging materials serve both protective and communicative functions, conveying product value to consumers [4]. As the first physical element a buyer

encounters, packaging reflects product quality and brand image [28]. Consumers evaluate packaging based on design and natural-looking materials [29]. Common materials such as paper, glass, metal, plastic, and wood offer durability, recyclability, and resistance to weather and corrosion [3]. Increasingly, consumers prefer eco-friendly packaging, those made from recyclable materials and designed to reduce waste, favoring options like paper and glass over plastic [29]. As a result, sustainable packaging is gaining popularity [16]. Ultimately, packaging materials are essential for both product protection and enhancing visual appeal [25].

These findings demonstrate the relationship between impulsive e-commerce purchases and packaging materials. In relation to this, the research suggests the following hypothesis:

H4: Packaging materials have a positive relationship with impulse buying in e-commerce.

E. Impulse buying in e-commerce

Impulse buying refers to unplanned purchases triggered by situational marketing and social cues in online environments [30],[31]. It is influenced by emotional engagement, entertainment, and interactivity, making it a powerful driver of online sales [32]. Scholars note that impulse purchases are frequently stimulated by social cues and marketing tactics in digital spaces [31]. Product attributes, packaging, branding, and visual cues contribute to impulsive buying behavior [33]. E-commerce growth amplifies this, influenced by personal traits and platform design [34]. Online product access increases impulse purchases over in-store. Social media, as a powerful marketing tool, significantly influences consumer decisions, including impulse buying [35]. Increasingly, consumers make purchases based on content viewed on social platforms [36]. Social shopping, a part of e-commerce, promotes consumer interaction through networks [37]. E-commerce growth heightens research interest in impulse buying [38].

F. Theoretical background

The S-O-R (Stimulus-Organism-Response) model explains how environmental stimuli affect consumer behavior, originally in retail settings. In this model, the servicescape—cleanliness, design, and signage—stimulates moods and behaviors [31]. This framework has been adapted to e-commerce, where stimuli include features of online marketplaces [39]. The S-O-R model posits that external stimuli (S) affect an individual's internal cognitive and emotional states (O), which then lead to behavioral responses (R) [40]. Prior studies have shown that online stimuli significantly influence impulsive buying [31]. Due to its strong focus on consumer behavior, the S-O-R framework is widely used to study online impulse purchases [41]. According to [30], impulse buying is defined as an unplanned purchase triggered by stimuli [42]. The model also provides a useful basis for understanding consumer reactions to live streaming and social media marketing [43]. The S-O-R model is a framework for analyzing environmental influences on online consumer behavior. This study uses it to explain how packaging influences online impulse buying.

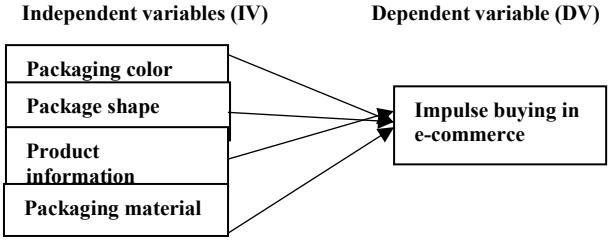


Fig. 1. Conceptual Framework (*Source: Author's compilation*)

III. DATA AND VARIABALES

A. Study period and sample

This study used a cross-sectional quantitative design to investigate how visual packaging design elements affect impulse buying among Generation Z consumers in Sri Lanka's Western Province. In 2025, data were gathered via a structured online questionnaire on Google Forms. After cleaning, 461 valid responses were analyzed with SPSS using descriptive statistics, correlation, and multiple regression.

B. Dependent variable

Impulse buying in e-commerce: In this study, impulse buying in e-commerce is considered the dependent variable, representing spontaneous and unplanned purchasing behavior triggered by visual packaging stimuli during online shopping.

C. Independent variable

This study highlights four main visual packaging design elements as independent variables: packaging color and graphics, shape, product information, and material. These act as visual stimuli influencing consumer behavior in e-commerce, particularly among Generation Z. Color and graphics focus on aesthetics to capture attention and evoke emotions. Shape relates to the package's form, impacting perceptions of novelty and attractiveness. Product information provides text to help informed decisions, while material conveys quality and sustainability.

D. Methodology and model specifications

The study employed a quantitative, deductive research design aligned with a positivist philosophical stance, which emphasizes objectivity, measurable data, and hypothesis testing. This method worked well for investigating the connections between impulsive purchasing behavior and visual packaging design components in the context of online shopping. The research was cross-sectional in nature, with data collected at a single point in time using a structured survey strategy. The target population consisted of Generation Z consumers aged 20 to 28 residing in the Western Province of Sri Lanka, a region with a high concentration of online shoppers. A non-probability convenience sampling technique was used to collect data from respondents. The population was considered effectively unlimited for sampling purposes. Therefore, Krejcie and Morgan's (1970) sample size

determination table was applied, indicating a minimum required sample size of 384 at a 95% confidence level. To ensure a higher precision, 490 questionnaires were distributed, and 461 valid responses were collected and analyzed. Data was collected through a self-administered online questionnaire distributed via Google Forms. The instrument comprised a total of 32 items rated on a 5-point Likert scale, ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The questionnaire was divided into two main sections. The first part gathered demographic data (gender, age, education level, marital status, employment status, monthly income, district, and internet usage frequency). The second part assessed the independent and dependent variables of the study. The independent variables included Packaging Color & Graphics (PCG), Packaging Shape (PS), Product Information (PI), and Packaging Materials (PM). The dependent variable was Impulse Buying in E-commerce (IBE). Data was analyzed with SPSS using multiple regression to assess each packaging design element's effect on impulsive buying, descriptive statistics to summarize the data, and correlation analysis to explore variable relationships. This approach offered a thorough insight into how visual packaging influences online consumer purchases.

IV. EMPIRICAL RESULTS

A. Reliability

Summary statistics: The summary statistics of dependent and independent variables for reliability are presented in Table 1.

Table 1: Reliability summary statistics

Variables	Cronbach's Alpha
PCG	0.793
PS	0.813
PI	0.722
PM	0.805
IBM	0.840

Source: Author's compilation

Cronbach's Alpha was used to assess internal consistency. All constructs exceeded the acceptable threshold of 0.70, indicating reliable measurement. Packaging Color & Graphics (α = 0.793), Packaging Shape (α = 0.813), Packaging Information (α = 0.722), Packaging Material (α = 0.805), and Impulse Buying (α = 0.840) showed satisfactory reliability.

B. Validity

Summary statistics: The summary statistics of dependent and independent variables for validity are presented in Table 2.

Table 2: Validity summary statistics

Variables	No. of Items	Factor loading Range	CR Value	AVE Value
PCG	8	0.617-0.776	0.917	0.583
PS	7	0.576-0.764	0.909	0.592
PI	5	0.619-0.794	0.905	0.658
PM	6	0.665-0.749	0.911	0.633
IBE	6	0.778-0.789	0.882	0.556

Source: Author's compilation based on Fornell and Larcker -1981

Measurement validity was assessed using SPSS software confirmatory factor analysis. All factor loadings exceeded 0.6, indicating strong item reliability. Composite Reliability (CR) values ranged from 0.882 to 0.917, and Average Variance Extracted (AVE) values ranged from 0.556 to 0.658, confirming internal consistency and convergent validity. KMO and Bartlett's test results further supported the adequacy of the data for factor analysis.

C. Correlation analysis

Correlation analysis is a statistical method used to determine the strength and direction of the relationship between two or more variables. It helps identify whether and how strongly pairs of variables are related [2]. Among the visual packaging design elements, packaging color and graphics, packaging shape, and packaging material show significant positive correlations with impulse buying behavior. However, product information does not exhibit a significant correlation. Among control variables, income and gender demonstrate mild positive associations with impulse buying.

D. Multiple Regression Analysis

Table 3: Multiple Regression Analysis summary statistics

R-Square	Adjusted R-Square
0.809	0.645

Source: Author's compilation

The R^2 value of 0.809 indicates that 80.9% of the variance in impulse buying behavior is explained by the independent variables, demonstrating a strong explanatory power. The adjusted R^2 value of 0.645, which accounts for the number of predictors and sample size, provides a more conservative estimate, confirming the model's overall robustness and minimizing the likelihood of overfitting.

E. Hypothesis Testing

Summary statistics: The summary statistics of dependent and independent variables for Hypothesis Testing are presented in Table 4.

Table 4: Hypothesis testing summary statistics

Hypothesis Testing	Beta value	Significance Value	Decision Rule	Accepted / Rejected
H1: Packaging color and graphics have a positive relationship with impulse buying on e-commerce.	0.199	<0.001	<0.05	Accepted
H2: Packaging shape has a positive relationship with	0.369	<0.001	<0.05	Accepted

impulse buying in e-commerce.				
H3: Product information has a positive relationship with impulse buying in e-commerce.	0.086	0.073	<0.05	Rejected
H4: Packaging materials have a positive relationship with impulse buying in e-commerce.	0.241	<0.001	<0.05	Accepted

Source: Author's compilation

The results of the hypothesis testing are summarized in Table 4. H1, which proposed a positive relationship between packaging color and graphics and impulse buying in e-commerce, was accepted with a beta value of 0.199 and a significance level of <0.001. H2, which examined the relationship between packaging shape and impulse buying, was also accepted ($\beta = 0.369$, $p < 0.001$), indicating a strong positive influence. H3, which hypothesized a positive relationship between product information and impulse buying, was rejected as the result was not statistically significant ($\beta = 0.086$, $p = 0.073$). H4, which proposed a positive relationship between packaging materials and impulse buying, was accepted with a beta value of 0.241 and a significance level of <0.001. These findings support the importance of visual and sensory packaging elements in influencing impulse buying, while textual product information shows no significant effect.

V. CONCLUSION AND RECOMMENDATIONS

This study investigated the impact of visual packaging design elements on impulse buying behavior among Generation Z consumers in Sri Lanka's Western Province. The findings indicate that packaging color and graphics, packaging shape, and packaging material significantly influence impulse buying, while product information does not have a statistically significant effect. These results support the Stimulus–Organism–Response (S-O-R) model, which emphasizes the role of emotional responses to external stimuli in shaping consumer behavior, particularly in digital environments where decisions are made quickly and emotionally.

Packaging color and graphics played a central role by triggering emotional arousal and facilitating spontaneous decisions. This highlights their strategic relevance in e-commerce, where consumers often respond to visual cues more than rational content. The lack of significance in product information suggests that detailed descriptions or technical data are less impactful during impulse purchases—especially for products like cosmetics, where visual appeal strongly influences buying decisions.

However, the findings should be interpreted with caution. The study focused only on Gen Z consumers within a limited geographical area, which may affect generalizability. Impulse buying behaviors may vary in different cultural, age, or offline shopping contexts. Additionally, while Gen Z is associated with environmental awareness, their actual behavior in this study was more influenced by aesthetics than by product details or ethical considerations—revealing a possible gap between values and actions.

From a practical standpoint, marketers and designers should prioritize visually stimulating packaging—using bright colors, bold graphics, unique shapes, and eco-friendly materials—to enhance emotional appeal.

Overall, the study extends the application of the S-O-R model to an emerging e-commerce market and provides insights for improving packaging strategies aimed at stimulating impulse buying. Future research should explore broader demographics and product categories.

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