

A Study on the Impact of One-page Pop-up Advertisement Designs on User Behavior for Different Product Categories: A Case Study of Consumer Electronics and Apparel

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1 Introduction: Background and Research Question

Pop-up ads are everywhere on online shopping websites. They're often used to catch a user's attention, promote a special deal, or encourage a quick purchase. Previous studies have shown that the layout of pop-up advertisements significantly influences user engagement and click-through rates [Pieters et al., 2007]. These findings suggest that even subtle changes in design can lead to major differences in user behavior.

But we noticed something interesting—**not everyone reacts to these ads the same way**, and the product type seems to matter a lot. For instance, a large field experiment across 25 product categories (including clothing, cars, and food) showed that social advertising effectiveness varies significantly by category, with some (e.g., apparel) driving far higher engagement than others [Huang et al., 2020]. Also, based on early observations, it seems *possible* that people shopping for clothing may be more drawn to visually attractive pop-ups [Marwan et al., 2024].

This leads us to ask: Can one single ad design really work for all kinds of products?

Why is this study important?

Because **bad ads don't just fail—they annoy people**. In the competitive world of online shopping, getting users' attention (and trust) is harder than ever. If we can figure out **what kind of ad works best for each product type**, we can help companies create designs that feel more personalized and effective.

Also, this research can help improve:

- **User experience** (by showing more relevant info)
- **Conversion rates** (by matching design to what people care about)
- **Marketing strategy** (by avoiding one-size-fits-all mistakes)

By understanding how layout, visuals, and content affect user behavior in different contexts, we hope to provide practical guidance for better ad design.

2 Theoretical Background

To anticipate how one-page pop-up ads will resonate differently for consumer electronics (search goods) versus apparel (experience goods), we ground our framework in three core literatures—product classification & involvement, ad-media matching theories, and concrete evidence on content emphasis in advertising.

2.1 Product Type, Involvement, and Ad–Media Matching

Search vs. Experience Goods

Building on [Huang et al., 2009], products bifurcate into search goods, whose key attributes (e.g., technical specs, dimensions) can be fully evaluated before purchase, and experience goods, whose value emerges only through use (e.g., fit, feel). Consumer electronics (smartphones, headphones) are classic search goods: buyers systematically compare features and specs. Apparel is an experience good: shoppers rely on imagery, style cues, and peer feedback to infer fit and quality.

Product Involvement

Product involvement captures the degree of cognitive effort a consumer expends when processing information. High-involvement categories (e.g., electronics) trigger central, systematic processing, whereas low-involvement categories (e.g., inexpensive apparel) elicit peripheral cue reliance.

Media Richness & Information Scent

Media Richness Theory posits that communication is most effective when channel richness (i.e., capacity for immediate feedback, multiple cues) matches message complexity. Detailed spec-driven layouts (rich channels for data) suit search goods, while imagery-rich layouts align with experience goods. Information Foraging Theory adds that strong ‘information scent’, clear signals guiding users to desired content, drives engagement and reduces search costs.

Elaboration Likelihood Model (ELM)

According to ELM, persuasive messages follow either the central route (deep, argument-based processing) when involvement is high, or the peripheral route (surface cues) when involvement is low. Matching ad content with the user’s likely processing route increases persuasion: detailed specification arguments for high-interest search goods, and visual or social cues for low-interest experience goods.

Implication: Pop-up ads that align layout richness and cues (specs vs. images/reviews) with product type and involvement will yield stronger preferences and subjective fluency.

2.2 Expression of Advertised Information

We operationalize ‘expression’ as the primary content emphasis in a pop-up:

Visual-focused (Big Images, Minimal Text)

Large, high-quality images tap into sensory and aesthetic appeal, improving the attitude toward the ad.

Review-focused (Ratings & Social Proof)

Prominent user ratings and testimonials leverage social proof, a powerful peripheral cue shown to increase click-through and trust.

Specification-focused (Detailed Features/Specs)

Rich specification lists satisfy the search-good buyer’s desire for certainty, reducing perceived

risk, and increasing confidence.

Price-focused (Discounts & Promotions)

Highlighting price promotions can spur immediate conversions; deep discounts drive short-term sales spikes, though their loyalty effects may be transient.

Each format imposes different cognitive demands: specification-focused ads demand analytical processing, whereas visual- and review-focused ads rely on peripheral cues and quick affective judgments.

2.3 Hypotheses

H1 (Matching Effect):

H1a: For consumer electronics, specification- and review-focused layouts will be rated more favorably than visual or price-focused layouts.

H1b: For apparel, visual and review-oriented layouts will be rated more favorably than specification or price-focused layouts.

By testing these hypotheses, we can identify how to tailor one-page pop-up ads to different product categories for optimal user engagement and perceived effectiveness.

There are some elements in a one-page pop-up ad layout that could contribute to the effectiveness of the ad [Ahmed, 2020]. Our study aims to explore how these pop-up ads, differing in elements' proportion, affect user's preferences and behavior across two very different product categories: consumer electronics and daily necessities.

According to the studies, we created four types of ad layouts:

1. Visual-focused (big images, little text)
2. Review-focused (shows ratings and user feedback)
3. Specification-focused (detailed product info or features)
4. Price-focused (promotions and discounts)

Participants will see these ad styles and tell us which one they prefer for each product type. We're more interested in what users like and find useful, rather than how they actually click or buy.

3 Method

The questionnaire for this study was designed based on existing theories and prior research instruments. It is divided into four main sections: Demographic Information, Online Shopping Behavior, One-Page Advertisement Behavior, and One-Page Advertisement Layout Preferences.

Each section is detailed as follows:

1. Demographic Information

This section aims to explore the relationship between respondents' basic demographics and their layout preferences for advertisements, in order to analyze the differing information presentation needs among various groups. It includes three questions covering gender, age,

and average monthly spending.

2. Online Shopping Behavior

This section investigates how respondents' online shopping behavior correlates with their advertisement layout preferences. The questions cover shopping frequency, the device used for shopping, types of products purchased online, and average spending per product type—totaling four questions.

3. One-Page Advertisement Behavior

Since the focus of this study is on layout preferences for one-page advertisements, this section examines respondents' behavior when encountering such ads. It includes two questions: whether they click on the ads and how long they stay on the ad page.

4. One-Page Advertisement Layout Preferences

The final section aims to collect respondents' preferences regarding one-page ad layouts. We designed mock web pages for two product categories—consumer electronics and apparel. Each category includes four layout designs, each emphasizing a different element: "image," "price," "specifications," or "reviews," resulting in a total of eight layout versions.

Respondents are asked to rank the four layouts for each product category based on their interest in clicking to learn more about the product. To avoid order bias, the layout options are presented in random order. This section contains two questions, one for each product category.

4 Results

4.1 Descriptive Statistics

4.1.1 Descriptive Summary of Gender Distribution

Among the 273 respondents in this study, 54.95% were male (150 people), 44.69% were female (122 people), and 0.37% identified as other genders (1 person). Overall, the sample showed a slightly higher proportion of male respondents, as illustrated in Appendix Figure 1.

4.1.2 Descriptive Summary of Age Distribution

Data was collected from 273 respondents. As shown in Appendix Figure 2, the majority of the sample fell within the 18–25 age group, accounting for approximately 73.6% (201 people). This was followed by those aged 26–35 (45 people, 16.5%). Other age groups were less represented:

- Age 36–45: 15 people (about 5.5%)
- Age 46–55: 8 people (about 2.9%)
- Age 56–65: 1 person (about 0.4%)
- Under 18: 3 people (about 1.1%)

Overall, the sample was highly concentrated in the younger demographic, which may be related to the distribution channels used for the survey, the nature of the research topic, or the platforms where users are most active.

4.1.3 Expenditure Distribution per Month

Respondents were asked about their average monthly spending on everyday expenses such as food, daily necessities, and entertainment (excluding rent), as shown in Appendix Figure 3.

The results revealed that the most common spending range was NT\$10,001–20,000, with 145 respondents (53.1%). This was followed by NT\$10,000 or less, with 86 respondents (31.5%). Higher spending brackets were as follows:

- NT\$20,001–30,000: 27 respondents (9.9%)
- NT\$30,001–50,000: 12 respondents (4.4%)
- NT\$50,001–80,000: 2 respondents (0.7%)
- Over NT\$100,001: 1 respondent (0.4%)

In summary, over 84.6% of respondents reported monthly expenditures below NT\$20,000, suggesting generally lower spending levels, likely due to the younger age profile of the sample.

4.1.4 Online Shopping Frequency

Regarding online shopping frequency, 98 respondents (35.9%) reported shopping online 1–2 times per month. The next most common response was “irregular” shopping behavior, with 95 respondents (34.8%). Additionally:

- Weekly shopping: 33 respondents (12.1%)
- 2–3 times per week: 13 respondents (4.8%)
- Almost daily: 6 respondents (2.2%)
- Rarely or never shop online: 28 respondents (10.3%)

As shown in Appendix Figure 4, nearly 82.8% of respondents have online shopping experience, with most falling into the low-to-moderate frequency range (irregular to 1–2 times per month).

4.1.5 Device Used for Online Shopping

According to Appendix Figure 5, the majority of respondents shop online using mobile phones, accounting for 80.95%. Computers were the second most used device (16.48%), while only 2.56% used tablets. In general, mobile device users (phones and tablets combined) made up 83.51% of the total, significantly outnumbering non-mobile users.

4.1.6 Most Frequently Purchased Online Categories

As shown in Appendix Figure 6, this question allowed multiple selections, and 273 respondents provided 344 total responses. The results were as follows:

- Fashion items (e.g., clothing, shoes, accessories): 156 respondents (57.1%)
- 3C products (e.g., electronics, digital devices): 113 respondents (41.4%)
- Other categories (e.g., household items, cosmetics, food): 75 respondents (27.5%)

4.1.7 Average Online Spending on 3C Products

Appendix Figure 7 shows the expenditure distribution for respondents who have purchased 3C-related items ($n = 113$). The spending breakdown is as follows:

- NT\$500–1,000: 36 respondents (31.86%)
- NT\$200–500: 26 respondents (23.01%)
- NT\$1,000–3,000: 23 respondents (20.35%)

- Over NT\$3,000: 18 respondents (15.93%)
- Less than NT\$200: 10 respondents (8.85%)

Overall, most consumers preferred to spend between NT\$200 and NT\$1,000 per transaction on 3C or electronic-related products.

4.1.8 Average Online Spending on Fashion Items

Appendix Figure 8 presents the spending distribution among respondents who have purchased fashion-related items ($n = 156$). The findings are as follows:

- NT\$500–1,000: 54 respondents (34.62%)
- NT\$1,000–3,000: 48 respondents (30.77%)
- NT\$200–500: 42 respondents (26.92%)
- Over NT\$3,000: 7 respondents (4.49%)
- Less than NT\$200: 5 respondents (3.21%)

Overall, spending on fashion items was concentrated in the mid-to-low price range (NT\$200–3,000), with NT\$500–1,000 being the most common.

4.1.9 Willingness to Click on Pop-up Ads

As shown in Appendix Figure 10, over half of the respondents (55.31%) reported that they do not click on pop-up ads and tend to ignore them. However, 39.93% said they would click if the ad pertains to a product category they are interested in. Only 4.76% said they usually click on such ads, representing the highly interactive segment.

Overall, about 45% of respondents had engaged with pop-up ads, primarily driven by content relevance.

4.1.10 Dwell Time on Single-page Advertisements

As shown in Figure 10, the average dwell time on one-page pop-up ads was distributed as follows:

- Less than 3 seconds: 116 respondents (42.5%)
- 3–5 seconds: 70 respondents (25.6%)
- Almost 0 seconds (close immediately): 52 respondents (19.0%)
- 5–10 seconds: 24 respondents (8.8%)
- More than 10 seconds: 11 respondents (4.0%)

In total, over 87% of respondents spent less than 5 seconds on such ads, indicating that without immediate visual appeal, these advertisements are likely to be ignored. This supports the findings on click behavior and highlights the importance of the “prime visual area”—the critical few seconds when a user’s attention is at its peak and engaging content must be effectively delivered.

4.2 Layout Preference Analysis

4.2.1 Comparison of Information Element Rankings

4.2.1.1 Individual Product Ranking Comparison

This study asked respondents to rank four key informational elements—price, image, specifications, and reviews—for two product types: 3C (consumer electronics) and fashion (clothing/accessories). Rankings ranged from 1 (most important) to 4 (least important). The results are presented in Tables 1 and 2.

For 3C products, the highest ranked element was **image**, with 39.19% of respondents placing it first, followed by **specifications** at 31.50%. When combining the top two rankings, image (64.83%) and specifications (64.47%) emerged as the most valued sources of information. In contrast, **reviews** and **price** were ranked lower—over 30% of respondents placed them last (reviews: 35.53%, price: 35.16%), suggesting that these elements are perceived as less critical in the context of consumer electronics.

In comparison, fashion products placed even greater emphasis on **images**, with 54.95% ranking them as most important—the most concentrated ranking result in this study. **Specifications** followed, with 38.46% ranking them second and 15.75% first, totaling 54.21%. This suggests that while images are the primary draw for fashion products, specifications also serve as meaningful complementary information.

Reviews for fashion items received more mixed evaluations: only 11.72% ranked them first, while 28.21% ranked them second and 27.84% ranked them last, indicating a relatively limited influence compared to image and specifications.

Price was not considered a major factor in either product category. Only about 13–17% ranked it first (3C: 13.55%, fashion: 17.58%), while more than 30% placed it last (3C: 35.16%, fashion: 34.80%), highlighting its relatively low impact in single-page advertisement contexts.

To further investigate the ranking differences, a *Friedman test* was conducted. The results revealed statistically significant differences among the four elements for both product categories: 3C products ($Fr = 58.27$, $df = 3$, $p < 0.001$) and fashion products ($Fr = 69.91$, $df = 3$, $p < 0.001$), as shown in Tables 3 and 4.

Further *Wilcoxon signed-rank tests* with Bonferroni correction revealed the following preference structures:

- Fashion: Image > Specifications > (Reviews $\approx$ Price)
- 3C products: (Image $\approx$ Specifications) > (Reviews $\approx$ Price)

Here, “>” indicates a statistically significant preference, and “ $\approx$ ” indicates no significant difference (all p -values < 0.05 after correction).

In summary, **image** emerged as the most important element across both product types. 3C products emphasized a combination of image and specifications, while fashion products leaned more heavily on image, supported by specifications. Reviews had moderate influence for fashion items but remained secondary, while price was consistently considered the least important across both categories.

These findings suggest that consumers adjust their information priorities based on the type of product. Therefore, future ad designs should take these differences into account and dynamically tailor content presentation strategies to enhance communication effectiveness.

Table 1: 3C Product Information Element Ranking (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	37 (13.55%)	107 (39.19%)	86 (31.50%)	43 (15.75%)
2	62 (22.71%)	70 (25.64%)	86 (31.50%)	51 (18.68%)
3	78 (28.57%)	62 (22.71%)	58 (21.25%)	82 (30.04%)
4	96 (35.16%)	41 (15.02%)	39 (14.29%)	97 (35.53%)

Table 2: Ranking Summary for Fashion Product Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	48 (17.58%)	150 (54.95%)	43 (15.75%)	32 (11.72%)
2	56 (20.51%)	35 (12.82%)	105 (38.46%)	77 (28.21%)
3	74 (27.11%)	32 (11.72%)	88 (32.23%)	88 (32.23%)
4	95 (34.80%)	56 (20.51%)	42 (16.85%)	76 (27.84%)

Table 3: Wilcoxon Signed-Rank Test Results for 3C Products (Bonferroni Corrected)

Comparison Pair	p (Bonferroni)	Interpretation
Image vs. Specs	0.00164	Not significant
Image vs. Reviews	0.00000032	Image > Reviews
Image vs. Price	0.000000024	Image > Price
Specs vs. Reviews	0.00911	Specs > Reviews
Specs vs. Price	0.01014	Specs > Price
Reviews vs. Price	1.00000	No significant difference

Table 4: Wilcoxon Signed-Rank Test Results for Fashion Products (Bonferroni Corrected)

Comparison Pair	p (Bonferroni)	Interpretation
Image vs. Specs	0.000164	Image > Specs
Image vs. Reviews	0.00000032	Image > Reviews
Image vs. Price	0.000000024	Image > Price
Specs vs. Reviews	0.00911	Specs > Reviews
Specs vs. Price	0.01014	Specs > Price
Reviews vs. Price	1.00000	No significant difference

4.2.1.2 Comparison of Prioritization Between Fashion and 3C Products

Although the overall ranking trends for the two product categories (fashion and 3C products) appear similar, it is important to investigate whether there are statistically significant differences in how respondents rank the four types of pop-up advertisement layouts in these two contexts, or whether the order of preferences is largely the same across product types.

Since this study collected paired data, the *Wilcoxon Signed-Rank Test* was employed to examine

paired differences (null hypothesis H_0 : the median rankings for the two product categories are equal), using a two-tailed test with a significance level of $\alpha = 0.05$. Given the sample size ($n \geq 134$), the test used normal approximation (z-scores). A summary of the test results is shown in Table 5.

The results showed that for image-oriented layouts, $z = 2.00$, $p = 0.045 < 0.05$, indicating a significant difference between fashion and 3C product rankings. Specifically, image layouts had significantly lower (i.e., higher priority) ranks in the fashion context, suggesting that respondents relied more heavily on visual information when browsing fashion ads than when browsing 3C product ads.

On the other hand, for specification-focused layouts, $z = -3.41$, $p < 0.001$, indicating a highly significant difference. The negative z -value suggests that specifications were ranked significantly higher (i.e., more important) in the 3C product context than in the fashion context, which aligns with the characteristics of 3C products (i.e., being functionally complex and information-heavy).

As for price- and review-focused layouts, the p -values were 0.321 and 0.168, respectively—both above the 0.05 threshold. Thus, there is insufficient evidence to suggest any significant difference in the ranking of price or review layouts between the two product categories.

While it is already established that image and specification layouts are generally more preferred than price or review layouts, the comparative analysis reveals further nuance:

- Consumers show a significantly stronger preference for images when viewing fashion ads than when viewing 3C product ads.
- In contrast, specifications are significantly more valued in the context of 3C products than in fashion ads.

These findings highlight that layout preferences are not universal across product types. Instead, consumers adjust their prioritization of information elements based on the nature of the product, and therefore, advertisement layout strategies should be tailored accordingly to optimize effectiveness.

Table 5: Wilcoxon Signed-Rank Test for Layout Rankings Between 3C and Fashion Products

Layout Type	n	T^+	T^-	z	p -value	Conclusion
Image	134	5425.0	3620.0	2.00	0.045	Significant
Specifications	189	6406.5	5485.0	-3.41	< 0.001	Significant
Price	149	6111.5	5063.5	0.99	0.321	Not significant
Reviews	137	5368.0	4085.0	1.38	0.168	Not significant

4.2.2 Gender-Based Analysis

4.2.2.1 3C Products – Gender-Based Comparison

As shown in Tables 6 and 7, as well as Appendix Figure 13, overall, male and female respondents exhibited similar patterns in ranking the informational elements (price, image, specifications, and reviews) for 3C products. However, some subtle differences in ranking proportions were observed between genders.

First, images were regarded as relatively important by both groups. Among male respondents, 40.67% ranked "image-focused" layouts as the most important (1st place), compared to 36.89% of female respondents. This suggests that images play a critical role for both genders in capturing attention and facilitating initial product evaluation.

Regarding specification information, the ranking distribution was also comparable. Among males, 28.67% ranked it first, and 36.67% ranked it second; among females, 35.25% ranked it first and 27.87% ranked it second. Overall, specifications were considered moderately to highly important by both genders, with females showing a slightly higher percentage in the top rank—possibly indicating greater concern for product functionality.

The ranking of reviews showed a more dispersed distribution. For females, 28.69% and 33.61% ranked reviews as 3rd and 4th, respectively. For males, the corresponding percentages were 31.33% and 36.67%, indicating that reviews were generally considered supplementary information, with males being more likely to treat them as lower priority.

As for price, neither gender considered it a primary factor. Only 15.33% of male and 11.48% of female respondents ranked price first, while 33.33% of males and 37.70% of females ranked it last (4th). This indicates that price was generally viewed as less influential, with females being relatively less concerned about pricing.

In summary, while there were no stark gender differences in the overall ranking of information elements for 3C products, some trends emerged:

- Males showed a more concentrated preference for image-focused layouts.
- Females displayed a more balanced distribution across specifications and reviews.

Table 6: Male Respondents' Rankings for 3C Product Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	23 (15.33%)	61 (40.67%)	43 (28.67%)	23 (15.33%)
2	32 (21.33%)	38 (25.33%)	55 (36.67%)	25 (16.67%)
3	45 (30.00%)	26 (17.33%)	32 (21.33%)	47 (31.33%)
4	50 (33.33%)	25 (16.67%)	20 (13.33%)	55 (36.67%)

Table 7: Female Respondents' Rankings for 3C Product Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	14 (11.48%)	45 (36.89%)	43 (35.25%)	20 (16.39%)
2	30 (24.59%)	31 (25.41%)	34 (27.87%)	26 (21.31%)
3	32 (26.23%)	16 (13.11%)	29 (23.77%)	35 (28.69%)
4	46 (37.70%)	30 (24.59%)	7 (5.74%)	41 (33.61%)

4.2.2.2 Gender-Based Comparison for Fashion Products

According to Tables 8 and 9 and Appendix Figure 14, when ranking informational elements for fashion products (price, image, specifications, and reviews), male and female respondents exhibited similar overall trends, but there were still notable differences in the distribution of rankings for each element.

Images were clearly regarded as the most important element by both genders, with 62.30% of female respondents ranking it first—significantly higher than 48.67% of males. While nearly half of the male respondents also ranked image first, their preferences were more spread out across second to fourth place, suggesting that images had a more concentrated appeal to females.

Regarding price, neither gender considered it the most critical factor. Males showed a relatively even distribution across all ranks: 21.33%, 22.00%, 26.67%, and 30.00% for ranks 1 through 4, respectively. Females, on the other hand, displayed a more distinct tendency to rank price lower—only 13.11% ranked it first, while over 40.98% placed it last (4th). This indicates that females are less likely to prioritize price when evaluating fashion products.

For specifications, both genders showed consistent ranking patterns, with a substantial portion placing it in the top two positions. Among males, 18.00% ranked it first and 38.00% second; among females, 13.11% and 39.34%, respectively. This reflects a shared perception of specifications as a moderately important source of information.

In terms of reviews, female rankings were more concentrated in the middle positions—33.61% ranked them second, and 31.97% third. Male responses skewed slightly lower, with 32.67% ranking reviews third and 31.33% ranking them last. This suggests that both genders regard reviews as useful but not essential, with males placing slightly less emphasis on them than females.

In summary, images were the most universally valued element in fashion product layouts, with females showing especially strong preference by ranking them first. Males demonstrated more varied preferences, particularly in their acceptance of price as a factor. Females were notably less concerned with price and showed more concentrated preference for image-driven layouts.

Table 8: Male Respondents’ Rankings for Fashion Product Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	32 (21.33%)	73 (48.67%)	27 (18.00%)	18 (12.00%)
2	33 (22.00%)	24 (16.00%)	57 (38.00%)	36 (24.00%)
3	40 (26.67%)	18 (12.00%)	43 (28.67%)	49 (32.67%)
4	45 (30.00%)	35 (23.33%)	23 (15.33%)	47 (31.33%)

Table 9: Female Respondents’ Rankings for Fashion Product Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	16 (13.11%)	76 (62.30%)	16 (13.11%)	14 (11.48%)
2	22 (18.03%)	11 (9.02%)	48 (39.34%)	41 (33.61%)
3	34 (27.87%)	11 (11.48%)	35 (28.69%)	39 (31.97%)
4	50 (40.98%)	21 (17.21%)	28 (22.95%)	28 (22.95%)

4.2.2.3 Cross-Tabulation Analysis Between Gender and Ranking Preferences

After analyzing the survey responses, we further examined how each respondent ranked the four layout types (image, price, reviews, specifications) across both product categories (3C and fashion). For each product type, we counted how often each layout was ranked in position k (where $k = 1-4$). A 2×4 contingency table was constructed, with gender (male, female) as the row variable and layout type as the column variable.

We then applied the Pearson’s chi-square test (degrees of freedom = 3) to determine whether gender and layout ranking distribution are statistically independent.

Using a significance level of $\alpha = 0.05$, the results (as shown in Table 19) indicated that there were no significant differences in layout preference distributions between males and females, regardless of the product category (3C or fashion) or the ranking position. For example, in the case of 1st-place rankings:

- For 3C products, $\chi^2(3) = 1.95$, $p = 0.582$
- For fashion products, $\chi^2(3) = 5.89$, $p = 0.117$

These results suggest that gender is not a determining factor in how individuals rank advertisement layouts. In other words, there is no statistically significant difference between male and female respondents in terms of which layout types are most preferred, moderately preferred, or least preferred.

Table 10: Chi-square Test Results Between Gender and Layout Rank (N = 115)

Product Type	Rank Position	χ^2	df	p-value	Conclusion ($\alpha = 0.05$)
3C	1st	1.95	3	0.582	Not significant
Fashion	1st	5.89	3	0.117	Not significant
3C	2nd	2.70	3	0.440	Not significant
Fashion	2nd	5.30	3	0.151	Not significant
3C	3rd	1.87	3	0.599	Not significant
Fashion	3rd	0.06	3	0.996	Not significant
3C	4th	1.34	3	0.719	Not significant
Fashion	4th	5.76	3	0.124	Not significant

4.2.3 Age-Based Analysis

4.2.3.1 3C Products – Age-Based Comparison

Based on Tables 11 to 14 and Appendix Figure 15, while different age groups showed a generally consistent trend in ranking informational elements for **3C products** (price, image, specifications, reviews), some subtle differences were observed across age segments.

First, **images** were widely regarded as the most important source of information across all age groups. Among respondents under age 25, 40.20% ranked images as the top priority. Similarly, 46.67% of those aged 36–45 and 44.44% of those aged 46 and above did the same. While the 26–35 age group showed a more distributed ranking, 31.11% still placed images in the first position, indicating that images have broad appeal across all age ranges.

Second, **specifications** were notably emphasized by the 26–35 age group, with 40.00% ranking them first and 31.11% second. This suggests that functionality and detailed product information are crucial for this group when shopping for 3C products. In contrast, those under 25 placed specifications more toward the middle, with 30.39% and 34.31% ranking them first and second, respectively. Among older respondents, rankings for specifications were more scattered; notably, 55.56% of those aged 46 and above ranked them last (4th), indicating that specifications are considered less critical by older consumers.

Regarding **price**, 37.75% of respondents under 25 placed it last, with only 13.24% considering it the most important factor. Similarly, in the 36–45 age group, 40.00% placed price last, and just 6.67% ranked it first. This suggests lower price sensitivity among younger and middle-aged adults. While the 26–35 group also leaned toward placing price lower, the distribution was more even. For those aged 46 and above, price appeared more relevant—33.33% placed it in the 1st, 2nd, and 3rd ranks respectively, with no one placing it last, suggesting that price is a relatively more important factor for older adults.

In terms of **reviews**, all age groups generally treated them as secondary. Among those under 25, 36.27% ranked reviews last, while only 16.18% ranked them first. The 26–35 and 36–45 groups had similar distributions, with 33.33% placing reviews 3rd and 4th, indicating that reviews were typically considered mid-to-lower in importance. For the 46+ group, rankings were more centralized, with 55.56% ranking reviews third, 11.11% second, and none ranking them first. Overall, reviews were not a primary source of information across age groups, but among older respondents, they were more often treated as moderately relevant.

To evaluate whether layout preferences differed significantly by age, a *Kruskal-Wallis H test* was conducted across the four age categories. The test results are shown in Table 15.

Statistically, only price came close to the significance threshold ($p \approx 0.06$), while other elements had p -values well above 0.05. Although not statistically significant, exploratory analysis was conducted to observe general trends (see Table 16). The results suggested that only price showed a “weak significance” with age, where respondents aged 46 and above were more likely to prefer price-oriented layouts. However, this difference did not remain significant after multiple comparison adjustments.

In summary, age does not appear to have a strong influence on layout preferences for 3C products. The small sample size in the older age group may limit the strength of conclusions, and future research is encouraged to **expand the 46+ age group sample and explore how the balance between price and specification information influences layout effectiveness.**

Table 11: 3C Product Price Ranking by Age Group (1 = Most Important, 4 = Least Important)

	Rank $\leq$ 25	26–35	36–45	$\geq$ 46
1	27 (13.24%)	6 (13.33%)	1 (6.67%)	3 (33.33%)
2	44 (21.57%)	12 (26.67%)	3 (20.00%)	3 (33.33%)
3	56 (27.45%)	14 (31.11%)	5 (33.33%)	3 (33.33%)
4	77 (37.75%)	13 (28.89%)	6 (40.00%)	–

Table 12: 3C Product Image Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	$\leq$ 25	26–35	36–45	$\geq$ 46
1	82 (40.20%)	14 (31.11%)	7 (46.67%)	4 (44.44%)
2	50 (24.51%)	11 (24.44%)	6 (40.00%)	3 (33.33%)
3	43 (21.08%)	10 (22.22%)	1 (6.67%)	1 (11.11%)
4	29 (14.22%)	10 (22.22%)	1 (6.67%)	1 (11.11%)

Table 13: 3C Product Specification Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	$\leq$ 25	26–35	36–45	$\geq$ 46
1	62 (30.39%)	18 (40.00%)	4 (26.67%)	2 (22.22%)
2	70 (34.31%)	14 (31.11%)	4 (26.67%)	2 (22.22%)
3	48 (23.53%)	6 (13.33%)	4 (26.67%)	2 (22.22%)
4	24 (11.76%)	7 (15.56%)	3 (20.00%)	5 (55.56%)

Table 14: 3C Product Review Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	$\leq$ 25	26–35	36–45	$\geq$ 46
1	33 (16.18%)	7 (15.56%)	3 (20.00%)	–
2	40 (19.61%)	8 (17.78%)	2 (13.33%)	1 (11.11%)
3	57 (27.94%)	15 (33.33%)	5 (33.33%)	5 (55.56%)
4	74 (36.27%)	15 (33.33%)	5 (33.33%)	3 (33.33%)

Table 15: Kruskal-Wallis Test for 3C Layout Preferences by Age Group

Layout Type	Kruskal-Wallis H	p	Conclusion
Price-focused	7.43	0.059	Marginal (approaching significance)
Image-focused	4.08	0.253	Not significant
Specification-focused	4.60	0.203	Not significant
Review-focused	0.73	0.865	Not significant

Table 16: Average Ranking of 3C Layout Preferences by Age Group

Age Group	Price-focused	Specification-focused	Image-focused
≤ 25	2.90	2.17	2.09
26–35	2.76	2.09	2.36
36–45	3.07	2.47	1.73
≥ 46	2.00	2.89	1.89

4.2.3.2 Fashion Products – Age-Based Comparison

As shown in Tables 17 to 20 and Appendix Figure 16, while respondents across different age groups showed a general consensus in ranking the informational elements for fashion products, some subtle differences were observed in the details of their preferences.

Overall, images were considered the most important information element by all age groups. This was especially evident among those aged 25 and below (58.82%) and those aged 36–45 (53.33%). However, it is noteworthy that a non-negligible proportion of younger and middle-aged respondents also ranked images last—19.12% for the under-25 group and 28.89% for the 26–35 group—indicating that while images are generally valued, some individuals in these groups place less emphasis on visual elements, leading to some divergence in rankings.

For price, its importance increased slightly with age. Among respondents aged 46 and above, 44.44% ranked price as the most important factor—even higher than those who ranked images first in this group (33.33%). This makes them the only age group that prioritized price over all other elements. In contrast, 36.76% of those under 25 ranked it last, indicating that younger consumers tend to care less about pricing when it comes to fashion products.

In terms of specifications, both the under-25 and 26–35 groups showed moderate to high emphasis on this element. Specifically, 14.22% of the under-25 group ranked specifications first, and 39.71% ranked them second—a combined total of 53.93%. For the 26–35 group, 24.44% and 35.56% ranked them first and second, respectively—a combined 60%. This indicates that younger and middle-aged consumers do consider functional and practical product information when shopping for fashion items. In comparison, rankings among the 36–45 and 46+ groups were more evenly distributed. Among those aged 36–45, each rank (1st to 4th) accounted for approximately 20%–27%, showing no strong preference. Meanwhile, none of the respondents aged 46 and above ranked specifications first, suggesting that this group places low priority on functional details.

Regarding reviews, the under-25 group showed the most even distribution, with the highest proportion placing it third (32.35%), followed by second (29.90%) and fourth (27.45%), indicating that reviews are moderately important among younger consumers. The 26–35 group showed a strong tendency to place reviews last (33.33%), making them the least review-focused group among all age segments. In contrast, both the 36–45 and 46+ age groups primarily ranked reviews third (46.67% and 44.44%, respectively), suggesting that older consumers view reviews as a stable secondary reference, rather than a primary decision-making factor.

Table 17: Fashion Product Price Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	≤ 25	26–35	36–45	≥ 46
1	34 (16.67%)	8 (17.78%)	2 (13.33%)	4 (44.44%)
2	41 (20.10%)	9 (20.00%)	5 (33.33%)	1 (11.11%)
3	54 (26.47%)	16 (35.56%)	3 (20.00%)	2 (22.22%)
4	75 (36.76%)	12 (26.67%)	4 (33.33%)	2 (22.22%)

Table 18: Fashion Product Image Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	≤ 25	26–35	36–45	≥ 46
1	120 (58.82%)	9 (42.22%)	8 (53.33%)	3 (33.33%)
2	21 (10.29%)	5 (11.11%)	3 (20.00%)	3 (33.33%)
3	24 (11.76%)	5 (11.11%)	1 (6.67%)	2 (22.22%)
4	39 (19.12%)	13 (28.89%)	3 (20.00%)	1 (11.11%)

Table 19: Fashion Product Specification Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	≤ 25	26–35	36–45	≥ 46
1	29 (14.22%)	11 (24.44%)	2 (13.33%)	–
2	81 (39.71%)	16 (35.56%)	4 (26.67%)	4 (44.44%)
3	60 (29.41%)	13 (28.89%)	4 (26.67%)	2 (22.22%)
4	34 (16.67%)	5 (11.11%)	4 (33.33%)	3 (33.33%)

Table 20: Fashion Product Review Ranking by Age Group (1 = Most Important, 4 = Least Important)

Rank	≤ 25	26–35	36–45	≥ 46
1	21 (10.29%)	7 (15.56%)	2 (13.33%)	2 (22.22%)
2	61 (29.90%)	12 (26.67%)	3 (20.00%)	1 (11.11%)
3	66 (32.35%)	11 (24.44%)	7 (46.67%)	4 (44.44%)
4	56 (27.45%)	15 (33.33%)	3 (20.00%)	2 (22.22%)

To further examine the observed differences, we conducted a Kruskal-Wallis H test across the four age groups to determine whether there were any statistically significant differences in layout ranking distributions for **fashion products**. The results are presented in Table 21.

However, the findings indicated that there were **no significant differences** in layout preferences among the four age groups (25 and below, 26–35, 36–45, and 46 and above) for any of the fashion layout types. After applying *Bonferroni correction* to all pairwise comparisons, the adjusted *p*-values remained too large to indicate significance.

One likely explanation is the **limited sample size** in certain groups—particularly the 46 and above group, which included only 9 respondents—resulting in **insufficient statistical power**. Consequently, the results suggest that **age did not have a statistically significant impact** on layout preferences for fashion-related pop-up advertisements in this study.

To further investigate the potential trend that older adults may prefer layouts with fewer images and more prominent pricing, a **larger sample of older participants** is needed in future research.

Table 21: Kruskal-Wallis Test for Fashion Layout Preferences by Age Group

Layout Type	Kruskal-Wallis H	p	Conclusion
Image-focused	4.55	0.208	Not significant
Specification-focused	3.71	0.295	Not significant
Price-focused	2.70	0.440	Not significant
Review-focused	0.05	0.997	Not significant

4.2.4 Analysis Based on Shopping Behavior

4.2.4.1 3C Products – Comparison Based on “Most Frequently Purchased in the Past Year”

As shown in Tables 22 and 23 and Appendix Figure 17, the overall information ranking trends reveal that **frequent 3C online shoppers** place significantly more importance on **specifications** than those who do not frequently shop for 3C products. Among frequent 3C buyers, 35.40% ranked specifications first, and 30.97% ranked them second—a combined total of 66.37%. This surpasses the combined first and second place rankings for images (36.28% and 26.55%, totaling 62.83%), suggesting that frequent 3C shoppers place greater emphasis on product functionality and technical details.

In contrast, image rankings were generally lower among frequent 3C buyers. Compared to infrequent 3C shoppers, a smaller proportion ranked images first (36.28% vs. 41.25%), while higher percentages placed images third (21.24%) or fourth (15.93%). This indicates that images are less influential for those who regularly shop for 3C products online.

Conversely, specifications ranked higher for frequent buyers—not only in terms of first and second rankings but also due to a lower proportion assigning it the lowest rank (12.39% compared to 15.62% for infrequent buyers), reflecting a more concentrated front-loaded preference.

Regarding price, frequent 3C buyers exhibited a **polarized ranking pattern**. Only 22.12% ranked price third, notably lower than the 33.12% among infrequent buyers. This may suggest that frequent buyers have a clearer stance on price—either considering it important or unimportant, but less likely to treat it as a middle-ground factor.

Finally, **reviews** showed clear differences as well. Among frequent 3C buyers, 35.40% ranked reviews third, much higher than the 26.25% seen in infrequent buyers. This implies that frequent buyers are more likely to treat reviews as secondary, rather than primary, sources of information.

In summary, compared to those who rarely buy 3C products online, frequent 3C shoppers place less emphasis on images, but more importance on specifications and price, while placing lower relative value on reviews.

Table 22: Frequent 3C Buyers’ Ranking of Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	19 (16.81%)	41 (36.28%)	40 (35.40%)	13 (11.50%)
2	29 (25.66%)	30 (26.55%)	35 (30.97%)	19 (16.81%)
3	25 (22.12%)	24 (21.24%)	24 (21.24%)	40 (35.40%)
4	40 (35.40%)	18 (15.93%)	14 (12.39%)	41 (36.28%)

Table 23: Infrequent 3C Buyers’ Ranking of Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	18 (11.25%)	66 (41.25%)	46 (28.75%)	30 (18.75%)
2	33 (20.62%)	40 (25.00%)	55 (34.38%)	32 (20.00%)
3	53 (33.12%)	19 (11.88%)	34 (21.25%)	42 (26.25%)
4	56 (35.00%)	23 (14.37%)	25 (15.62%)	56 (35.00%)

4.2.4.2 Fashion Products – Comparison Based on “Most Frequently Purchased in the Past Year”

As shown in Tables 24 and 25 and Appendix Figure 18, the ranking patterns of informational elements for **fashion products** were generally similar between frequent and infrequent fashion online shoppers, with one notable difference in how **price** was evaluated.

Frequent fashion shoppers were more likely to rank price lower overall: **29.49%** ranked it third, and **37.18%** ranked it fourth—both higher than the proportions among infrequent shoppers (23.93% and 31.62%, respectively). This suggests that price is relatively less important to frequent fashion shoppers, with a stronger tendency to place it toward the bottom of their priority list.

For other elements, both groups considered **images** the most important reference information. 57.05% of frequent shoppers ranked images first, compared to 52.14% of infrequent shoppers—showing a slightly stronger preference among frequent buyers.

In terms of **specifications**, frequent shoppers were more likely to place them in second position (39.74% vs. 36.75%), indicating that while functionality and product details are relevant, they are generally seen as supplementary rather than primary decision factors.

As for **reviews**, the ranking distributions between the two groups were very similar, showing no significant divergence in how review information is valued.

In summary, while both frequent and infrequent fashion shoppers value images most, frequent shoppers place less emphasis on price, assign moderate value to specifications, and treat reviews similarly to those who shop for fashion items less often.

Table 24: Frequent Fashion Buyers’ Ranking of Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	25 (16.03%)	89 (57.05%)	24 (15.38%)	18 (11.54%)
2	27 (17.31%)	20 (12.82%)	62 (39.74%)	47 (30.13%)
3	46 (29.49%)	17 (10.90%)	45 (28.85%)	48 (30.77%)
4	58 (37.18%)	30 (19.23%)	25 (16.03%)	43 (27.56%)

Table 25: Infrequent Fashion Buyers’ Ranking of Information Elements (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	23 (19.66%)	61 (52.14%)	19 (16.24%)	14 (11.97%)
2	29 (24.79%)	15 (12.82%)	43 (36.75%)	30 (25.64%)
3	28 (23.93%)	15 (12.82%)	40 (34.19%)	34 (29.06%)
4	37 (31.62%)	26 (22.22%)	21 (17.95%)	33 (28.21%)

4.2.4.3 Effect of Past Purchase Behavior on Layout Preference – Statistical Testing

Based on the observed differences described above, we further examined whether **past purchase behavior** influenced layout preferences for both **fashion** and **3C products**. Respondents were divided into two groups based on whether they reported having most frequently purchased the product type in the past year.

- **For fashion products**, participants were grouped by the variable `buy_clothes` into a “*purchasing group*” ($n = 156$) and a “*non-purchasing group*” ($n = 117$).
- **For 3C products**, the variable `buy_3c` was used to create a “*purchasing group*” ($n = 113$) and a “*non-purchasing group*” ($n = 160$).

To compare the distribution of layout rankings between the two groups, we applied the **Mann–Whitney U test** for each of the four layout types. The significance level was set at $\alpha = 0.05$.

The test results, shown in Table 26, indicate that for both **fashion** and **3C products**, all p -values exceeded 0.05, meaning there were **no statistically significant differences** in layout ranking distributions between the purchasing and non-purchasing groups.

In summary, there is no evidence that prior purchase behavior significantly influenced layout preferences. For both product categories, the ranking of all four layout designs **did not differ meaningfully** between those who had purchased the product frequently in the past year and those who had not.

Table 26: Mann–Whitney U Test Results Comparing Layout Preferences by Purchase Behavior

Category	Layout Type	U	p-value	Conclusion
Fashion	Image-focused	8624.0	0.3915	Not significant
Fashion	Spec-focused	8956.5	0.7838	Not significant
Fashion	Price-focused	10049.0	0.1371	Not significant
Fashion	Review-focused	8882.5	0.6949	Not significant
3C	Image-focused	9522.0	0.4325	Not significant
3C	Spec-focused	8389.5	0.2917	Not significant
3C	Price-focused	8389.0	0.2909	Not significant
3C	Review-focused	9801.0	0.2166	Not significant

4.2.4.4 3C Products – Comparison Based on Online Shopping Frequency

Based on participants’ reported online shopping frequency (`shopping_freq_avg`), respondents were categorized into two groups:

- **High-frequency group:** shopping once per week or more ($n = 52$)
- **Low-frequency group:** shopping 1–2 times per month or irregularly ($n = 221$)

The analysis of information ranking for 3C products revealed slightly different preference tendencies between the two groups:

Image

In terms of the importance of images, 39.37% of the low-frequency group ranked images first, compared to 38.46% in the high-frequency group. While these figures are similar, more high-frequency shoppers placed images in the second position (28.85%) compared to the low-frequency group (24.89%), suggesting a slight shift toward mid-ranking among frequent shoppers.

Specifications

The low-frequency group placed greater emphasis on specifications: 33.48% ranked them first, compared to 23.08% in the high-frequency group. Similarly, 33.94% of low-frequency shoppers ranked specifications second, slightly higher than 28.85% in the high-frequency group. These results suggest that low-frequency shoppers value technical and functional product details more than frequent shoppers.

Price

Price rankings showed a polarized pattern among frequent shoppers: 21.15% of the high-frequency group ranked price first, nearly double that of the low-frequency group (11.76%). However, only 19.23% of the high-frequency group ranked price third, compared to 30.77% of the low-frequency group. The percentage placing price last (4th) was similar in both groups, indicating that frequent shoppers are more divided in how they perceive price—either very important or not at all.

Reviews

For reviews, 36.54% of high-frequency shoppers ranked them third, and 26.92% ranked them fourth. In comparison, the low-frequency group had 28.51% ranking reviews third and 37.56% ranking them fourth. Although there are minor differences, both groups clearly treat reviews as a lower priority, rather than a key decision factor.

Table 27: High-Frequency Group – 3C Product Information Ranking (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	11 (21.15%)	20 (38.46%)	12 (23.08%)	9 (17.31%)
2	12 (23.08%)	15 (28.85%)	15 (28.85%)	10 (19.23%)
3	10 (19.23%)	9 (17.31%)	14 (26.92%)	19 (36.54%)
4	19 (36.54%)	8 (15.38%)	11 (21.15%)	14 (26.92%)

Table 28: Low-Frequency Group – 3C Product Information Ranking (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	26 (11.76%)	87 (39.37%)	74 (33.48%)	34 (15.38%)
2	50 (22.62%)	55 (24.89%)	75 (33.94%)	41 (18.55%)
3	68 (30.77%)	47 (21.27%)	46 (20.81%)	63 (28.51%)
4	77 (34.84%)	33 (14.93%)	26 (11.76%)	83 (37.56%)

4.2.4.5 Fashion Products – Comparison Based on Online Shopping Frequency

In the context of fashion product information rankings, the comparison between high-frequency and low-frequency online shoppers revealed subtle but notable preference differences:

Images

The low-frequency group placed much greater emphasis on images: 58.37% ranked images first, significantly higher than 40.38% in the high-frequency group. Additionally, the low-frequency group had lower proportions in second (10.86%) and third (10.41%) positions, indicating a highly concentrated preference for images.

In contrast, the high-frequency group showed a more even distribution across rankings: while 40.38% still placed images first, rankings from second to fourth each accounted for approximately 17% to 21%, suggesting that although images are still valued, their importance is less dominant among frequent shoppers.

Specifications

40.72% of the low-frequency group ranked specifications second, and 30.32% placed them third—both higher than the 28.85% and 23.08% in the high-frequency group, respectively. This suggests that low-frequency shoppers generally view specifications as moderately important, but not as a top priority.

Price

The high-frequency group demonstrated a polarized pattern in their valuation of price: 25.00% ranked price first (compared to 15.84% of the low-frequency group), and 36.54% ranked it third (vs. 24.89%). However, they were less likely to rank price second (11.54% vs. 22.62%) or fourth (26.92% vs. 36.65%), indicating that frequent shoppers tend to see price as either very important or not important at all, with fewer treating it as a neutral or middle-ground factor.

Reviews

For reviews, the high-frequency group showed a slightly forward-shifted distribution: 38.46% placed reviews second, compared to 25.79% in the low-frequency group. This implies that frequent online shoppers are more likely to treat reviews as a secondary—but meaningful—source

of information, reflecting a greater reliance on peer feedback.

Table 29: High-Frequency Group – Fashion Product Information Ranking (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	13 (25.00%)	21 (40.38%)	11 (21.15%)	7 (13.46%)
2	6 (11.54%)	11 (21.15%)	15 (28.85%)	20 (38.46%)
3	19 (36.54%)	9 (17.31%)	12 (23.08%)	12 (23.08%)
4	14 (26.92%)	11 (21.15%)	15 (28.85%)	13 (25.00%)

Table 30: Low-Frequency Group – Fashion Product Information Ranking (1 = Most Important, 4 = Least Important)

Rank	Price-focused	Image-focused	Specification-focused	Review-focused
1	35 (15.84%)	129 (58.37%)	32 (14.48%)	25 (11.31%)
2	50 (22.62%)	24 (10.86%)	91 (40.72%)	57 (25.79%)
3	55 (24.89%)	23 (10.41%)	68 (30.32%)	63 (28.51%)
4	81 (36.65%)	45 (20.36%)	32 (14.48%)	63 (28.51%)

4.2.4.6 Layout Preference Testing Based on Shopping Frequency

Given the observed differences in the comparisons above, we conducted statistical tests to verify whether layout ranking distributions differ significantly between high-frequency and low-frequency shoppers.

For each layout type (ranked from 1 = most preferred to 4 = least preferred), we used the Mann–Whitney U test (two-tailed) to evaluate differences between the two groups. Additionally, we applied the Kruskal–Wallis H test using the original 6-level shopping frequency scale to assess whether layout preferences varied across multiple frequency levels.

Mann–Whitney U Test Results (see Table 24):

For 3C products, the *specifications* layout showed a significant difference:

High-frequency group: mean rank = 2.46

Low-frequency group: mean rank = 2.12

$U = 6787.5$, $p = 0.034 < 0.05$

This indicates that frequent shoppers (shopping once per week or more) ranked specification-focused layouts lower than less frequent shoppers. In other words, low-frequency shoppers place more value on specification details when viewing 3C ads.

For fashion products, the *image* layout showed a marginally significant trend:

$p = 0.076$, slightly above the 0.05 threshold.

This suggests that high-frequency shoppers may prefer image-dominant layouts slightly more than low-frequency ones; however, the result is not statistically conclusive.

Kruskal–Wallis H Test Results (see Table 25):

When analyzing layout rankings across the full 6-level shopping frequency scale, no layout type showed statistically significant differences in rankings. This means that when considering a broader range of shopping frequencies, layout preferences remained stable.

Summary:

Among consumers who engage in online shopping for the respective product types:

- The only significant difference observed was for 3C product specifications, where low-frequency shoppers were more likely to favor specification-heavy layouts than high-frequency shoppers.
- No other layout types, for either product category, showed significant differences based on frequency.
- The 6-level frequency analysis also yielded no statistically significant variation in layout preferences.

Table 31: Mann–Whitney U Test Results for Layout Preferences by Online Shopping Frequency

Product	Layout Type	High Freq. Mean Rank ($n = 52$)	Low Freq. Mean Rank ($n = 221$)	p-value
3C	Image	2.0962	2.1131	0.9397
3C	Specification	2.4615	2.1176	0.0342
3C	Price	2.7115	2.8869	0.3890
3C	Review	2.7308	2.8824	0.2977
Fashion	Image	2.1923	1.9276	0.0763
Fashion	Specification	2.5577	2.4480	0.5119
Fashion	Price	2.6538	2.8523	0.3162
Fashion	Review	2.5962	2.8009	0.1638

Table 32: Kruskal–Wallis H Test Results by Online Shopping Frequency Level

Product Type	Layout Type	H (p-value)
3C	Specification Layout	9.64 (0.086)
Fashion	Review Layout	6.34 (0.275)
Other 6 items	–	0.73–5.95 (0.31–0.99)

4.2.5 Analysis Based on Monthly Spending Levels

4.2.5.1 Monthly Spending and Its Influence on Layout Preferences

Based on average monthly spending, participants were divided into three groups:

Low spending ($< \text{NT\$}10,000$, $n = 86$)

Medium spending ($\text{NT\$}10,001\text{--}20,000$, $n = 145$)

High spending ($> \text{NT\$}20,000$, $n = 42$)

The results of the 3C product layout preference rankings revealed distinct patterns across the three spending groups:

Image

All three groups regarded images as the most important element overall, but the degree of concentration differed.

The medium-spending group had the highest proportion (42.07%) ranking images first, compared to 34.88% in the low-spending group and 38.10% in the high-spending group.

In both the low and high groups, image rankings were more evenly distributed across positions 2 to 4, each holding roughly 19%–23%, indicating a more balanced valuation.

Specifications

The high-spending group most frequently ranked specifications in second place (40.48%).

The medium group showed equal emphasis on specifications ranked first and second (both 33.79%), suggesting consistently moderate importance.

The low-spending group had a more scattered distribution—though 32.56% ranked specifications first, the remaining three positions each held at least 14%, reflecting a less focused preference.

Price

The high-spending group showed the most balanced distribution, ranging from 19.05% (3rd place) to 33.33% (2nd place).

The medium-spending group was more price-indifferent, with around 71% of respondents ranking price third or fourth, suggesting it was not a primary concern.

The low-spending group also tended to deprioritize price, with 37.21% ranking it last (4th place).

Reviews

Among the high-spending group, 45.24% ranked reviews in third place—the highest of all groups. In contrast, 41.38% of the medium-spending group placed reviews last (4th place), indicating lower trust or reliance on reviews.

The low-spending group showed a more even distribution across second to fourth place (25%–30%), suggesting no strong preference or avoidance for review-based information.

Table 33: Layout Ranking for 3C Products – Low Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	14 (16.28%)	30 (34.88%)	28 (32.56%)	14 (16.28%)
2	20 (23.26%)	20 (23.26%)	24 (27.91%)	22 (25.58%)
3	20 (23.26%)	18 (20.93%)	22 (25.58%)	26 (30.23%)
4	32 (37.21%)	18 (20.93%)	12 (13.95%)	24 (27.91%)

Table 34: Layout Ranking for 3C Products – Medium Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	14 (9.66%)	61 (42.07%)	49 (33.79%)	21 (14.48%)
2	28 (19.31%)	21 (14.48%)	49 (33.79%)	27 (18.62%)
3	50 (34.48%)	19 (13.10%)	25 (17.24%)	37 (25.52%)
4	53 (36.55%)	10 (6.90%)	11 (7.59%)	60 (41.38%)

Table 35: Layout Ranking for 3C Products – High Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	9 (21.43%)	16 (38.10%)	9 (21.43%)	8 (19.05%)
2	14 (33.33%)	8 (19.05%)	17 (40.48%)	2 (4.76%)
3	8 (19.05%)	8 (19.05%)	7 (16.67%)	19 (45.24%)
4	11 (26.19%)	10 (23.81%)	9 (21.43%)	13 (30.95%)

In the ranking of informational elements for fashion products, respondents were divided into three groups based on their monthly spending levels (low, medium, high), and the following preference differences were observed:

- **Images**

- All spending groups regarded them as the most important source of information, but the degree of concentration varied significantly.
- In the medium spending group, 60.69% ranked images in the first position—the highest among all three groups—
- followed by the low spending group (50.00%), and then the high spending group (45.24%).
- Meanwhile, the medium group showed only 10%–18% in ranks 2 to 4, indicating that images were the primary decision factor.
- In contrast, the low and high spending groups had a more even distribution, showing that although images were still considered important, they did not dominate as clearly.

- **Specifications**

- All three groups mainly ranked this element in the second or third position.
- The medium group was the most concentrated, with 40.00% placing it second.
- The low group followed, with 38.37% also placing it second.
- The high group distributed their rankings evenly across second and third place (33.33% each).

- **Price**

- The high spending group exhibited a polarized evaluation:
 - * 26.19% ranked it first, while 35.71% ranked it third.
- The medium group showed a gradual shift toward lower importance, with the highest proportion (35.86%) ranking it fourth, indicating that price is not a key factor for this group.
- The low spending group also showed a bimodal distribution:
 - * 40.70% placed price in the fourth position,
 - * while nearly 20% ranked it in the first or second,
 - * suggesting that price still holds some relevance for them.

- **Reviews**

- None of the groups considered them the most important.

- In the high spending group, review rankings were more evenly spread:
 - * 33.33% ranked them fourth,
 - * around 26% each in the second and third positions,
 - * and only 14.29% in the first.
- The medium group tended to rank reviews in the middle to lower positions:
 - * 33.79% in third and 26.90% in fourth.
- The low group showed similar results:
 - * 32.56% ranking reviews third and 26.74% fourth.

Table 36: Layout Ranking for Fashion Products – Low Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	17 (19.77%)	43 (50.00%)	16 (18.60%)	10 (11.63%)
2	18 (20.93%)	10 (11.63%)	35 (38.37%)	25 (29.07%)
3	16 (18.60%)	15 (17.44%)	27 (31.40%)	28 (32.56%)
4	35 (40.70%)	18 (20.93%)	10 (11.63%)	23 (26.74%)

Table 37: Layout Ranking for Fashion Products – Medium Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	20 (13.79%)	88 (60.69%)	21 (14.48%)	16 (11.03%)
2	30 (20.69%)	16 (11.03%)	58 (40.00%)	41 (28.28%)
3	43 (29.66%)	15 (10.34%)	38 (26.21%)	49 (33.79%)
4	35 (36.85%)	17 (11.72%)	28 (19.31%)	39 (26.90%)

Table 38: Layout Ranking for Fashion Products – High Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price	Image	Specification	Review
1	11 (26.19%)	19 (45.24%)	6 (14.29%)	6 (14.29%)
2	8 (19.05%)	12 (28.57%)	11 (26.19%)	11 (26.19%)
3	15 (35.71%)	6 (14.29%)	11 (26.19%)	14 (33.33%)
4	8 (19.05%)	5 (11.90%)	14 (33.33%)	14 (33.33%)

Given the observed differences above, we further conducted Kruskal–Wallis H tests on the eight layout ranking values across the three spending groups. The results are presented in Table 30. With the exception of the “price-emphasized” layout for 3C products, none of the other tests reached statistical significance.

A post hoc comparison for the significant result (see Table 40) revealed that the only statistically significant difference occurred between the medium-spending group (NT\$10–20k) and the

high-spending group (>NT\$20k). The medium-spending group ranked price-emphasized layouts significantly lower, indicating that, compared to high spenders, they place less importance on price presentation when viewing one-page 3C advertisements. No significant differences were found between the low-spending group and the other two groups.

This result suggests that high spenders, due to their larger average purchase amounts, may still care about discounts or price transparency. Meanwhile, medium spenders seem more focused on functionality and appearance, with price being a secondary consideration rather than a primary factor. However, as the high-spending sample size was only 42 respondents, the effect size and confidence intervals should be verified through further research.

Table 39: Kruskal–Wallis H Test Results of Layout Rankings by Spending Level

Category	Layout Type	H Statistic	<i>p</i> -value	Result
3C	Price-Emphasized Image	3.794	0.150	Not Significant
3C	Specification-Emphasized	2.567	0.277	Not Significant
3C	Price-Emphasized	6.229	0.044	Significant
3C	Review-Emphasized	3.327	0.190	Not Significant
Fashion	Price-Emphasized Image	3.854	0.146	Not Significant
Fashion	Specification-Emphasized	1.615	0.446	Not Significant
Fashion	Price-Emphasized	4.423	0.110	Not Significant
Fashion	Review-Emphasized	0.085	0.958	Not Significant

Table 40: Post Hoc Pairwise Comparisons for Price-Emphasized Layout in 3C Products

Comparison Group	U	<i>p</i> (Unadjusted)	<i>p</i> (Bonferroni)	Conclusion
Medium (10–20k) vs Low (<10k)	3561.0	0.004	0.012	Significant
High (>20k) vs Low (<10k)	921.0	0.110	0.330	Not Significant
Medium (10–20k) vs High (>20k)	622.0	0.260	0.780	Not Significant

4.2.5.2 Fashion Products – Comparison Based on Monthly Spending Levels

To examine whether frequent 3C shoppers ($n = 113$) show differences in layout preferences based on their spending levels, participants who reported regularly purchasing 3C products in the past year were divided into three groups: Low spending (<NT\$500, $n = 36$), Medium spending (NT\$500–1,000, $n = 36$), and High spending (>NT\$1,000, $n = 41$).

After grouping participants by their average spending, we compared how each group prioritized four types of information: price, image, specifications, and reviews. The results revealed clear differences in layout preferences based on spending capacity.

Image and Specifications

Among the medium and high spending groups, images were consistently viewed as the most important information: 41.67% of the medium group and 39.02% of the high group ranked images first, both higher than the corresponding proportions for specifications (38.89% and 29.27%). However, in the low spending group, specifications were ranked first by 38.89%, exceeding the 27.78% who ranked images first. This suggests that lower-spending users may place greater emphasis on technical details when evaluating 3C products.

Price

For price-oriented layouts, the proportion of participants ranking them first or second increased with spending level: 25.00% in the low spending group, 47.22% in the medium group, and 53.66% in the high group. This pattern implies that as spending increases, consumers become more attentive to price-related information, possibly to ensure they are getting appropriate value for larger purchases.

Reviews

Across all three groups, reviews were generally seen as less important. The low spending group showed a total of 47.22% ranking reviews in the first or second positions, while only 19.44% of the medium group and 19.52% of the high group did the same. This indicates that lower spenders tend to rely more on reviews, whereas medium and high spenders give them relatively less consideration.

Table 41: Layout Rankings for 3C Products – Low Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	7 (19.44%)	10 (27.78%)	14 (38.89%)	5 (13.89%)
2	2 (5.56%)	11 (30.56%)	11 (30.56%)	12 (33.33%)
3	9 (25.00%)	10 (27.78%)	6 (16.67%)	11 (30.56%)
4	18 (50.00%)	5 (13.89%)	5 (13.89%)	8 (22.22%)

Table 42: Layout Rankings for 3C Products – Medium Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	4 (11.11%)	15 (41.67%)	14 (38.89%)	3 (8.33%)
2	13 (36.11%)	7 (19.44%)	12 (33.33%)	4 (11.11%)
3	10 (27.78%)	7 (19.44%)	9 (25.00%)	10 (27.78%)
4	9 (25.00%)	7 (19.44%)	1 (2.78%)	19 (52.78%)

Table 43: Layout Rankings for 3C Products – High Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	8 (19.51%)	16 (39.02%)	12 (29.27%)	5 (12.20%)
2	14 (34.15%)	12 (29.27%)	3 (7.32%)	11 (26.83%)
3	6 (14.63%)	9 (21.95%)	19 (46.34%)	7 (17.07%)
4	13 (31.71%)	4 (9.76%)	7 (17.07%)	14 (34.15%)

We further conducted statistical tests to confirm the findings. First, a Kruskal–Wallis H test was performed to examine differences across multiple groups, with the results shown in Table 44. The test revealed no significant differences in preferences for images, specifications, or price. However, a significant difference was found for the *reviews* section.

A follow-up analysis using the Mann–Whitney U test and Bonferroni correction was conducted for post hoc comparisons among the three spending groups (low, medium, and high). As shown in Table 45, a significant difference was observed between low spenders (under NT\$500) and medium spenders (NT\$500–1,000) in terms of the ranking of the reviews section (Bonferroni-adjusted p -value = 0.016). In other words, users who typically spend NT\$500–1,000 per purchase tend to place less importance on having the *reviews* section prominently displayed (i.e., they ranked it lower) compared to those who spend less than NT\$500. No significant differences were found between the other group comparisons or for the other three types of layout elements.

Table 44: Kruskal–Wallis Test Results on Layout Ranking among Frequent 3C Buyers

Layout Type	H	p-value	Conclusion
Image Emphasized	0.853	0.653	Not Significant
Specification Emphasized	2.488	0.288	Not Significant
Price Emphasized	4.207	0.122	Not Significant
Review Emphasized	8.738	0.013	Significant

Table 45: Post Hoc Pairwise Comparison Results for Review-Emphasized Layout (Low, Medium, High Spending Groups)

Comparison Group	U	p (Unadjusted)	p (Bonferroni)
Low (<\$500) vs. Medium (500–1k)	411.5	0.005	0.016 (Significant)
Low vs. High (>1k)	921.0	0.051	0.152 (Not Significant)
Medium vs. High	621.5	0.203	0.610 (Not Significant)

4.2.5.3 Fashion Products – Comparison of Layout Preferences Among Frequent Buyers by Spending Level

To explore whether frequent fashion buyers ($n = 156$) differ in their layout preferences based on spending levels, respondents who had regularly purchased fashion products in the past year were divided into three groups: *Low spending* (< NT\$500, $n = 47$), *Medium spending* (NT\$500–1,000, $n = 54$), and *High spending* (> NT\$1,000, $n = 55$).

The results revealed slight differences in information ranking distributions among the three groups:

Image

All groups placed a high level of importance on images, especially the high-spending group, where 63.64% ranked images first. This was higher than both the medium group (51.85%) and the low group (55.32%), suggesting that the more consumers spend, the more importance they place on the visual presentation of fashion advertisements.

Price

In terms of price, the low-spending group showed a polarized distribution: 40.43% ranked price fourth (lowest), but 23.40% still ranked it first (highest). This indicates that price may be a contentious factor for this group, with some seeing it as critical and others as unimportant.

In contrast, the medium and high-spending groups generally ranked price lower. For example, in the high-spending group, 36.36% placed price third and 38.18% fourth, suggesting that price is not a primary decision factor for higher-spending fashion buyers.

Specifications

The distribution of specification rankings was generally similar across all three groups, with only a slight backward shift in the low-spending group. However, the differences were minor and not substantial.

Reviews

For reviews, both the low- and high-spending groups had the highest proportion of respondents ranking it second—36.17% and 36.36%, respectively—suggesting that reviews are considered helpful but not critical.

In the medium-spending group, although a notable portion ranked reviews first, 66.67% ranked them third or fourth, indicating that the majority still consider reviews secondary to other information types.

Table 46: Fashion Product Information Ranking – Low-Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	11 (23.40%)	26 (55.32%)	4 (8.51%)	6 (12.77%)
2	6 (12.77%)	20 (42.55%)	12 (25.53%)	17 (36.17%)
3	11 (23.40%)	9 (19.15%)	14 (29.79%)	13 (27.66%)
4	19 (40.43%)	8 (17.02%)	9 (19.15%)	11 (23.40%)

Table 47: Fashion Product Information Ranking – Medium-Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	8 (14.81%)	28 (51.85%)	10 (18.52%)	8 (14.81%)
2	13 (24.07%)	10 (18.52%)	21 (38.89%)	10 (18.52%)
3	15 (27.78%)	6 (11.11%)	16 (29.63%)	17 (31.48%)
4	18 (33.33%)	10 (18.52%)	7 (12.96%)	19 (35.19%)

Table 48: Fashion Product Information Ranking – High-Spending Group (1 = Most Important, 4 = Least Important)

Rank	Price Emphasized	Image Emphasized	Specification Emphasized	Review Emphasized
1	6 (10.91%)	35 (63.64%)	10 (18.18%)	4 (7.27%)
2	8 (14.55%)	6 (10.91%)	21 (38.18%)	20 (36.36%)
3	20 (36.36%)	2 (3.64%)	15 (27.27%)	18 (32.73%)
4	21 (38.18%)	12 (21.82%)	9 (16.36%)	13 (23.64%)

We further conducted a Kruskal–Wallis H test to examine differences across the three spending groups. The results are shown in Table 49. The test revealed that there were no statistically significant differences for the image-, specification-, or price-oriented layouts. However, the review-oriented layout showed a marginal overall difference across groups.

To investigate this further, we conducted Mann–Whitney U tests with Bonferroni correction as post hoc analysis. The pairwise comparisons between the high, medium, and low spending

groups are summarized in Table 49. The results showed that no pairwise comparisons reached statistical significance.

In other words, while the overall test suggested a potential difference in review-oriented layout preferences, no specific group differed significantly from the others in pairwise comparisons.

Table 49 Kruskal–Wallis H Test Results on Layout Ranking among Frequent Fashion Buyers by Spending Group

Layout Type	H	p-value	Conclusion
Image Emphasized	0.782	0.676	Not Significant
Specification Emphasized	1.463	0.481	Not Significant
Price Emphasized	1.099	0.577	Not Significant
Review Emphasized	2.040	0.361	Not Significant

4.2.6 Hypothesis Summary

In summary, our findings offer partial support for H1a and full support for H1b. For 3C products, layouts emphasizing specifications and images were consistently rated more favorably, with specifications showing statistically significant preference over reviews and price. While review-focused layouts received moderate rankings, price-focused layouts were consistently the least preferred. Therefore, H1a is **partially supported**—specification-based designs were strongly favored as hypothesized, but image-focused layouts also emerged as highly valued, suggesting that visual presentation plays a greater role than initially expected. In contrast, the results for apparel products align closely with the expectations outlined in H1b. Image-based layouts were the dominant preference across all user subgroups, and review-focused layouts were generally ranked higher than those emphasizing specifications or price. These consistent patterns across demographics provide strong evidence that **H1b is supported**, reinforcing the importance of visual and social proof elements in influencing layout preference for fashion-related items.

4.3 Research Conclusion

Overall, since most users spend only a short amount of time on pop-up advertisement pages, their layout preferences vary slightly between product types.

For **fashion products**, images ranked higher than specifications, which in turn ranked above reviews and price.

For **3C products**, both images and specifications were valued more than reviews and price. Notably, 3C shoppers relied more heavily on specifications than fashion shoppers, indicating that these two product categories should not be treated the same in layout design.

Factors such as gender, age, and purchase history did not show significant effects on layout preferences. However, when analyzing spending habits in detail, it was found that consumers who spend NT\$10,000–20,000 per month valued price less than those spending over NT\$20,000.

Additionally, among those who had purchased 3C products in the past year, users with an average spending of NT\$500–1,000 per purchase were less likely to prioritize review-oriented layouts compared to those who spent less than NT\$500 per purchase.

That said, price and review information were generally less influential than image and specification content. As such, while minor adjustments can be made for specific consumer segments, these elements should not be the primary focus of layout restructuring.

The only behavioral variable found to significantly influence layout preferences was **shopping frequency**.

- For 3C products, high-frequency shoppers were less focused on specifications compared to low-frequency ones.
- For fashion products, high-frequency shoppers showed a stronger preference for image-based layouts.

Based on these findings, to capture user attention within a limited viewing time on one-page advertisements, the following recommendations are proposed:

For Fashion Products:

- It is recommended that the layout be **image-centered**, with specifications, price, and reviews placed in secondary areas.
- E-commerce platforms can adapt ad presentation based on users' shopping frequency:
 - For high-frequency shoppers (those who shop weekly or more), ads can emphasize images while suppressing other information, possibly using collapsible sections instead of displaying all content upfront.
 - For other users, a layout combining a strong visual element with secondary information blocks may be more appropriate.

For 3C Products:

- It is recommended to focus on both **images and specifications**, while price and reviews can be placed in secondary sections.
- Ad layouts can be differentiated based on shopping frequency:
 - A highly visual layout emphasizing product images can be shown to high-frequency shoppers.
 - A layout combining images with key specifications and flexible product descriptions can be shown to other users.

Additionally:

- For users with an average monthly spending of NT\$10,000–20,000, the proportion of price information can be further reduced.
- For those who typically purchase mid-priced items (around NT\$500–1,000), the proportion of review content can also be reduced, with more emphasis on other elements.

In summary, **price and review content are not the primary drivers** in layout design. Adjustments to these elements may be considered depending on the target audience, but they should not be the main focus of layout changes

5 Future Directions and Limitations

Limitations

While this study provides useful insights into user preferences for pop-up ad designs, there are a few limitations to consider:

- **Limited age range of participants**

Most of our participants were between 18–25 years old, which may not fully represent older age groups like working adults or senior users. These groups might have different online shopping habits and design preferences.

- **Focus on user opinions, not actual behavior**

Our study asked people what they prefer, not what they actually click on or buy. Real-life behavior may not always match what people say in a survey.

- **Only two product categories**

We focused on just two types of products: consumer electronics and fashion. However, other categories like groceries, home goods, or luxury items might lead to different design preferences.

- **Mock-up limitations**

The pop-up ad designs we showed were prototypes and may not fully capture the experience of a real e-commerce website. Factors like loading speed, animation, or placement could also affect user behavior.

Future Directions

To build on our findings, future research can explore:

- **Wider age and user groups**

Include a more diverse group of participants, such as middle-aged users or less tech-savvy shoppers, to better understand broader preferences.

- **Behavioral experiments**

Use A/B testing or real website tracking to measure how users interact with different ad designs in a real environment, not just based on self-reported preferences.

- **More product types**

Study additional product categories like food, household goods, or luxury brands to see if users' layout preferences still vary.

- **Mobile vs. desktop experience**

Since most users shop on mobile devices, future studies could test how design preferences change depending on screen size or interface.

- **Long-term impact**

Explore whether better-matched ad designs lead to higher customer loyalty or repeat purchases over time.

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