



The Influence of Consumers' Visual Attention on Product Packaging Elements in Their Purchasing Process Using Eye-Tracking Technology

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Citation: Atri, R., Maghsoudi Rahim Abadi, M., Keimasi, M., & Abedi, E. (2025). The Influence of Consumers' Visual Attention on Product Packaging Elements in Their Purchasing Process Using Eye-Tracking Technology. *Business, Marketing, and Finance Open*, 2(1), 72-88.

Received: 17 August 2024

Revised: 18 October 2024

Accepted: 17 December 2024

Published: 01 January 2025



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Abstract: Packaging plays a key role in attracting consumers' attention at the point of sale and can become a market winner by creating differentiation. This study examines the influential packaging elements in capturing visual attention and being selected by consumers, with results obtained through quantitative and experimental methods. The research follows an exploratory approach and was conducted in three phases. Initially, key influential packaging elements in food products were identified through interviews with industry professionals. Then, a filtering questionnaire was employed to classify products as utilitarian or hedonic, based on consumption patterns. This phase involved non-random and purposive sampling. Subsequently, an eye-tracking experiment was conducted to quantitatively measure visual attention to the examined elements. In the final phase, a quantitative questionnaire-based experiment was used to complement the previous phase's data and examine the research hypotheses in greater detail. In the last two phases of the study, non-random and snowball sampling methods were applied. For demographic variable analysis, frequency and percentage distribution methods were used, while the Friedman nonparametric test in SPSS software was employed to analyze and compare packaging attractiveness and consumers' purchase intention. Additionally, the relationships and effects of variables in the structural equation model were analyzed using SmartPLS software. The study's findings indicate that the impact of transparency and character elements in packaging on consumer attention and product selection varies depending on the product type. For pasta, gummy candies, and chocolate, the simultaneous presence of transparency and character significantly influenced attention and purchase selection. However, in the case of olive oil, there was no significant relationship between different packaging conditions and consumer attention or selection.

Keywords: Visual attention, packaging, eye-tracking system, transparency, character

1. Introduction

The current highly competitive market presents numerous complexities in the marketing and sales of consumer goods, with multiple factors contributing to the transformation of the competitive landscape [1]. In other words, in the era of information and electronic communication, organizations of all sizes must strategically plan their market presence to adapt to rapid market changes and sustain their operations in this turbulent environment [2, 3]. The expansion of markets, as well as the attraction and retention of customers, has become a major concern for organizations, prompting them to employ various sales promotion strategies to

showcase their products to consumers and facilitate their selection. One such strategy adopted by organizations is packaging, which serves as a means of establishing effective communication with consumers [4]. Consumers often base their purchasing decisions on the visual appearance of products [5]. Packaging is one of the most critical yet decisive stages in product presentation and consumption. When shopping, consumers first encounter product packaging and make decisions within the first few seconds [6]. In essence, packaging acts as an immediate visual stimulus [7] and serves as a medium for conveying messages to consumers [8]. Given that 73% of purchase decisions are made at the point of sale and 90% of these decisions are influenced by the visual appearance of packaging [3, 4, 9], the critical focal point that demands attention is the moment of purchase. This is where consumer influence can be maximized through innovation and the strategic use of packaging elements [9, 10].

Packaging design encompasses artistic, graphic, and aesthetic elements displayed on product packaging to capture customer attention. However, packaging information refers to any details presented on or within the packaging that guide consumers in their purchasing and usage decisions [11]. Packaging not only plays a role in attracting consumer attention but also aids in conveying expectations regarding the sensory perception of the product. Previous studies indicate that consumers do not pay attention to all the information on packaging; rather, they selectively process some details while disregarding others [4, 12]. Moreover, research suggests that consumers' evaluation and selection of packaging elements—while neglecting others—depend on the purpose of the purchase, whether for hedonic enjoyment or utilitarian benefits [6, 13, 14]. A fundamental question arises: does the product fail to capture consumer attention, or is the consumer simply uninterested in engaging with it? A precise answer to this question requires eye-tracking analysis [15].

Extensive research has been conducted using modern tools to understand consumer purchasing behavior. For example, Gregor Franken (2020) examined brand elements, text, shape, and imagery using eye-tracking technology, revealing that participants paid more attention to product names and brand names (due to larger font sizes) and spent more time viewing images on packaging than textual information [15]. In another study, Marco Fazio et al. (2020) analyzed olive oil product labels before production using eye-tracking, investigating two packaging models and three label types [4]. The findings suggested that consumers associated transparent packaging with quality, while images containing hands using the product and slogans such as "You Are the Winner" attracted consumer attention.

Similarly, research by Sophie Lacoste-Badie et al. (2020) examined the impact of symmetrical versus asymmetrical front-of-package designs on the visual attention of consumers for fast-moving consumer goods. Their laboratory experiment using eye-tracking demonstrated that symmetry influences consumer attention—first by affecting overall visual focus on the package and second by determining which specific areas of the packaging hold attention [16]. In another study, M. Ronyastra (2021) exposed respondents to images of 20 different biscuit packages while recording visual responses with eye-tracking technology. Findings indicated that popular brands attracted more attention, and orange packaging was more visually engaging than other colors. Elements such as company name, brand name, and product image were deemed essential and necessary on packaging [17].

Another study by Xueer Ma et al. (2020) explored whether food packaging with transparent windows (compared to packaging with graphical representations of food or non-food items in the same position and size) had advantages in attracting consumer attention and influencing purchase decisions. The results showed no significant differences between transparent and graphical windows. For canned fruits, the time to first fixation was shorter in the transparent packaging condition than in others. For nuts, purchase intent was higher for both transparent and graphical packaging conditions compared to the baseline, with packaging attractiveness playing a mediating role

in purchase decisions [18]. Barbara Sabo et al. (2017) investigated the effect of packaging transparency on product attractiveness, revealing that consumers preferred transparent packaging, whereas opaque packaging was often ignored and perceived as less healthy [19].

Previous studies suggest that the use of characters in packaging is predominantly associated with hedonic products such as chocolate, chips, and gummy candies, often serving as a unique or serialized brand symbol. However, in contemporary packaging design, characters extend beyond anthropomorphic or animal representations in hedonic products and are now incorporated into various product categories. This study aims to examine how transparency and character usage in packaging influence consumer visual attention across different product types—utilitarian and hedonic. These elements, selected as novel and influential packaging factors, have not been extensively addressed in previous research. The study also seeks to answer a fundamental question: does the lack of visual attention to a product lead to non-purchase? The central research question of this study is whether selected packaging elements—transparency and character usage—affect consumer visual attention in utilitarian and hedonic products and whether their attractiveness influences consumer purchase decisions. To investigate this, four products were selected across two categories: pasta and olive oil as utilitarian products, and gummy candies and chocolate as hedonic products.

2. Methodology

This study is applied in nature, as its findings will be directly applicable to food product manufacturing companies. Given the type of data and execution method, the research follows a descriptive-survey and causal approach. In this study, the researcher describes and interprets existing conditions, relationships, prevailing opinions, current processes, observable effects, or emerging trends. The primary focus is on the present, although past events and their effects on the current situation are also examined. Additionally, the study is survey-based, as it aims to sample a smaller group and generalize the findings to the broader population. Since the study investigates the impact of an independent variable on a dependent variable, it can be classified as causal research.

The research was conducted in three stages. The first stage involved a literature review and a survey-based approach. Some research data were collected from online sources and prior studies, while others were obtained through interviews and questionnaires with designers and marketing managers. Initially, a thorough review of the research literature was conducted to identify gaps, followed by interviews with nine designers and managers in the food industry. These participants were selected through non-random sampling and invited for interviews to identify influential packaging elements based on current industry concerns and research gaps. The interviews continued until theoretical saturation was reached.

Transparency and character were selected as packaging elements, as they have not been extensively addressed in previous research yet have gained prominence in the food packaging industry. To accurately assess these elements based on consumer purchasing patterns, it was necessary to examine consumer consumption patterns according to product type (hedonic or utilitarian). Therefore, the consumer consumption pattern questionnaire (Kim, 2009) was adapted using five statements, and participants' responses were recorded using a five-point Likert scale, with the total score calculated. The sample for this stage was the same as in the first phase. After the interviews, participants were asked to complete the questionnaire via an online link. The assumption regarding product selection categorized pasta and olive oil as utilitarian products and gummy candies and chocolate as hedonic products. The questionnaire results confirmed this classification. The filtering questionnaire for consumption patterns (James Self & Chajoong Kim, 2015) produced the following results:

The mean response to utilitarian product-related questions was 4.1 for pasta and 4.1 for olive oil, confirming their classification as utilitarian products.

The mean response to hedonic product-related questions was 4.2 for chocolate and 4.1 for gummy candies, confirming their classification as hedonic products.

After determining the study products, their packaging was specifically designed by focusing on the two examined elements while eliminating other packaging features present in the market. The second stage involved a quantitative analysis of the identified variables using an eye-tracking system. The research paradigm adopted a positivist approach, and the quantitative method employed was experimental. After identifying and modeling the variables—transparency and character usage in packaging—four experimental conditions were considered: (1) presence of transparency, (2) absence of transparency, (3) presence of character, and (4) simultaneous presence of both transparency and character. These conditions were applied to four products (pasta, chocolate, gummy candies, and olive oil) across the two product categories (utilitarian and hedonic), with packaging designed accordingly for testing.

To measure visual attention to the examined packaging elements, an experiment was conducted using the Tobii eye-tracking device and Tobii Pro Lab software. Most neuromarketing studies on marketing and advertising employ sample sizes ranging from 15 to 50 participants in laboratory environments (Cook et al., 2011; Venkatraman et al., 2015). Given the experimental nature of this study and participant limitations, a sample of 60 participants was selected and tested. Initially, participants were screened via telephone interviews using a pre-experiment filtering questionnaire to determine eligibility. Since the experiment was conducted in an academic setting, efforts were made to ensure diversity in age groups, educational backgrounds, and participants' interests in the selected products.

In the second stage, participants attended the laboratory individually, where they were seated in front of a computer equipped with Tobii Studio software and observed the experimental images. Upon completing the experiment, participants were given another questionnaire that included color images of the displayed products and two questions regarding visual appeal and purchase intention. Participants rated four packaging models for each product. This step was designed to complement the previous phase. These steps were repeated for all 60 participants, and the collected data from the eye-tracking experiment and follow-up questionnaire were analyzed.

Given the relatively large target population, participant selection criteria focused on decision-makers and influencers in purchasing food products. The study included working professionals with academic education and students, who were invited to participate in the experiment. The final two research stages used non-random and snowball sampling methods.

Regarding gender distribution, since no reliable data on gender-specific consumer preferences for the selected products were available, an equal number of male and female participants were recruited. For social class considerations, prior studies indicated that upper-middle-class individuals were appropriate for the study; therefore, participants were selected from social grades A, B, and C.

In this study, demographic variables were analyzed using frequency and percentage distribution methods. Packaging attractiveness and consumers' purchase intention were examined using the Friedman nonparametric test, and data were analyzed using SPSS version 29.

3. Findings and Results

To examine the gender distribution of participants in the study, 25 participants were female (41.7%), and 35 were male (58.3%). The educational level distribution showed that 41 participants (68.3%) had a bachelor's degree, while 19 participants (31.7%) had a master's degree. In terms of occupational distribution, 45 participants (75%) were students, making up the largest group. Additionally, 2 participants (3.3%) were self-employed, 2 participants (3.3%) were digital marketing specialists, 2 participants (3.3%) were marketing specialists, 8 participants (13.3%) were employees, and 1 participant (1.7%) was a marketing manager. Regarding age distribution, 22 participants (36.7%) were aged between 18 and 21, 23 participants (38.3%) were between 22 and 24, and 15 participants (25%) were between 25 and 28. This categorization represents the age composition of the study sample.

At this stage of the study, participants were asked to sit in front of a computer screen equipped with an eye-tracking system that was connected to the display. The purpose was to assess and record pupil position over time. The eye-tracking device used in this study was a fixed Tobii device with a sampling power of 30 Hz, suitable for laboratory sampling with minimal sound and light interference. Tobii Pro Lab software was used for designing the eye-tracking test phases, calibrating participants' eyes, and conducting statistical analyses. The product images were displayed in a randomized order to prevent participant bias. Each participant was exposed to 16 images, and their eye movements were recorded. The product designs were tested in four packaging conditions, incorporating transparency and character elements, and were displayed to the participants.



Figure 1. Product Packaging Images for Pasta, Olive Oil, Chocolate, and Gummy Candies

The examined variables in this study included time to first fixation, number of fixations, duration of visits, number of visits, and total fixation duration. Common methods for analyzing eye-tracking data include attention maps such as heat maps (Blascheck et al., 2017). Heat maps highlight areas of an image where participants focused their attention, with warmer colors (shifting toward red) indicating higher levels of processing and attention.

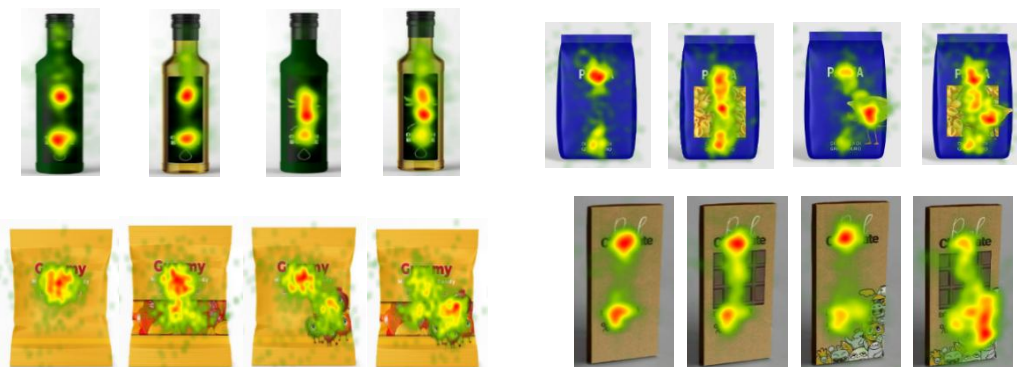


Figure 2. Heat Maps for Processing Four Packaging Conditions

At this stage, all design elements were processed by the participants. The intensity of warm colors in the images indicated that the highest level of processing, attention, and fixation was directed toward packaging that included

both transparency and character elements. In the next condition, transparent packaging without a character element received the second-highest level of attention.

Overall, based on the results from the eye-tracking system and the questionnaire completed by participants after the experiment, the study examined four packaging conditions across different product categories (utilitarian and hedonic). These conditions included (1) packaging with both transparency and character, (2) packaging with character but no transparency, (3) packaging with transparency but no character, and (4) packaging with neither transparency nor character. After completing the experiment, participants were asked to fill out a questionnaire assessing the attractiveness of the packaging and their purchase intention. The questionnaire included color images of the tested products and two questions evaluating visual appeal and purchase intention. The results from both the eye-tracking data and the questionnaire were analyzed using the Friedman nonparametric test in SPSS version 29.

The Friedman test results indicate that there are significant differences in packaging attractiveness across different packaging types (test statistic = 34.267, significance level < 0.001). The findings clearly show that transparent packaging with a character element had the highest mean attractiveness rating (mean = 0.52), which was significantly different from the other packaging types. Packaging with only a character element (mean = 0.12) and packaging with neither transparency nor character (mean = 0.03) were considerably less attractive than transparent packaging with a character element. Even packaging with transparency alone (mean = 0.33) was rated higher than packaging with only a character element. These results suggest that packaging design features, particularly the combination of transparency and character, have a significant impact on the attractiveness of pasta packaging.

Table 1. Comparison of Reported Packaging Attractiveness for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.52	0.504	3	34.267	<0.001
Packaging with character	0.12	0.324	-	-	-
Packaging without character and transparency	0.03	0.181	-	-	-
Transparent packaging	0.33	0.475	-	-	-

The Friedman test results also indicate significant differences in purchase intention across different packaging types (test statistic = 45.200, significance level = 0.001). These findings clearly demonstrate that transparent packaging with a character element had the highest mean purchase intention (mean = 0.53), significantly outperforming other packaging types. Packaging with only a character element (mean = 0.08) and packaging with neither transparency nor character (mean = 0.00) ranked considerably lower in purchase intention compared to transparent packaging with a character element. Even transparent packaging alone (mean = 0.38) scored higher than packaging with only a character element. These results suggest that packaging design features, particularly the combination of transparency and character, have a significant impact on consumers' purchase intention for pasta products.

Table 2. Comparison of Reported Purchase Intention for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.53	0.503	3	45.200	<0.001
Packaging with character	0.08	0.279	-	-	-
Packaging without character and transparency	0.00	0.000	-	-	-
Transparent packaging	0.38	0.490	-	-	-

The Friedman test results indicate that there are no significant differences in packaging attractiveness across different packaging types for olive oil (test statistic = 3.867, significance level = 0.276). The mean attractiveness ratings for different packaging types are relatively close, with transparent packaging with a character element (mean = 0.33), packaging with a character element (mean = 0.17), packaging without character and transparency (mean = 0.28), and transparent packaging (mean = 0.22) showing no significant differences in packaging attractiveness. These findings suggest that packaging design does not have a substantial impact on the attractiveness of olive oil packaging, and all packaging types appear relatively similar in appeal.

Table 3. Comparison of Reported Packaging Attractiveness for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.33	0.475	3	3.867	0.276
Packaging with character	0.17	0.376	-	-	-
Packaging without character and transparency	0.28	0.454	-	-	-
Transparent packaging	0.22	0.415	-	-	-

The Friedman test results indicate that there are no significant differences in purchase intention across different packaging types for olive oil (test statistic = 6.533, significance level = 0.088). The mean purchase intention ratings for different packaging types are relatively close, with transparent packaging with a character element (mean = 0.35), packaging with a character element (mean = 0.13), packaging without character and transparency (mean = 0.22), and transparent packaging (mean = 0.30) showing no significant differences in purchase intention. These findings suggest that packaging design does not have a substantial impact on purchase intention for olive oil, and all packaging types appear relatively similar in influence.

Table 4. Comparison of Reported Purchase Intention for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.35	0.481	3	6.533	0.088
Packaging with character	0.13	0.343	-	-	-
Packaging without character and transparency	0.22	0.415	-	-	-
Transparent packaging	0.30	0.462	-	-	-

The Friedman test results indicate significant differences in packaging attractiveness across different packaging types for chocolate (test statistic = 35.600, significance level < 0.001). Transparent packaging with a character element had the highest mean attractiveness rating (mean = 0.52), significantly higher than other packaging types. This finding highlights the strong positive effect of combining transparency and character in enhancing the attractiveness of chocolate packaging. Packaging with a character element (mean = 0.07) and packaging without character and transparency (mean = 0.07) were significantly less attractive than transparent packaging with a character element and even transparent packaging alone (mean = 0.35). These differences indicate that packaging with transparency and a character element has the greatest impact on increasing packaging attractiveness.

Table 5. Comparison of Reported Packaging Attractiveness for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.52	0.504	3	35.600	<0.001
Packaging with character	0.07	0.252	-	-	-
Packaging without character and transparency	0.07	0.252	-	-	-

Transparent packaging	0.35	0.481	-	-	-
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The Friedman test results indicate significant differences in purchase intention across different packaging types for chocolate (test statistic = 36.133, significance level < 0.001). Transparent packaging with a character element had a mean purchase intention of 0.40, which was significantly lower than transparent packaging alone (mean = 0.48) but higher than other packaging types. Packaging with a character element (mean = 0.05) and packaging without character and transparency (mean = 0.07) were significantly lower in purchase intention than both transparent packaging and transparent packaging with a character element. These differences indicate that transparent packaging has the strongest influence on increasing purchase intention, but transparent packaging with a character element also has a notable positive impact on purchase intention for chocolate.

Table 6. Comparison of Reported Purchase Intention for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.40	0.494	3	36.133	<0.001
Packaging with character	0.05	0.220	-	-	-
Packaging without character and transparency	0.07	0.252	-	-	-
Transparent packaging	0.48	0.504	-	-	-

The Friedman test results indicate significant differences in packaging attractiveness across different packaging types (test statistic = 78.000, significance level < 0.001). Transparent packaging with a character element had the highest mean attractiveness rating (mean = 0.73), significantly higher than other packaging types. This finding highlights the strong positive effect of combining transparency and character in enhancing the attractiveness of gummy candy packaging. Packaging with a character element (mean = 0.05) and packaging without character and transparency (mean = 0.03) were significantly lower in attractiveness than transparent packaging with a character element and even transparent packaging alone (mean = 0.18). These differences indicate that packaging with transparency and a character element has the greatest impact on attracting consumer interest.

Table 7. Comparison of Reported Packaging Attractiveness for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.73	0.446	3	78.000	<0.001
Packaging with character	0.05	0.220	-	-	-
Packaging without character and transparency	0.03	0.181	-	-	-
Transparent packaging	0.18	0.390	-	-	-

The Friedman test results indicate significant differences in purchase intention across different packaging types (test statistic = 82.400, significance level < 0.001). Transparent packaging with a character element had the highest mean purchase intention rating (mean = 0.73), significantly higher than other packaging types. This finding highlights the strong positive effect of combining transparency and character on increasing purchase intention for gummy candy. Packaging with a character element (mean = 0.03) and packaging without character and transparency (mean = 0.00) were significantly lower in purchase intention than transparent packaging with a character element and even transparent packaging alone (mean = 0.23). These differences indicate that packaging with transparency and a character element has the strongest influence on increasing purchase intention.

Table 8. Comparison of Reported Purchase Intention for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.73	0.446	3	82.400	<0.001
Packaging with character	0.03	0.181	-	-	-
Packaging without character and transparency	0.00	0.000	-	-	-
Transparent packaging	0.23	0.427	-	-	-

Overall, when examining different packaging types for pasta, gummy candy, and chocolate, the presence of both character and transparency in packaging had the highest attractiveness and purchase intention. In contrast, for olive oil, the levels of attractiveness and purchase intention were similar across all four packaging conditions, making it difficult to prioritize any one packaging type.

The Friedman test results indicate no significant differences in the time to first fixation across different packaging conditions for gummy candy (test statistic = 3.675, significance level = 0.299). The mean time to first fixation across different packaging types was relatively close, with transparent packaging with character (mean = 0.048), packaging with character (mean = 0.029), packaging without character and transparency (mean = 0.038), and transparent packaging (mean = 0.049) showing no significant differences in time to first fixation.

Table 9. Comparison of Time to First Fixation for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.074	0.107	3	2.415	0.491
Packaging with character	0.069	0.104	-	-	-
Packaging without character and transparency	0.132	0.513	-	-	-
Transparent packaging	0.058	0.092	-	-	-

The Friedman test results indicate no significant differences in time to first fixation across different packaging conditions for olive oil (test statistic = 0.467, significance level = 0.926). The mean time to first fixation across different packaging types was relatively close, with transparent packaging with character (mean = 0.094), packaging with character (mean = 0.094), packaging without character and transparency (mean = 0.071), and transparent packaging (mean = 0.096) showing no significant differences in time to first fixation. These results suggest that packaging design does not have a substantial impact on the time to first fixation for olive oil, and all packaging types appear relatively similar.

Table 10. Comparison of Time to First Fixation for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.094	0.321	3	0.467	0.926
Packaging with character	0.094	0.259	-	-	-
Packaging without character and transparency	0.071	0.107	-	-	-
Transparent packaging	0.096	0.318	-	-	-

The Friedman test results, with a test statistic of 16.702 and a significance level of less than 0.001, indicate that the mean time to first fixation for transparent packaging with a character element (mean = 0.047) was significantly lower than that of other packaging types. Conversely, packaging with a character element alone had the longest mean time to first fixation (mean = 0.232). These findings emphasize that packaging design significantly impacts the time to first fixation for chocolate, with transparent packaging with a character element capturing consumer attention the fastest.

Table 11. Comparison of Time to First Fixation for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.047	0.083	3	16.702	<0.001
Packaging with character	0.232	0.486	-	-	-
Packaging without character and transparency	0.083	0.122	-	-	-
Transparent packaging	0.115	0.487	-	-	-

The Friedman test results indicate no significant differences in time to first fixation across different packaging conditions for gummy candy (test statistic = 3.675, significance level = 0.299). The mean time to first fixation across different packaging types was relatively close, with transparent packaging with character (mean = 0.048), packaging with character (mean = 0.029), packaging without character and transparency (mean = 0.038), and transparent packaging (mean = 0.049) showing no significant differences.

Table 12. Comparison of Time to First Fixation for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.048	0.096	3	3.675	0.299
Packaging with character	0.029	0.071	-	-	-
Packaging without character and transparency	0.038	0.080	-	-	-
Transparent packaging	0.049	0.105	-	-	-

The Friedman test results indicate no significant differences in fixation duration across different packaging conditions for pasta (test statistic = 6.046, significance level = 0.109). Specifically, the mean fixation duration for transparent packaging with a character element (0.375 seconds) was similar to other packaging types. Packaging with a character element (0.399 seconds), packaging without character and transparency (0.405 seconds), and transparent packaging (0.407 seconds) showed no significant differences in fixation duration. These results suggest that all packaging types attract similar levels of visual attention.

Table 13. Comparison of Fixation Duration for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.375	0.104	3	6.046	0.109
Packaging with character	0.399	0.111	-	-	-
Packaging without character and transparency	0.405	0.135	-	-	-
Transparent packaging	0.407	0.199	-	-	-

The Friedman test results indicate significant differences in fixation duration across different packaging conditions for olive oil (test statistic = 14.571, significance level = 0.002). Transparent packaging with a character element had a mean fixation duration of 0.321 seconds, significantly higher than transparent packaging alone (mean = 0.310 seconds). Packaging with a character element (mean = 0.364 seconds) and packaging without character and transparency (mean = 0.329 seconds) also had longer fixation durations than transparent packaging alone. Overall, packaging with a character element attracted the longest fixation duration, while transparent packaging alone had the shortest fixation duration.

Table 14. Comparison of Fixation Duration for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.321	0.083	3	14.571	0.002
Packaging with character	0.364	0.097	-	-	-
Packaging without character and transparency	0.329	0.087	-	-	-
Transparent packaging	0.310	0.080	-	-	-

The Friedman test results indicate no significant differences in fixation duration across different packaging conditions for chocolate (test statistic = 3.575, significance level = 0.311). The mean fixation duration for transparent packaging with a character element was 0.275 seconds, for packaging with a character element was 0.285 seconds, for packaging without character and transparency was 0.308 seconds, and for transparent packaging was 0.292 seconds. These results suggest that all packaging types attracted similar fixation durations, and the observed differences were not statistically significant. Overall, none of the packaging types significantly captured more visual attention and focus than others.

Table 15. Comparison of Fixation Duration for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.275	0.044	3	3.575	0.311
Packaging with character	0.285	0.069	-	-	-
Packaging without character and transparency	0.308	0.084	-	-	-
Transparent packaging	0.292	0.081	-	-	-

The Friedman test results indicate significant differences in fixation duration across different packaging conditions for gummy candy (test statistic = 15.844, significance level = 0.001). Transparent packaging with a character element had a mean fixation duration of 0.289 seconds, which was significantly lower than other packaging types. Packaging with a character element (mean = 0.290 seconds) and transparent packaging (mean = 0.296 seconds) had slightly lower durations compared to packaging without character and transparency (mean = 0.346 seconds). These results suggest that transparent packaging with a character element attracted the least visual attention and focus, while packaging without character and transparency had the highest fixation duration.

Table 16. Comparison of Fixation Duration for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	0.289	0.056	3	15.844	0.001
Packaging with character	0.290	0.072	-	-	-
Packaging without character and transparency	0.346	0.113	-	-	-
Transparent packaging	0.296	0.077	-	-	-

The Friedman test results indicate significant differences in fixation count across different packaging conditions for pasta (test statistic = 13.954, significance level = 0.003). Transparent packaging with a character element had the highest mean fixation count (13.40), while packaging without character and transparency had the lowest mean fixation count (11.63).

Table 17. Comparison of Fixation Count for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	13.40	3.401	3	13.954	0.003
Packaging with character	12.52	3.116	-	-	-
Packaging without character and transparency	11.63	4.162	-	-	-
Transparent packaging	12.38	4.287	-	-	-

The Friedman test results indicate significant differences in fixation count across different packaging conditions for olive oil (test statistic = 8.059, significance level = 0.045). Packaging with a character element had the lowest mean fixation count (13.70), while transparent packaging had the highest mean fixation count (15.32).

Table 18. Comparison of Fixation Count for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	14.75	3.187	3	8.059	0.045
Packaging with character	13.70	3.595	-	-	-
Packaging without character and transparency	14.97	3.579	-	-	-
Transparent packaging	15.32	3.877	-	-	-

Significant differences in fixation count were observed across different packaging conditions for chocolate (test statistic = 23.910, significance level < 0.001). Transparent packaging with a character element had the highest mean fixation count (17.57), while packaging with a character element alone had the lowest mean fixation count (15.55).

Table 19. Comparison of Fixation Count for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	17.57	3.099	3	23.910	<0.001
Packaging with character	15.55	3.280	-	-	-
Packaging without character and transparency	16.02	3.793	-	-	-
Transparent packaging	16.85	3.839	-	-	-

Significant differences in fixation count were observed across different packaging conditions for gummy candy (test statistic = 33.143, significance level < 0.001). Packaging with a character element had the highest mean fixation count (17.28), while packaging without character and transparency had the lowest mean fixation count (13.93).

Table 20. Comparison of Fixation Count for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	16.78	3.130	3	33.143	<0.001
Packaging with character	17.28	3.889	-	-	-
Packaging without character and transparency	13.93	3.839	-	-	-
Transparent packaging	16.55	3.985	-	-	-

Statistical analysis using the Friedman test showed significant differences in visit duration across different packaging conditions for pasta (test statistic = 16.787, significance level < 0.001). The mean visit duration for transparent packaging with a character element was 4.587 seconds, which was higher than other packaging types. Packaging with a character element also had a relatively high mean visit duration of 4.651 seconds. In contrast, packaging without character and transparency had the lowest mean visit duration of 4.224 seconds. Transparent packaging had a mean visit duration of 4.440 seconds, placing it between the other packaging types. These results indicate that packaging type significantly affects consumer attention to pasta products.

Table 21. Comparison of Visit Duration for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	4.587	0.984	3	16.787	<0.001
Packaging with character	4.651	0.961	-	-	-
Packaging without character and transparency	4.224	1.397	-	-	-
Transparent packaging	4.440	1.145	-	-	-

The Friedman test results for comparing visit duration across different packaging conditions for olive oil showed significant differences between groups (test statistic = 8.867, significance level = 0.031). Packaging with a character element had a mean visit duration of 4.661 seconds, while packaging without character and transparency had the highest mean visit duration of 4.696 seconds. Transparent packaging with a character element (mean = 4.506 seconds) and transparent packaging (mean = 4.419 seconds) had shorter visit durations. These results indicate that

packaging type significantly impacts consumer attention to olive oil, with packaging with a character element and packaging without character and transparency drawing the most attention.

Table 22. Comparison of Visit Duration for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	4.506	1.134	3	8.867	0.031
Packaging with character	4.661	1.040	-	-	-
Packaging without character and transparency	4.696	0.948	-	-	-
Transparent packaging	4.419	1.212	-	-	-

The Friedman test results for visit duration across different packaging conditions for chocolate showed significant differences between groups (test statistic = 33.505, significance level < 0.001). Transparent packaging with a character element had the highest mean visit duration (4.847 seconds), while packaging with a character element alone had the lowest mean visit duration (3.965 seconds). Transparent packaging (mean = 4.710 seconds) and packaging without character and transparency (mean = 4.608 seconds) ranked in between. These results suggest that transparent packaging with a character element significantly increased consumer attention to chocolate products, while packaging with a character element alone had the least impact on consumer engagement.

Table 23. Comparison of Visit Duration for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	4.847	0.763	3	33.505	<0.001
Packaging with character	3.965	1.441	-	-	-
Packaging without character and transparency	4.608	0.965	-	-	-
Transparent packaging	4.710	0.955	-	-	-

The Friedman test results for visit duration across different packaging conditions for gummy candy showed significant differences between groups (test statistic = 20.453, significance level < 0.001). Transparent packaging with a character element had a mean visit duration of 4.746 seconds, while transparent packaging alone had the highest visit duration at 4.819 seconds. Packaging with a character element (mean = 4.695 seconds) and packaging without character and transparency (mean = 4.304 seconds) ranked lower. These findings suggest that packaging type significantly affects consumer attention to gummy candy, especially when using transparent packaging with a character element or transparent packaging alone.

Table 24. Comparison of Visit Duration for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	4.746	0.801	3	20.453	<0.001
Packaging with character	4.695	0.928	-	-	-
Packaging without character and transparency	4.304	1.265	-	-	-
Transparent packaging	4.819	0.702	-	-	-

The Friedman test results for the number of visits across different packaging conditions for pasta showed no significant differences between groups (test statistic = 3.694, significance level = 0.297). Transparent packaging with a character element had a mean of 1.18 visits, packaging with a character element had a mean of 1.23 visits, packaging without character and transparency had a mean of 1.28 visits, and transparent packaging had a mean of 1.20 visits. These results indicate that packaging type had no significant impact on the number of times consumers viewed pasta packaging.

Table 25. Comparison of Visit Count for Pasta Across Different Packaging Conditions

Pasta Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	1.18	0.596	3	3.694	0.297
Packaging with character	1.23	1.079	-	-	-
Packaging without character and transparency	1.28	0.613	-	-	-
Transparent packaging	1.20	0.514	-	-	-

The Friedman test results for comparing visit count across different packaging conditions for olive oil showed no significant differences between groups (test statistic = 5.295, significance level = 0.151). Transparent packaging with a character element had a mean of 1.20 visits, packaging with a character element had a mean of 1.12 visits, packaging without character and transparency had a mean of 1.15 visits, and transparent packaging had a mean of 1.22 visits. These results indicate that changes in packaging type did not significantly impact the number of visits for the olive oil product.

Table 26. Comparison of Visit Count for Olive Oil Across Different Packaging Conditions

Olive Oil Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	1.20	0.514	3	5.295	0.151
Packaging with character	1.12	0.454	-	-	-
Packaging without character and transparency	1.15	0.606	-	-	-
Transparent packaging	1.22	0.555	-	-	-

The Friedman test results for comparing visit count across different packaging conditions for chocolate showed significant differences between groups (test statistic = 19.007, significance level < 0.001). Transparent packaging with a character element had a mean of 1.08 visits, packaging with a character element had a mean of 1.35 visits, packaging without character and transparency had a mean of 1.12 visits, and transparent packaging had a mean of 1.17 visits. These results indicate that packaging type has a significant impact on the number of visits for the chocolate product.

Table 27. Comparison of Visit Count for Chocolate Across Different Packaging Conditions

Chocolate Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	1.08	0.462	3	19.007	<0.001
Packaging with character	1.35	0.606	-	-	-
Packaging without character and transparency	1.12	0.324	-	-	-
Transparent packaging	1.17	0.924	-	-	-

The Friedman test results for comparing visit count across different packaging conditions for gummy candy showed significant differences between groups (test statistic = 12.692, significance level = 0.005). Transparent packaging with a character element had a mean of 1.08 visits, packaging with a character element had a mean of 1.12 visits, packaging without character and transparency had a mean of 1.25 visits, and transparent packaging had a mean of 1.05 visits. These results indicate that different packaging types significantly impacted the number of visits for the gummy candy product.

Table 28. Comparison of Visit Count for Gummy Candy Across Different Packaging Conditions

Gummy Candy Product	Mean	Standard Deviation	Degrees of Freedom	Test Statistic	Significance Level
Transparent packaging with character	1.08	0.279	3	12.692	0.005
Packaging with character	1.12	0.372	-	-	-
Packaging without character and transparency	1.25	0.474	-	-	-
Transparent packaging	1.05	0.220	-	-	-

4. Discussion and Conclusion

This study aimed to bridge the theoretical and practical gap by analyzing and examining data using advanced global tools to provide knowledge that can be specifically and practically useful for industry owners and designers, particularly in the food industry. The findings can contribute to improving packaging design, enhancing product attractiveness, and increasing market differentiation. The present research sought to conduct a deeper investigation into packaging elements, specifically transparency and character, assessing their presence or absence in various packaging designs based on utilitarian and hedonic product classifications. This was accomplished using eye-tracking technology, yielding results that address the limitations of other data collection methods and offer greater reliability.

The results of this study, after filtering products based on their utilitarian or hedonic classification, were derived from a two-stage experiment involving eye-tracking technology followed by a questionnaire to supplement the previously gathered data. The findings indicate that, except for olive oil, transparency and character together accelerate visual attention to packaging and influence consumer selection for pasta, chocolate, and gummy candy products. According to the literature review and findings from the first phase of this research concerning product classification, pasta—classified as a utilitarian product typically purchased with planned intent—garnered more visual attention and selection when both character and transparency were present in the packaging. This finding addresses an existing theoretical gap in the literature, which suggests that characters on packaging are suitable primarily for children's products. The results demonstrate that regardless of the target audience, the presence of a character can enhance product attractiveness and selection.

Additionally, incorporating a character in packaging and leveraging it in long-term marketing campaigns can attract more customers and increase market share. The presence of a character on packaging evokes an emotional response from consumers, fostering long-term engagement and distinguishing the product from competitors. On the other hand, transparency in packaging allows buyers to see the product, instilling a sense of trust and enabling them to assess product quality visually. Therefore, for pasta as a utilitarian product, it can be concluded that incorporating characters and transparency in packaging design can effectively create product differentiation.

For olive oil, as the results did not indicate a significant level of visual attention or selection based on the studied elements, it is hypothesized that this outcome may be due to the packaging format, which typically involves glass rather than plastic or carton packaging. Future research should conduct a more detailed investigation into this product.

For hedonic products, which, according to the literature, are usually purchased impulsively and where packaging design plays a more significant role in influencing consumers than in utilitarian products, the results indicate that the presence of a character combined with product transparency increases the likelihood of attracting visual attention and ultimately being selected. Consequently, regardless of whether a product falls into the utilitarian or hedonic category, transparency and character play a crucial role in visual attention and final selection. In other words, the combined use of these two elements enhances packaging appeal, differentiates the product from others in stores, and increases its chances of being chosen by consumers. Successful brands must seek creativity in packaging design to gain a competitive edge in today's diverse and highly competitive market. Finally, paying attention to packaging elements—specifically character and transparency—can significantly contribute to achieving this differentiation.

This research encountered several limitations, including constraints on the sample size, product selection, the age group of participants, and the limited number of domestic studies examining packaging-related factors using eye-tracking technology. It is recommended that future research consider a more targeted sample selection aligned with the specific target market of each product. Additionally, in this study, other packaging elements were held constant to allow for a more precise examination of the two selected elements. Future research should explore additional packaging elements separately using eye-tracking technology to provide more comprehensive conclusions. Moreover, olive oil and other products with relatively similar packaging formats (such as glass or bottle packaging) should be examined in greater detail. It is suggested that for these products, both the shape of the packaging and the label be analyzed simultaneously.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

Acknowledgments

Authors thank all participants who participate in this study.

Conflict of Interest

The authors report no conflict of interest.

Funding/Financial Support

According to the authors, this article has no financial support.

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