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How Visual Design in Dairy Packaging Affects Consumer Attention and Decision-Making

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Abstract: The design of product packaging significantly impacts consumer behavior by attracting attention and influencing purchasing choices within a competitive market environment. This research explores the effects of visual packaging elements, such as branding, imagery, and descriptive text, on consumer preferences and decisions. By examining regular, organic, and character-themed milk packaging, the study seeks to determine which features effectively capture attention and drive engagement. Employing eye-tracking tools (Tobii Pro Spectrum and Tobii Pro Lab) alongside survey analysis, the study evaluates consumer focus through fixation durations and heatmap visualizations. The findings indicate that character-themed packaging draws the most attention, with colorful illustrations and prominently displayed brand names playing a central role. Fixation data highlight brand names as the most consistently engaging feature across all packaging types. Regression analysis further reveals that cultural familiarity influences preferences, as international participants favored designs resembling those from their home regions or familiar global brands. These insights underscore the importance of visually appealing and culturally relevant designs in building consumer engagement and brand loyalty. The study offers valuable guidance for marketers and designers aiming to create packaging that resonates with diverse audiences and market demands.

Keywords: dairy industry; packaging design; consumer behavior; decision-making; eye-tracking technology; visual engagement

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1. Introduction

The dairy industry is an essential part of the global food system [1], and milk remains a staple in households worldwide [2]. Milk and dairy products play a vital role in diets worldwide, offering essential proteins and minerals necessary for human growth and overall health [3]. Milk and dairy products are often considered key components of a well-rounded and nutritious diet [4]. According to the Food and Agriculture Organization of the United Nations, dairy cows account for the majority of global milk production at 82.4%, followed by buffalo at 13.6%, and goats at 2.3%, with rising dairy consumption and population growth projected to necessitate an additional 600 billion kilograms of milk by 2067 [5,6]. As the global population continues to grow, expected to reach 9.7 billion by 2050 from 7.7 billion in 2019, the demand for dairy products is steadily increasing [7].

Milk delivered to dairies is processed into fresh products like drinking milk, yogurt, cream, and fermented milks [8]. Dairy products, including fresh milk, its derivatives, powdered varieties, and synthesized proteins and fats used in industrial foods, are consumed regularly by more than 80% of the global population. These products address a wide range of nutritional requirements and preferences, playing a crucial role in global food security and supporting the livelihoods of billions worldwide [9]. With the rising demand for dairy products driven by population growth, the dairy industry plays a vital role in meeting these needs, highlighting the necessity of sustainable production practices to secure long-term availability and accessibility [10].

Visual attention influences not only the products consumers notice but also their perceptions of quality, ability to recall the brand, and intention to make a purchase [11]. Elements of packaging, including color, shape, size, and typography, have a profound impact on visual attention, with each aspect uniquely influencing consumer behavior [12]. Additionally, the length and depth of visual interaction with a product's packaging can shape emotional reactions, strengthening the bond between the consumer and the brand [13]. Visual attention is reflected in ocular behavior, which is primarily an unconscious phenomenon, making eye-tracking the most suitable method for its measurement [14]. Eye-tracking research in marketing has proven valuable for assessing visual attention, gaining insights into how consumers interpret visual commercial displays, and evaluating the impact of visual marketing stimuli [15].

Research on how packaging design affects consumer attention and decision-making in the dairy industry is rare despite the industry's increasing significance. Packaging is a critical component of marketing that directly affects consumer behavior, yet there remains a significant gap in understanding which visual features most effectively capture attention and drive purchasing decisions in the context of dairy products. Addressing this gap is essential for developing effective marketing strategies that align with evolving consumer preferences. This study examines the impact of milk packaging design on consumer attention and preferences using eye-tracking technology and survey analysis. The research focuses on identifying the packaging features that capture visual attention and shape purchasing decisions, comparing regular milk, organic milk, and character-themed designs. Key research questions include the following:

1. Which visual aspects of milk packaging are most effective in attracting consumer attention?
2. How do various packaging styles affect consumer perceptions and preferences?
3. What insights can these preferences provide for marketing strategies in the dairy industry?

By integrating findings from eye-tracking heatmaps with consumer survey data, the study offers valuable insights into the influence of packaging on consumer decision-making. The outcomes aim to provide practical recommendations for marketers and designers in the dairy industry, enabling the creation of packaging that not only appeals visually but also enhances consumer engagement and loyalty.

2. Literature Review

2.1. Visual Appeal and Consumer Behaviors

Brand preferences are increasingly influenced by the aesthetic appeal and uniqueness of visual design, underscoring its critical role in shaping consumer purchasing decisions [16]. Real-world purchasing scenarios are influenced by numerous visual cues, with decision-making often being largely subconscious and only a small number of these stimuli leaving a lasting impression in memory [17]. Modern packaging has moved beyond its conventional purpose of simply enclosing and safeguarding products [18,19], now serving

as a strategic means to drive sales at the point of purchase while delivering both practical and experiential value [20]. Packaging captures attention while conveying brand identity and enriching the customer experience [21]. Thus, packaging design can serve as a powerful tool to shape consumer preferences and provide businesses with opportunities to enhance their commercial success [12]. Consumers tend to select products or packaging that stand out and capture their visual attention, as attention plays a crucial role in influencing product choice [22]. Gaining insights into customer preferences and challenges plays a vital role in creating or enhancing products that effectively meet their needs, ensuring a strong alignment with the market [23].

Visual appeal is crucial in influencing consumer behavior and connecting perception with brand engagement [24]. Visual elements play a vital role in shaping how consumers perceive, evaluate, and engage with products by drawing attention and conveying aspects such as functionality, visual appeal, and symbolic meaning [25]. Gibson (1941) [26] introduced the concept of feature-driven visual search, termed the "intention of seeing", highlighting the intrinsic connection between visual attention and the actions or responses it provokes in individuals. Behe et al. (2015) [27] highlighted that visual attention directed toward specific display features, such as product signage and informational elements, plays a significant role in predicting consumer product selection within retail settings.

2.2. Customer Perceptions of Diary Product

Packaging plays a vital role in shaping consumer attitudes and decision-making by influencing perceptions, expectations, and purchase intentions [28]. Key elements such as design, functionality, and sustainability significantly impact how consumers interact with and evaluate products.

Studies emphasize that packaging design is critical for setting consumer expectations and reinforcing brand identity. Ares and Deliza (2010) [29] demonstrated that features like shape and color significantly influence sensory perceptions and purchase decisions for dairy products. Similarly, Orth and Malkewitz (2008) [12] identified five holistic design types, massive, contrasting, natural, delicate, and nondescript, that align with different brand personalities and impact consumer brand impressions. These findings highlight the strategic role of packaging design in enhancing product appeal and fostering loyalty.

Functional attributes of packaging also contribute to consumer decision-making. Silayoi and Speece (2007) [30] found that practical features, such as convenience and ease of use, are key drivers of purchase likelihood. Additionally, Wyrwa and Barska (2017) [31] noted that durability and user-friendliness are among the most valued characteristics of food packaging. These studies underscore the importance of functional considerations in designing packaging that meets diverse consumer needs.

Sustainability has emerged as an essential factor in modern packaging strategies. Magnier and Schoormans (2015) [32] showed that sustainable packaging elements, including visual appearance and verbal claims, positively affect consumer attitudes, particularly among environmentally conscious consumers. However, van Herpen et al. (2016) [33] found that consumers often rely on misleading cues or assumptions when assessing sustainability, resulting in discrepancies between perceived and actual environmental impacts. Despite these challenges, sustainable packaging remains a powerful tool for influencing perceptions of product quality and brand responsibility.

2.3. Eye-Tracking Technology in Packaging Research

Eye-tracking methodologies provide a deeper understanding of consumer preferences by connecting subconscious visual attention to conscious decision-making processes. The integration of eye-tracking technology with methodologies such as surveys, behavioral

experiments, and big data analysis has paved the way for deeper insights into consumer behavior [34]. This combined approach enables researchers to explore in greater depth how visual stimuli draw attention and affect cognitive and emotional processes [35]. Various studies have employed eye-tracking methodologies to explore the impact of visual stimuli on consumer attention, preferences, and decision-making across different industries, underscoring its significant influence on shaping behavior (see Table 1).

Table 1. Eye-tracking research on visual attention and consumer behavior across industries.

Reference	Industry	Stimuli	Key Findings
Kim and Kim (2024) [36]	Tourism	Travel websites (various layouts, images, and promotional elements)	Attractive layouts, prominent images, and promotional elements draw attention and shape user preferences, with strategic visual placement boosting engagement and usability.
Palacios-Ibáñez et al. (2023) [37]	Virtual Retail	Household products (virtual environments with product arrangements and designs)	Product placement and visual design heavily impact attention and preferences, shaping consumer decisions in virtual environments.
Bialkova et al. (2020) [38]	Food Retail	Cereal products (different brands, flavors, and nutrition labels)	Brand and product flavor drive consumer attention and choice, with strong brands and favorites attracting more focus. Label formats, shopping goals, and brand placement also shape attention and behavior.
Guo et al. (2019) [39]	Consumer Goods	Desk lamps (different levels of visual aesthetic quality)	Visually appealing desk lamps capture more attention and elicit stronger emotional responses, highlighting the impact of aesthetics on consumer preferences.
Luan et al. (2016) [40]	E-commerce	Online product reviews (search and experience products; attribute-based and experience-based reviews)	Consumers seeking search products focus more on attribute-based reviews, while experience product browsing shows less fixation variation. Eye-tracking highlights the role of review-product alignment in shaping behavior.

3. Materials and Methods

3.1. Stimuli

Eye-tracking technology is a frequently used physiological method for analyzing attention by monitoring both the frequency and duration of participants' glances at external stimuli. This method has proven invaluable in studying different aspects of visual engagement, such as how ad familiarity and creativity influence attention [41], the role of packaging designs in shaping consumer purchase decisions and capturing attention [42,43], and enhancing understanding of visual search processes [44]. According to Lockhead (1972) [45], "dimensional stimuli" refer to stimuli with measurable attributes, including color, brightness, shape, size, pitch, or intensity, which can be systematically adjusted in perception and cognitive processing experiments. Perceptual representations may function as simple "templates" or labels, each tailored to a specific stimulus and independent in structure or components from other representations, offering unique insights into how visual elements are processed [46]. By accurately measuring gaze patterns and

intentional viewing behaviors, eye-tracking provides meaningful insights into the processing of visual information across a range of stimuli [47]. The selected product category for the present study was dairy, specifically focusing on milk products. This category was chosen because milk is a universally consumed product with diverse packaging formats that influence consumer preferences. Seoul Milk was selected as the stimulus brand due to its leading position in the South Korean milk market, holding an estimated 43.85% market share as of 2023 [48,49]. The selection ensures the stimuli are representative of widely recognized and familiar products, which enhances the generalizability of the study. For this study, dairy milk products from Seoul Milk, a leading milk brand in South Korea [48], were selected as experimental stimuli. In 2023, Seoul Milk held an estimated 43.85% share of the South Korean milk market, reinforcing its position as the top market leader [49]. Figure 1 shows the experimental stimuli, highlighting the milk packaging designs shown to participants during the study.



Figure 1. Visual stimuli used in the study (서울우유: Seoul Milk, 꿀딴지: Honey jar, 초코: Chocolate, 딸기: Strawberry, 유기농 우유: Organic milk).

The visual stimuli for this study consisted of Seoul Milk products organized into two rows. The top row displayed chocolate and strawberry milk in three distinct packaging designs: regular, character-themed, and organic. The bottom row presented plain milk in four packaging formats: small carton, organic carton, large plastic bottle, and large carton. These examples were sourced and adapted from Seoul Milk's official website (www.seoulmilk.co.kr), accessed on 22 November 2024. Participants were exposed to the stimuli in a randomized order to minimize any potential biases caused by the sequence of presentation. Randomization ensures that participants' attention and engagement are influenced solely by the stimuli's characteristics rather than their position in the sequence.

3.2. Participants

This study involved 40 participants representing diverse nationalities. The participants were aged between 18 and 50 years, with the majority being in their 20s. The sample consisted of 14 females (35%) and 26 males (65%). Most participants were Korean, Vietnamese, Bangladeshi, and Nepalese, with smaller numbers from Indonesia, China, and other countries. Recruitment was conducted at a university, targeting students from both English and Korean tracks based on their interests and availability. Participants reported diverse milk consumption habits, ranging from occasional (1–3 times a month) to frequent (1–4 times a week) and very frequent (nearly daily). The eye-tracking experiments were conducted in the university's eye-tracking laboratory.

3.3. Methodology

The research adopted a comprehensive multi-step approach, which included data collection, processing, and analysis, to investigate consumer preferences for milk packaging designs (see Figure 2).

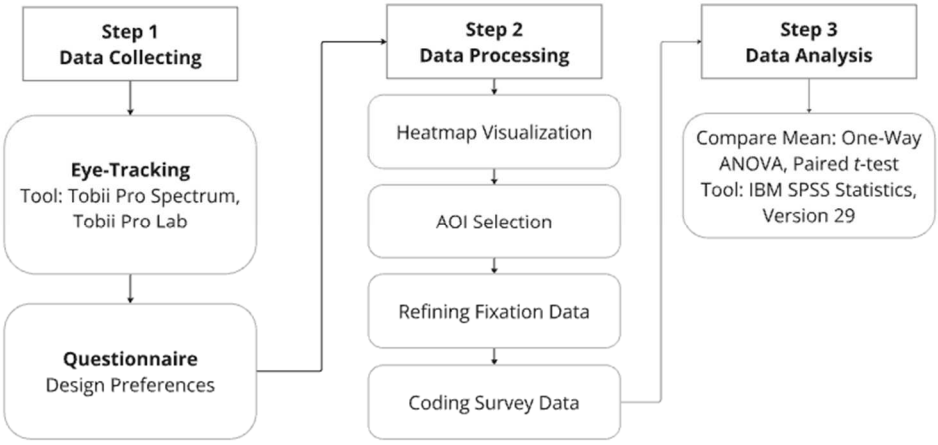


Figure 2. Methodology framework.

Data collection utilized two primary methods. First, eye-tracking technology, specifically Tobii Pro Spectrum and Tobii Pro Lab, was employed to capture visual attention metrics. Tobii Pro Lab, known for its robust capabilities in experimental design and data interpretation, has been widely adopted in research [50–52]. Participants were presented with various milk packaging designs, such as fixation points and Areas of Interest (AOIs), which were recorded to measure visual engagement. AOIs, representing predetermined regions of the packaging, were strategically defined to focus the analysis on elements like brand logos and product descriptions [53,54]. These regions allowed for the evaluation of key metrics such as fixation counts, gaze duration, and viewing sequences, offering detailed insights into visual attention and behavior [55]. In addition to the eye-tracking data, a questionnaire was administered to collect participants' subjective evaluations and preferences, providing a complementary perspective to the objective findings.

Once data collection was completed, a systematic processing workflow was implemented. Heatmaps were visualized to identify packaging types and areas that garnered the most attention. The predefined AOIs were analyzed further to extract detailed insights into participants' focus on specific visual elements. Fixation data underwent cleaning and refinement to ensure its accuracy and reliability for subsequent analyses. At the same time, questionnaire responses were coded systematically for both statistical and thematic evaluation. The final analysis was conducted using IBM SPSS Statistics, Version 29. Statistical procedures included One-Way ANOVA to detect significant differences in visual attention and preferences across the different packaging designs. Paired *t*-tests were also applied to evaluate specific pairwise comparisons between designs. By integrating objective data from eye-tracking with subjective feedback from the survey, this approach provided a comprehensive exploration of consumer preferences for milk packaging, shedding light on both visual engagement and individual design evaluations.

4. Results

4.1. Heatmap Visualization

Heatmap visualization is a widely used technique for analyzing eye-tracking data, providing a clear representation of user focus and visual attention [56]. By using intensity gradients, heatmaps emphasize areas with the highest levels of gaze activity, making it

easier to pinpoint regions that draw the most attention [57]. This approach helps uncover patterns in visual engagement, aiding in the assessment of design efficiency and the strategic placement of content [58]. Heatmaps simplify the interpretation of intricate data sets and present findings in a visually intuitive format, making them an essential tool in disciplines like user experience research, marketing, and consumer behavior analysis [59]. The heatmap uses green to represent lower expression levels and red to indicate higher expression levels [60]. The heatmap visualization for the study's stimulus, highlighting areas of visual attention based on gaze activity, is presented in Figure 3.



Figure 3. Heatmap visualization results.

The heatmap visualization illustrates consumer visual attention across different milk packaging designs, identifying areas with the highest and lowest levels of gaze activity. The findings show that character-themed packaging, such as designs featuring characters (e.g., Winnie the Pooh in this study), captures considerable attention, particularly around character illustrations and vibrant colors, as indicated by the red zones. These high-engagement areas suggest the effectiveness of such designs in attracting consumer focus. The heatmaps also reveal a consistent focus on the brand name, which commonly appears in red or orange zones across all packaging designs. This pattern suggests that consumers are naturally attracted to the brand logo and name, likely due to their strategic placement and familiarity. The importance of these textual elements highlights their pivotal role in packaging design, as clear, concise wording paired with a recognizable logo can significantly capture consumer attention and enhance engagement. These results align with earlier research, such as Pieters and Wedel (2004) [61], who emphasized the importance of brand logos in attracting visual attention in advertising. A study by Clement et al. (2013) [62] noted that consumers often prioritize brand names and essential product details during purchasing decisions. Together, these insights underscore the value of carefully positioning text and logos to maximize consumer interaction with packaging.

4.2. Fixation Duration

Fixation duration is a critical measure in eye-tracking research, representing the time a participant's gaze remains focused on a particular visual element or Area of Interest (AOI). This metric is widely recognized as a reflection of cognitive engagement and visual processing, with longer durations often linked to increased interest, perceived importance, or the complexity of interpreting the visual stimulus [63]. In contrast to rapid saccadic

eye movements, which denote shifts in focus, fixations capture the moments when the brain actively processes visual information, making them indispensable for understanding interactions with visual content [64]. In consumer behavior studies, fixation duration sheds light on which elements of product packaging, such as brand names, imagery, or labels, capture the most attention and influence consumer decision-making [65]. This study leverages fixation duration to evaluate the visual engagement elicited by different packaging designs and AOIs.

4.2.1. Fixation Duration by Areas of Interest (AOIs)

The examination of fixation duration across different Areas of Interest (AOIs) offered meaningful insights into which packaging elements garnered the greatest visual attention. Five distinct AOIs were analyzed for all regular packages: brand names, pictures, flavor descriptions, ingredient labels, and calorie information. Results indicated that brand names attracted the longest fixation durations, followed by pictures, flavor descriptions, ingredient labels, and, finally, calorie information. A One-Way ANOVA (see Table 2) revealed statistically significant differences in fixation durations across these AOIs ($F = 18.505$, $p < 0.001$). Subsequent post hoc Duncan tests confirmed this ranking of visual attention, showing that fixation durations for brand names were significantly greater than those for the other AOIs ($a < b < c$; $p < 0.001$).

Table 2. Fixation duration for packaging design elements by areas of interest (AOIs).

	Ingredient	Calorie	Flavor	Picture	Brand Name	Total	*F* Ratio	*p* Values
Fixation Duration	0.5 ^{a}	0.08 ^{a}	0.35 ^{a,b}	0.73 ^{b}	1.53 ^{c}	0.55	18.505	<0.001

Note. Post hoc Duncan test: a < b < c.

These findings highlight the critical role of brand names in packaging design, consistent with prior research emphasizing their influence on capturing consumer attention and enhancing product recall. For example, Pieters and Wedel (2004) [61] demonstrated that prominently positioned brand names are vital for creating visual prominence, enabling them to stand out amidst competing elements in busy retail settings. Similarly, Clement et al. (2013) [62] identified brand names as central visual anchors that guide consumer decision-making, underscoring their importance in shaping purchase choices. A previous study mentioned that nutrition labeling is often regarded as an essential tool for encouraging healthier food choices [66]. Nevertheless, the findings in Table 2 reveal that calorie information, a significant component of nutrition labeling, receives very little visual attention from consumers. Collectively, these studies underscore the importance of carefully designing and positioning brand names to enhance the overall effectiveness of packaging. The results of the fixation duration analysis by AOIs align with the heatmap visualizations, which consistently highlighted areas of intense visual focus (represented by red and orange zones) around brand names in all packaging designs.

4.2.2. Fixation Duration by Packaging Type

The analysis of fixation duration across different packaging types offers additional insights into consumer visual engagement with various packaging designs. Three packaging categories were examined: organic, regular, and character-themed packaging. As outlined in Table 3, the findings reveal notable variations in fixation durations among these packaging types, highlighting significant differences in consumer attention allocation. A One-Way ANOVA demonstrated significant variation in fixation durations across packaging types ($F = 6.967$, $p < 0.001$). Post hoc Duncan tests further confirmed that fixation durations for organic packaging were significantly shorter compared to those for regular and character-

themed packaging (a < b; $p < 0.001$). Among the packaging types, character-themed designs elicited the longest fixation durations, followed closely by regular packaging, with organic packaging showing the shortest fixation times.

Table 3. Fixation duration for packaging type.

	Organic Packaging	Regular Packaging	Character Packaging	Total	*F* Ratio	*p* Values
Fixation Duration	1256.10 [a]	1788.40 [b]	1799.35 [b]	1799.35	6.967	<0.001

Note. Post hoc Duncan test: a < b.

The findings indicate that character-themed packaging, with its vibrant designs and engaging visual elements, such as characters, is particularly effective in capturing and maintaining consumer attention. Animated characters play a crucial role in capturing attention, with the paper highlighting their effectiveness in engaging audiences, including children, across fields like teaching, entertainment, and marketing [67]. This observation aligns with Huddleston et al. (2015) [68], who found that visually distinctive and creatively designed packaging tends to enhance consumer engagement. Conversely, the shorter fixation durations observed for organic packaging may be attributed to its minimalist design, which often emphasizes eco-friendly messaging over visual appeal to draw attention [69].

4.2.3. Regression Analysis: Effects of Brand Attributes on Consumer Preference

This section investigates the influence of average viewing duration on consumer preferences for Korean milk brands, such as Seoul Milk, and international brands, including Nesquik. Seoul Milk is highly regarded for its strong brand reputation and extensive recognition within Korea [48]. The regression analysis aims to compare consumer preferences for local and international milk brands. Nesquik was selected as a representative international brand due to its widespread international popularity as a favored flavored milk among adults [70]. Additionally, Nesquik focuses its marketing efforts on younger audiences, particularly children, by highlighting themes such as convenience, energy, and enjoyment in its advertising campaigns [71]. The analysis considered Customer Preference (CP) as the dependent variable, with predictors derived from fixation durations on packaging recorded through eye-tracking technology (see Table 4).

Table 4. Linear regression results of packaging type.

Model	Unstandardized Coef.		Standardized Coef.	*t*
	B	Std. Error	Beta	
(Constant)	2.772	0.732		3.786 ***
Korean Milk (Seoul Milk)	−0.003	0.001	−0.384	−2.099 *
Overseas Milk (Nesquik)	0.009	0.003	0.551	3.014 **

Note. Dependent variable: Customer Preference (CP); $R^2 = 0.344$; $F = 5.495$; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The regression analysis utilized the same participant sample as the eye-tracking study to ensure consistency and alignment between the datasets, following methodologies commonly adopted in similar research [34]. The regression analysis demonstrated that the examined factors accounted for 34.4% of the variance in customer preferences ($R^2 = 0.344$). Both variables demonstrated statistically significant influences on customer preference. The analysis revealed that "Korean Milk (Seoul Milk)" had a negative association with customer preference ($\beta = -0.384$, $p = 0.048$), indicating that this product was less favored within the study's context. In contrast, "Overseas Milk (Nesquik)" showed a positive rela-

tionship (β = 0.551, p = 0.007), reflecting its greater appeal among the participants. These findings highlight the significant impact of visual engagement with packaging on shaping consumer preferences, particularly for the analyzed products, Seoul Milk and Nesquik. The participant sample, consisting of 40 individuals, offers valuable context for understanding these findings. Of the participants, 14 (35%) were Korean, while the remaining 26 (65%) represented a variety of nationalities, including Vietnamese, Bangladeshi, Nepalese, Indonesian, and Chinese, among others. This diverse participant composition underscores how cultural variations may influence consumer perceptions [72]. Additionally, cultural factors play a crucial role in how packaging conveys its message to consumers, ensuring that designs resonate with local cultural norms and expectations [73].

5. Discussion

This study underscores the vital role of packaging design in shaping consumer attention and influencing decision-making. Visual attention plays a key role in purchase intention, acting as the initial gateway through which consumers notice, evaluate, and develop impressions of a product, ultimately affecting their willingness to buy [27,74]. Heatmap analyses revealed that character-themed designs consistently drew the highest visual attention, particularly to vibrant illustrations and strategically placed brand logos. These findings align with earlier research indicating that visually engaging features, such as characters and vivid colors, significantly enhance consumer interaction with a product [75]. The responses to the research questions have been integrated into the discussion to ensure clarity and coherence, supported by relevant academic literature. Additionally, the study showed that brand names and essential product details commanded the longest fixation durations, highlighting their role as critical visual anchors [76].

Variation in fixation durations across different packaging styles, such as character-themed, regular, and organic, emphasizes the importance of tailoring design strategies to specific target audiences [77]. Character-themed packaging, which garnered the most engagement, is particularly effective for younger consumers or markets that prioritize visually distinctive designs. This aligns with findings by Mick et al. (2004) [78], which demonstrated that playful and vibrant packaging elements strongly appeal to buyers, enhancing both attention and purchase likelihood. Conversely, the minimalist and eco-friendly designs of organic packaging resonate more with environmentally conscious consumers, prioritizing sustainability over immediate visual allure [69,79]. These results highlight the need for packaging designs that balance aesthetics, practicality, and messaging to address diverse consumer preferences effectively.

Regression analysis further illustrated the impact of visual engagement on consumer preferences. While international brands like Nesquik were more popular among participants, Korean brands such as Seoul Milk were less favored, possibly due to differences in cultural or brand familiarity. These findings align with previous research on the relationship between cultural context and consumer perception, suggesting that local brands could strengthen their appeal by adopting innovative and culturally relevant packaging designs [72]. Adapting packaging designs to reflect local cultural norms and preferences could enhance consumer appeal, as supported by Yu and Cude (2009) [72].

The findings of this study offer insights for marketers and designers across various sectors. Character-themed packaging has proven to be a powerful consumer attraction, which captures consumer attention and creates interest through its playful and visually dynamic design elements. Leveraging character-themed packaging in family-oriented markets or through collaborations with popular media characters could amplify branding efforts [67]. This approach can also be applied to marketing initiatives and partnerships with popular themes and media, resulting in increased brand awareness and consumer

loyalty. Furthermore, the study highlights the critical role of brand names in drawing attention, emphasizing the importance of incorporating clear and strategically positioned logos and text into packaging design. Such visibility enhances brand recognition and trust, particularly in competitive markets where buying decisions are made rapidly.

To apply these insights, brands should prioritize packaging designs that make their names and logos highly visible and aesthetically appealing. Utilizing simple yet effective techniques such as bold typography, contrasting colors, and intentional placement can significantly enhance a brand's memorability. Furthermore, aligning packaging design with the brand's identity and values can enhance the consumer's experience, position the brand as a leader in the market, and allow for deep connections with the brand.

6. Conclusions

This study emphasizes the crucial influence of visual design in dairy packaging on consumer attention and decision-making. Packaging with character-themed designs proved particularly effective in drawing consumer interest, while brand names consistently acted as key focal points across all packaging variations. By combining data from eye-tracking technology with survey responses, the research offered a well-rounded view of consumer preferences, highlighting the advantages of integrating both quantitative and qualitative approaches in packaging studies.

The sample size of 40 participants aligns well with benchmarks in similar research. For instance, prior studies, such as Xu et al. (2017) [80] and Bialkova et al. (2020) [38], successfully derived meaningful conclusions with fewer than 50 participants, demonstrating the efficacy of smaller-scale studies. On the other hand, larger participant groups, as seen in research like Luan et al. (2016) [70] and Vraga et al. (2016) [81], offer insights that are more broadly applicable, showcasing the trade-off between depth and generalizability based on sample size and research objectives.

Through their empirical evidence regarding how visual design impacts consumer behavior, these findings significantly contribute to the development of marketing theory and practices. By combining eye-tracking data with consumer insights, this study maximizes the engagement of consumers with packaging by aligning the cognitive and emotional elements. Based on the study's findings, visual salience has been emphasized as a key factor that drives consumer decision-making in highly competitive markets. In practice, the insights can direct designers and marketers to create packages that not only attract attention but also strengthen brand recognition and loyalty. The results of these studies can be used to improve marketing strategies, optimize shelf presence, and adapt to evolving consumer preferences more effectively and efficiently.

It is essential to highlight a few limitations of this study. The products examined were primarily Korean milk brands alongside one international brand, which may not fully capture the variety of packaging styles seen across the global dairy market. Moreover, the study was conducted in a controlled laboratory setting, which may not reflect real-world shopping conditions where factors like time pressure, distractions, and social dynamics can influence consumer behavior. Additionally, using the same sample for both the eye-tracking and regression analyses while ensuring consistency may limit the generalizability of the findings. Furthermore, individual factors, such as hunger levels and personal conditions, were not entirely controlled [82], which could also affect the reliability of the results by introducing variability in how participants respond to the packaging designs.

Although nutritional labeling was incorporated as a design element in this study, its influence on consumer behavior, including satisfaction and loyalty [83], remains unclear and requires further investigation. The findings indicate that calorie information, a key aspect of nutritional labeling, attracted low visual attention, highlighting the need for additional

research to assess its potential impact on decision-making among health-conscious consumers.

Future studies could overcome these limitations by involving a broader and more diverse participant sample to improve the generalizability of the results. Expanding the research to include a wider variety of dairy products or even other food categories could yield more comprehensive insights into consumer preferences. Moreover, incorporating advanced physiological measurement techniques such as electrocardiography (ECG), electrodermal activity (EDA), or functional magnetic resonance imaging (fMRI) may offer a deeper and more objective understanding of consumers' emotional and cognitive reactions to packaging designs. With the advancement of technology, investigating the potential of augmented reality and interactive packaging to enhance consumer engagement could uncover new opportunities for improving decision-making and brand interactions. These suggested directions have the potential to advance packaging design research and provide actionable insights for industry applications.

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Conflicts of Interest: The authors declare no conflicts of interest.

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