

Exploring_Visual_Hierarchy

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Exploring Visual Hierarchy, Banner Blindness, and Selective Attention in Tokopedia Search Ads: A Qualitative Screencast Videography Analysis

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Abstract— This study examines the influence of visual hierarchy, banner blindness, and selective attention on user interactions with search adverts on Tokopedia, a prominent e-commerce site in Indonesia. As digital advertising emerges as a pivotal revenue generator for Tokopedia, comprehending user interaction with advertisements is essential for augmenting efficacy and refining user experience. The study is based on behavioral economics, elucidating how cognitive biases and emotional elements affect user behavior in a multifaceted digital landscape. The study use qualitative screencast videography to investigate the influence of visual design elements and cognitive processes on user attention and decision-making. Although visual hierarchy (e.g., contrast, size, alignment) directs attention, the perception of stimuli is more crucial in fostering engagement. Banner blindness arises from cognitive filtering, wherein people unconsciously disregard advertisements perceived as irrelevant. Moreover, selective attention affects purchasing decisions as consumers prefer advertisements that match with their objectives. The results underscore the necessity for a comprehensive strategy in advertisement design, integrating emotional resonance, contextual significance, and multi-sensory components. Recommendations for Tokopedia encompass tailored, adaptive advertising forms that diminish cognitive load and augment relevance to user intent. This study enhances digital marketing by utilizing behavioral economics to refine e-commerce advertisements. Subsequent research may enhance these findings by cross-platform investigations, eye-tracking, and neuroimaging to investigate the behavioral dynamics of internet advertising.

Keywords— behavioral economics, visual hierarchy, data science, digital advertising.

I. INTRODUCTION

Indonesia's digital economy has shown substantial expansion, with internet penetration at 69.8% in 2020 and anticipated to increase to 82.53% by 2026 [1]. In 2022, 62.6% of Indonesian internet users aged 16 to 64 participated in e-commerce, resulting in a Gross Merchandise Value (GMV) of USD 51.9 billion, the largest in Southeast Asia [2]. In 2021, Tokopedia, a prominent entity in this sector, amalgamated with Gojek to establish GoTo, which contributed IDR 349-428 trillion to Indonesia's GDP and generated employment for 1.7 million individuals, roughly 1.2% of the national workforce [3]. Furthermore, Tokopedia has exerted a

considerable social influence, alleviating poverty and diminishing income inequality [4].

In spite of these successes, GoTo has some challenges. The March 2022 IPO also took place in the midst of "Startup Winter", where global and Southeast Asia startup financing fell by 42% and 65% respectively [5]. As of Q3 2023, GoTo reported a loss of IDR 9.6 trillion, and it is clear that it continues to struggle in achieving profitability. In that overhead, advertising has emerged as an important, if still fairly limited, source of cash: It now makes up about 30 percent of GoTo's annual revenue. Advertising revenue on the site reportedly grew from IDR 17.6 billion (EUR 1,131,000) in 2018 to 623.4 billion (EUR 40,000,000) in 2022 [6].

In the context of pay-per-click (PPC) advertising, e-commerce marketing is crucial for helping brands reach potential customers and track the effectiveness of their campaigns. Globally, nearly half of online merchant advertising budgets are allocated to paid search [7]. For Tokopedia, optimizing ad delivery and relevance can directly influence click-through rates (CTR), a critical measure of user engagement. While the industry standard for CTR typically falls between 2% and 6% [8], lower CTRs observed on Tokopedia indicate an opportunity to better understand what drives—or limits—user interaction with these ads [9].

Studies have examined how visual hierarchy and psychological factors, such as banner blindness and selective attention, influence users' attention and fixation on advertising content [10]. The existing research tends to focus on the algorithms and quantity measures, and little is studied about the quality aspects of the e-commerce user attention dynamics phenomenon [11]. In this research, I explore the combination of visual and psychological in the search results of Tokopedia in order to increase click-through rates and revenue generation [12].

The first of these objectives is this study. Firstly, to study the effects of visual design elements of Tokopedia, which are location, size, and colour, on user engagement [13]. Second, to examine psychological constructs as banner blindness and selective attention in the context of decision making in the Tokopedia search interface [10].

The study aims to provide actionable insights to improve the advertising performance of Tokopedia and also contribute to the broader literature on user-centric digital marketing methods [14].

This research has both academic and practical significance. It improves understanding of consumer behaviour in visually complex digital environments, such as in e-commerce [15]. It offers Tokopedia the methods to enhance ad engagement and click-through rate by aligning with the user demand and then supports its long-term development [16]. This result is expected to provide guidance for the global e-commerce platforms to increase customer satisfaction and improve advertising effectiveness [17].

II. THEORETICAL REVIEW

This conceptual paper investigates the main theories and concepts which are the bases of customer behavior on e-commerce sites in the context of improving the performance of search ads on Tokopedia. Based on the general framework of behavioral economics, the theory of customer behavior, and the basic principles of visual hierarchy, banner blindness, and selective attention, we conducted this study.

A. Behavioral Economics

Behavioral economics is a field that integrates psychological findings into mainstream economic theory in order to explain inconsistencies within standard neoclassical accounts of rational behavior [15]. It is "the study of how psychological, cognitive, emotional, cultural, and social factors influence the decisions of individuals and institutions and how those decisions vary from those implied by classical economic theory" [18].

B. Visual Hierarchy

Not all elements on a webpage are equally important. Designers use size, contrast, color, and placement to establish visual hierarchy and guide attention to key content [19]. Research shows that emphasizing salience through size, contrast, and spacing reduces cognitive load, enhances task performance, and improves navigation in both web and mobile interfaces [20].

C. Selective Attention

Selective attention is the cognitive process of focusing on relevant stimuli while ignoring others, helping individuals manage limited mental resources [22]. In consumer settings, only a few products or ads capture attention, as the brain filters input based on salience and goals. The biased competition model explains that stimuli compete for attention, and only the most salient or goal-relevant ones are prioritized—shaping perception, memory, and decision-making [23].

III. METHODS

This study adopted an interpretivist approach to understand the cognitive and emotional dynamics of user interaction with Tokopedia's product search interface, emphasizing how visual design influences

enjoyment and decision-making. This perspective is suitable for capturing the subjective experience of online shopping, where interface design, attention biases, and personal preferences interact in complex ways.

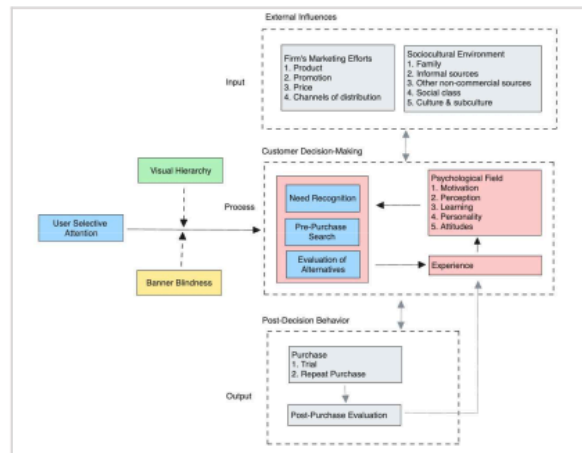


Fig. 1. Treemap Initial Conceptual Framework

Fig. 1 presents the conceptual framework, adapted from the "process" stage of the customer decision-making model [15], which includes need recognition, pre-purchase search, and alternative evaluation. At this stage, user attention is influenced by visual hierarchy and banner blindness, acting as moderators of selective attention [10], [22], [24].

The study followed a multi-qualitative methodology, including in-app screen recording and semi-structured expert interviews to investigate user behavior [25]. Screencast videography records on-screen interactions in real time, capturing behavior toward advertisements and app navigation within the Tokopedia app [26]. This technique offers a comprehensive view of user activity that conventional methods often miss. The flexibility of screen recording is particularly useful for studying dynamic user interactions, such as attention shifts and banner blindness—critical for understanding ad performance.

Expert interviews using a semi-structured format revealed underlying factors that influence user attention and engagement [27]. These interviews provided deeper rationales for incidents observed in the screencasts, contributing to a more in-depth understanding of the design elements influencing user decisions [28].

Data collection targeted active Tokopedia app users aged 25–34, a demographic that represents Indonesia's most active online shoppers [1]. Participants were required to have completed at least one transaction in the previous month. The dataset included 57 screencast recordings totaling over 200 minutes of user activity [26]. Thematic saturation was reached, ensuring no new insights emerged from additional data [29]. Participants performed product searches in the Fashion, Electronics, and Hobby categories. Recordings were created using the

app's built-in screen recording tool, and participants completed a short practice session beforehand.

The analysis employed both inductive and deductive approaches. Raw data were reduced and organized around study-relevant elements. A thematic analysis identified core themes such as "Visual hierarchy and attention allocation" and "Banner blindness in user navigation." Visualization tools—including heatmaps and flow diagrams—were used to illustrate user behavior, enabling insights into attention distribution and navigation patterns [31]. These visualizations helped identify key incidents—moments where user behavior shifted significantly. Through mapping these, we discovered shifts in user decision-making patterns.

In the final stage, findings were integrated and interpreted using the theoretical framework and the Cognitive Decision-Making Model, offering implications for optimizing user experience and interface design [32].

To enrich the qualitative analysis, a semi-structured interview protocol was developed based on preliminary observations. Seven experts in design and technology, each with a minimum of two years of professional experience and practical application of academic theories, were recruited (Table I). Individual interviews were recorded and analyzed using NVivo software, applying a mixed inductive–deductive coding strategy to ensure systematic treatment of expert input. This methodological triangulation bridged user-generated data and expert perspectives, enhancing the study's credibility and depth.

TABLE I. INTERVIEW PARTICIPANTS

Name	Gender	Age	Occupation
Fredick	M	27	Ecommerce Ads Product Manager
Theresa	F	27	Ecommerce Ads Product Manager
Nathan	M	30	Ecommerce UI/UX Designer
Stevie	F	30	Ecommerce UI/UX Designer
Polene	F	26	Personal Color Analyst
Nana	F	26	Personal Color Analyst
Phil	M	31	UI/UX Educator

IV. ANALYSIS AND DISCUSSION

This exploratory study using screencast videography to document user interactions with Tokopedia's search advertisements, yielding insights into behavioral patterns shaped by visual hierarchy, banner blindness, and selective attention. A total of 57 screencast recordings were amassed, with each of the 19 participants producing three videos centered on product searches in fashion, electronics, and hobbies. Individuals aged 25 to 34, residing in Greater Jakarta, conducted autonomous, self-directed inquiries. Each video had a duration of 3 to 10 minutes (Table II).

TABLE II. SCREENCAST PARTICIPANTS

Name	Gender	Age	Occupation
Agnes	F	26	Hospitality
Axel	M	27	Marketing Specialist
Christoforus	M	26	Software Engineer
Dimas	M	28	Graphic Designer
Isty	F	25	Content Creator

Name	Gender	Age	Occupation
Jaya	M	31	Project Manager
Jessica	F	31	Banker
Juanna	F	26	Medical Student
Lia	F	29	Teacher
Mulyanti	F	26	Software Engineer
Novita	F	32	Human Resources Specialist
Okta	M	34	Civil Engineer
Reynaldi	M	26	Medical Student
Rizal	M	32	Sales Executive
Shany	F	28	Fashion Designer
Steven	M	33	Accountant
Temmie	M	29	Chef
Veronica	F	26	Finance
Vian	F	25	Marketing Specialist

A. Data analysis

User behavior was examined using screencast videography, with 57 videos collected from 19 Tokopedia users completing product searches in fashion, electronics, and hobbies. The recordings were analyzed using an incident-based approach, where each notable user action—such as fixations, clicks, or skips—was identified and categorized. First phase of this analysis using Apple Keynote.

Incidents were grouped by visual behavior, such as brief or prolonged fixations and item clicks. In the second phase, patterns were organized and compared across all videos using Google Docs (Fig. 2), allowing for identification of recurring interaction types based on visual design elements.

The observed patterns were then examined in relation to existing theories on visual hierarchy, banner blindness, selective attention, and decision-making behavior. The following section presents eight theoretical frameworks from prior studies that help contextualize and interpret these behavioral patterns.



Fig. 2. Second Phase Incident Analysis

B. Eight theoretical frameworks

1) **Proximity and similarity.** Users tend to group visual or tactile elements based on their proximity and resemblance, such as shared color or texture. This principle, rooted in Gestalt psychology, influences

visual organization, perception, and attention in user interfaces [34].

2) **Text Regions & Saliency Text.** Text elements within e-commerce visuals enhance saliency by attracting visual attention. While these regions may not always align with direct eye fixations, they still draw interest and contribute to decision-making through perceptual emphasis [35].

3) **Edge density.** Edge density—defined by abrupt changes in color or brightness—plays a crucial role in object detection and attention. When combined with other low-level visual cues like hue or saturation, high edge density can make product images more noticeable and engaging [36, 44].

4) **Visual merchandising.** Consumers are influenced by how products are visually presented. Whether using models, clean white backgrounds, or lifestyle images, effective visual merchandising helps communicate value and drives user interest and engagement [37, 38].

5) **Prospect Theory.** People evaluate prices in relation to an internal reference point. Discounts are perceived as gains, while price increases are perceived as losses, which shifts search effort and buying decisions accordingly [39].

6) **Satisficing.** Rather than exhaustively evaluating all options, users often select the first product that meets their needs—a behavior known as satisficing. This strategy reduces cognitive load and accelerates decision-making in complex product environments [40].

7) **Bottom-up processing.** Users respond to salient visual stimuli—such as contrast, brightness, or movement—automatically, without needing to consciously direct their attention. These "pop-out" elements often drive immediate interaction [41, 42].

8) **Top-down processing.** Attention can also be goal-driven. Users apply their expectations, past experience, and search intent to selectively focus on information relevant to their goals while ignoring unrelated visual content [42, 43].

C. Semi-Structured Interview

Fig. 3 depict the distribution of expert confirmations among the eight proposed theories and their corresponding subpoints. Although the majority of subpoints garnered substantial expert validation and considerable trust, several new subpoints surfaced, namely Interaction Cost, Photography Professionalism, Perceived Credibility, Ad/Hard-Selling Tolerance, High-Intent Buying, and Product & Seller Familiarity [33].

Codes	Fredrick	Hana	Nathan	PHI	Polina	Steffie	Theresa	Total
1.1. Proximity and Similarity	0	2	1	4	1	0	2	10
2.1. Product Title	0	0	1	0	0	0	0	1
2.2. Brand Name or Logo	0	1	0	0	1	1	2	5
2.3. Product Specifications	2	1	4	1	2	0	2	12
2.4. Colored-Bar Text	0	0	3	2	1	0	0	6
3.1. Colored Border	0	1	1	3	0	4	2	11
3.2. Colored Background	1	0	1	0	0	4	3	10
3.3. Vibrant Product Face	3	3	5	2	3	1	1	23
4.1. Model Position	1	2	1	0	1	2	1	10
4.2. Body Shape Preference	0	2	0	3	3	0	0	8
4.3. White Inner for Outer Product	0	0	0	0	0	0	0	0
4.4. Single Object Against Seamless Paper	1	4	1	1	1	1	5	12
4.5. Using Realistic Setting	1	0	0	0	1	2	0	4
4.6. Theoretical Setting	0	2	2	0	1	3	1	9
4.7. Photography & Perceived Quality	3	3	3	1	3	4	2	21
5.1. Product Handling	5	0	3	0	0	1	1	10
5.2. Special Edition	2	1	3	1	3	0	1	11
5.3. Depreciated Value	0	0	0	0	0	0	0	0
5.4. Direct Discount	1	1	1	1	0	0	0	4
5.5. Mental Price Reference	2	3	0	1	1	1	0	8
6.1. Color Variants	2	0	1	0	0	2	0	5
6.2. Texture Variants	0	0	0	0	1	0	0	1
6.3. Interaction Cost	0	4	1	2	1	1	0	9
7.1. Pop-out Stimuli	1	1	4	1	1	2	0	10
7.2. Perceived Credibility	3	5	3	0	2	7	2	22
8.1. Keyword-Result Relevancy	2	0	1	0	2	3	1	9
8.2. Personal Preference	2	1	1	2	2	2	3	13
8.3. Hard Selling Tolerance	2	3	0	0	1	0	0	6
8.4. High Intent Buying	1	2	3	0	1	3	0	10
8.5. Product Familiarity	0	1	0	1	0	2	1	5
8.6. Seller Familiarity	0	0	0	0	0	1	1	2
Total	30	44	46	37	33	47	46	283

Fig. 3. NVivo Encoding Output on Subpoints

Similarity, Whited Inner Shirt, and Realistic Setting exhibited diminished confidence levels according to expert evaluations. Notably, some subpoints received expert endorsement and generated interest despite their scant citations in the NVivo coding, including Satisficing, Bundling, and Mental Price Reference. These discoveries highlight the congruence and disparity between early theoretical investigations and expert viewpoints, enhancing the framework with both corroborative data and novel exploratory aspects.

D. Discussion

This study explored the interaction between visual presentation elements, user perception, and decision-making within the Tokopedia product search interface. Data were gathered through two qualitative methods: screencast videography and expert interviews. The screencast phase revealed patterns related to users' immediate visual responses, such as fixation on grouped or visually distinct items, while interviews provided insight into cognitive and emotional factors influencing purchase decisions, such as perceived quality, reference pricing, and interaction costs. Together, these methods offered a layered view of user behavior, from initial visual attention to cognitive evaluation and final actions.

To structure these insights, 8 key observations from the screencast and 31 thematic codes from the interviews were reorganized into a conceptual framework comprising 12 themes across three stages of user interaction: Stimuli Perception, Cognitive Processing, and Behavioral Outcomes. In the first layer, attention is driven by design features such as proximity, color, edge density, and thematic product presentation. The second layer focuses on how users interpret these cues, weighing credibility, information clarity, and perceived value. The final layer captures behavioral responses, including decision shortcuts (satisficing), emotional alignment, and responses to attention-grabbing or familiar elements. This model

reflects a progression from automatic perception to intentional decision-making.

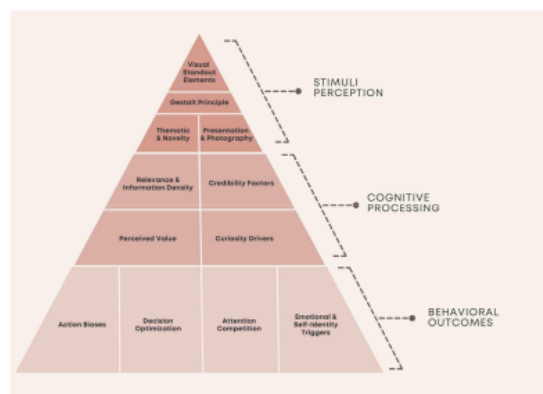


Fig. 4. Proposed Model

The synthesized model (Fig. 4) provides a structured lens for understanding user engagement in visually dense e-commerce environments. It illustrates how design elements influence attention and behavior, not in isolation, but as part of a cognitive flow shaped by user goals, preferences, and emotional responses. By aligning each theme to a distinct interaction stage, the model contributes to both theoretical understanding and practical design considerations for optimizing user experience in online retail platforms.

V. CONCLUSIONS

This research investigated cognitive interaction between the visual design and decision-making in the Tokopedia product search environment through screencast videography and semi-structured interviews. The study presents an integrated model of e-commerce which combines visual stimulus, cognitive filters, and action effect that explains user engagement and click-through behavior at the website level of analysis.

The main findings can be broadly divided into three important contributions:

1. **Expanding from Visual Hierarchy to Stimuli Perception.** The work verifies that the visual principle of blood hierarchy – proximity, similarity, edge density and saliency – are critical in guiding user attention. Moreover, dynamic stimuli (e.g., animations, interactivity, emotive content) increase visual saliency and subsequently deepen participant engagement with product adverts.

2. **Mitigating Banner Blindness Through Cognitive Alignment.** Cognitive filters, such as banner blindness and selective attention, affect how users react to advertising. The results indicate that familiarized ad formats, customized contents, and stripped-down interfaces consistent with users' expectations and browsing motivations are adopted strategies to get rid of cognitive fatigue and add exposure to the ads.

3. **From Selective Attention to Behavioral Outcomes.** Users are driven by their interests and thus their decisions are influenced by the level of fit between ad content and user intent. Ads that can

satisfactorily meet the consumer's shopping intention and browsing stage enable a more efficient decision-making process, and contribute to better CTR and conversion.

This research contributes theoretically by bridging visual design, cognitive theory, and user behavior in e-commerce advertising. Practically, it offers insights for designing visually salient and cognitively aligned advertisements that reduce user fatigue and improve engagement. Future studies could expand this model through cross-platform comparisons, longitudinal tracking, multimodal data integration, and predictive models that align stimuli with user intent.

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