



Proceeding Paper

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# Improvements to Visual Design on the Online News Portal ABC.com by Employing Usability and Eye Tracking Methods

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# Improvements to Visual Design on the Online News Portal ABC.com by Employing Usability and Eye Tracking Methods <sup>†</sup>

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**Abstract:** This study aims to enhance the visual design of ABC.com, a leading Indonesian online news portal, by using usability and eye-tracking methods. As news media transitions from print to digital, maintaining an optimal user experience is crucial. This study addresses design deficiencies on ABC.com, particularly related to news accessibility, search functionality, and the impact of advertisements. This research employs questionnaires and eye-tracking technology to identify user behavior and validate the findings. Key usability aspects, such as content accessibility, error prevention, and visual appeal, are analyzed to improve the website's layout. The eye-tracking results reveal that users focus mainly on the center of the screen, often missing critical elements like the latest news and the search engine. This study proposes enhancements in typography, contrast, and page layout, based on the identified needs. The final design of ABC.com improved by enhancing efficiency, clarity, aesthetics, readability, and user comfort. The redesign showed mean improvements of 0.16, 0.41, 0.65, 0.32, and 0.54 in these criteria, respectively, indicating a notable enhancement in usability. This study's findings offer a practical guideline that can be directly applied to enhance similar online news platforms in Indonesia.



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**Keywords:** usability; eye tracking; website; online newspaper

## 1. Introduction

In this more evolved era, numerous corporations and organizations are establishing their identities on digital platforms or media. By 2024, the number of dot id (.id) domain registrations increased to 963,623 [1]. In addition to employing internet media for branding image, it is also extensively utilized by enterprises and organizations to generate revenue. The rise is evidenced by the 44.3% growth in online advertising usage from 2014 to 2017, culminating in a transaction value of USD 1.44 billion in 2017 [2].

A result of this technological breakthrough is the transition of news media into the digital realm. Numerous news organizations are transitioning from print publications to internet-based E-News enterprises. ABC.com, a moniker employed to preserve secrecy in this matter, is an online news platform that has been functioning for a prolonged duration in Indonesia. As a news organization, it is customary for them to feature advertising on its pages. They often achieve this by employing graphic advertisements positioned at various intervals or between the phrases of their written news articles. This occasionally obstructs readers from viewing the available content. The inclusion of adverts within the news articles being read is particularly notable. Advertisements are occasionally extensive and frequently obscure the material presented by the media.

As a purveyor of public knowledge, ABC.com must offer a presentation that does not disrupt its readership. By positioning adverts in locations that do not divert readers' attention while remaining conspicuous to them, it is anticipated the usability of their pages will be enhanced. Furthermore, readers will have enhanced comfort and accessibility in obtaining the information they seek. It is anticipated that enhancements to the design of this news page will subsequently enhance the usability, affective, and cognitive dimensions of the ABC.com website.

Usability refers to the user's satisfaction about the performance, perception, and impression following the completion of a specific task [3]. Moreover, usability signifies a metric of a task that is both efficient and effective, yielding a sensation of satisfaction with the performance of the utilized technology [4]. The aspects of usability are categorized into three components: perception, ease of learning/remembering, and control over a process. The usability of electronic gadgets has significantly improved during their development. Included are those identified in the study by Prastawa et al. [4], where usability is associated with cognitive and affective aspects. The eye-tracking methodology has been extensively employed to examine the user experience and usability of website visitors. Eye tracking is a technique employed to observe and document an individual's ocular movements. This technique is typically facilitated by a gadget known as an eye tracker. Data processing using this method allows for the screen display to be segmented into multiple areas of interest (AOIs) according to specific objectives, with the resultant readings from this tool presented as numeric values, heat maps, or gaze plots that illustrate regions where the operator's gaze is predominantly focused [5,6]. The AOI is a region that demonstrates the highest concentration of visual attention and can be studied objectively, devoid of subjective influences, as indicated in [7]. For example, usability has been employed to analyze user interest in tourism websites. A study's findings reveal that individuals demonstrate a stronger preference for visual stimuli over written content [8]. Eye tracking has been employed to evaluate the usability of various websites utilizing website builders [9]. Eye tracking data have been utilized to evaluate the positioning of adverts and sponsor logos at sporting events to achieve optimal logo placement [10]. Consequently, the evaluation of ocular data will yield a design that aligns with user requirements.

During the design process, it is uncommon for a singular option to emerge when only one optimal design is required. Consequently, a selection phase is required for the concepts generated during the process. The selection procedure for the resultant concept can be categorized into two types: concept screening, which filters broader concepts or larger quantities, and concept selection, which derives outcomes from a smaller or more focused set of concept options [11]. The design process involves numerous intricate components that encompass various aspects. All features of web design can be categorized into nine primary groups: precedence, spacing, navigation, web creation, typography, usability, alignment, sharpness, and consistency [12]. Text constitutes the predominant design element. Ta'eed [12] emphasized the significance of factors such as text spacing and the selection of font type and size in producing an effective text display.

Besides language, color constitutes a significant component of visual art. Color will reveal the essence and disposition of an entity. Each color on Earth possesses distinct psychological associations that might represent emotions or significances. While color symbols may convey varying meanings in different contexts, a color can possess a specific generic significance [13]. For instance, white signifies purity, innocence, simplicity, and sanctity. In graphic design, it is frequently employed as a text color that conveys a luminous effect on a dark background. Additionally, orange symbolizes vitality, enthusiasm, flamboyance, and attention. Its characteristics are appealing, vibrant, and jovial, creating an impression of openness and amiability for observers. Beyond psychology, colors can be blended or

coupled in multiple ways to augment the visual quality of a design [14]. The prevalent technique involves examining a color wheel and delineating several lines, utilizing complementary hues that exhibit a pronounced contrast, such as blue–orange, red–green, or purple–yellow. In addition to complimentary colors, there are alternative methods, including analogous, which pairs a color with its adjacent hue; split-complementary, which forms an isosceles triangle; triadic, which creates an equilateral triangle; and tetradic, which arranges colors in a square formation.

## 2. Materials and Methods

The data gathering process is segmented into three stages: the preliminary survey, pre-sampling, and sampling. Sampling was conducted via convenience and purposive methods. The preliminary survey employed an interview technique to investigate and validate existing issues, involving 20 respondents aged 18 to 30 years who had utilized the ABC.com website.

The questionnaire was developed using issues identified in the preliminary survey, together with the questionnaire utilized in Prastawa et al. [4]. Data were gathered from 47 participants who utilized ABC.com. According to research by Prastawa et al. [4], the author posits that cognitive, affective, and usability dimensions are connected. Given that the study exclusively employed a questionnaire approach for data collection, this paper will incorporate data obtained using an eye tracker to enhance the questionnaire, validate findings, and improve the web design process of ABC.com more effectively than previously.

Concurrently, the methodology employed to analyze the acquired data is segmented into multiple components. Data acquired through the questionnaire method would be analyzed using the Structural Equation Model–Partial Least Square (SEM-PLS) technique, followed by quadrant analysis and descriptive analysis. This study also employed a brief questionnaire that complemented the primary questionnaire. Data gathered include challenges in locating current news, utilization of the available search functionalities, the quantity of adverts viewed by participants, and inquiries concerning the news consumed by respondents.

Prior to data collection from the questionnaire, respondents engaged in a procedure of recording retinal traces, usually referred to as eye tracking, by performing specific tasks. The data acquired by the eye-tracking approach will be processed by segmenting the screen into multiple areas of interest (AOIs) and examined descriptively. The sample comprises individuals aged 20 to 30 years, with a minimum of 39 participants required to ensure stable data, as indicated by research from the Nielsen Norman Group [15]. AOI is categorized into three sections: the main page (home screen) as illustrated in Figure 1, the news pages as depicted in Figure 2, and specifically the most recent news and news search menu as shown in Figure 3.

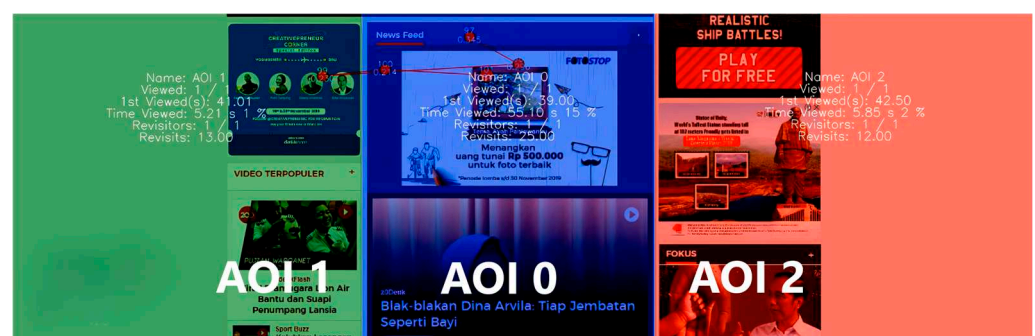


Figure 1. The employed section of AOI 0,1, and 2.

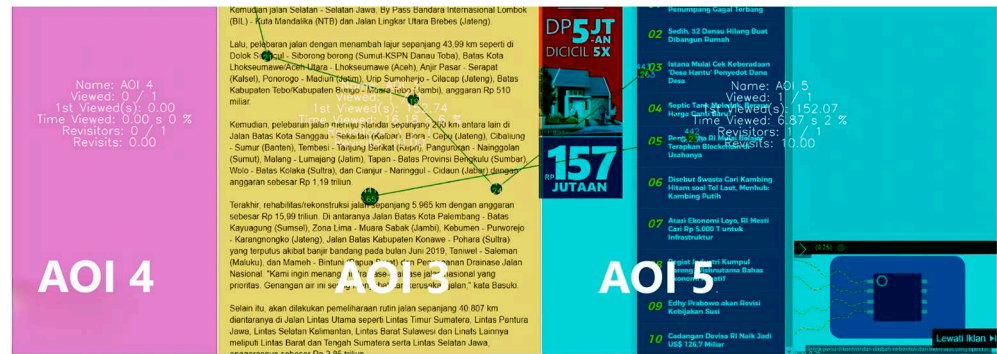


Figure 2. The employed section of AOI 3,4, and 5.



Figure 3. The employed section of AOI 6 and 7.

The home screen is designated as category one to analyze the duration and pattern of the respondent’s eye movements within the news section presented by ABC.com, as well as to examine the supplementary information (sweetener) provided by ABC.com, which includes advertisements, popular videos, forums, public reports, and various other interactive elements for users. On the news page (category two), we observe the respondent’s eye movement regarding the provided news material and examine areas beyond the news, such as adverts and articles with other titles. The third category pertains to the news search menu, used to evaluate the search functionality presently accessible on ABC.com and the most recent news provided.

To ensure uniform data, each respondent was assigned many activities (task scenarios) prior to completing the questionnaire, during which eye tracking data were also recorded. The respondents’ tasks are delineated in eight steps, as stated in Table 1.

**Table 1.** Activities conducted by participants.

Number	Activities
1	Participants engage with the briefing and tool configurations.
2	Participants access the HOME page of ABC.com.
3	Participants examine the HOME page.
4	Participants utilize and experiment with the search functionality.
5	Participants provide the information established by the researchers.
6	Participants peruse and investigate the designated news webpage.
7	Participants navigate back to the HOME page.
8	Participants complete the questionnaire administered by the researchers.

### 3. Results

Multiple methods yielded several outcomes, including findings from supporting interviews, usability questionnaires, and screen recordings utilizing the eye-tracking technology.

#### 3.1. Eye Tracking Results

Upon completion of the recording, the captured data are analyzed by segmenting the screen into three areas of interest (AOIs) on the main page and three AOIs on the news page. This section seeks to obtain further data that addresses and validates the issues identified in the questionnaire responses. Furthermore, two additional areas of interest (AOIs) are positioned on the main page to ascertain the visibility of the search engine and the current news. This study employs eight areas of interest (AOIs) across two ABC.com sites.

The user's eye fixation on the ABC.com homepage is concentrated solely on the central region (AOI 0); however, the user also briefly glances at the left and right sections of the screen (AOI 1 and AOI 2). Consequently, it may be asserted that the user allocates around 63% of their time to the primary objective, with the remainder directed elsewhere. Currently, the news presentation is effective, since the user has engaged with 81% of the news section and only 19% outside its intended scope.

However, forty percent of users did not engage with the area of interest featuring the latest news (AOI 7). This indicates that some customers continue to struggle with locating the latest news on the homepage of ABC.com.

In the search menu (AOI 6), an increase in revisits and fixations correlates with enhanced responder comprehension of the search menu. Nonetheless, 81% of participants were unable to locate the existing search menu.

#### 3.2. Usability Questionnaire Results

Based on the results presented in Table 2, an analysis was conducted to identify the indicators that are suboptimal (positioned in quadrant 4), namely, those with a Loading Factor value beyond 0.6 but an Average value below 3.5, indicated in yellow in Table 2. The overall results revealed eight indicators (LEAR 2, EP, IFHI, LNAV, APPL, COMF, ATTR 1, and ATTR 2) with worse values compared to other indicators. The results indicate that, in addition to advertising, both content and layout were identified as issues by users during the initial survey stage of the ABC.com page.

**Table 2.** Summary of usability questionnaire method outcomes.

Code	Indicator	Description	Loading Factor	Average
X1	LEAR 1	The news material aligns with the initial title I encountered.	0.68	4.17
X2	LEAR 2	I can readily identify the primary messages that the news writer intends to communicate.	0.71	3.47
X3	ERAD	I can readily comprehend the text presented on the page.	0.74	4.00
X4	EP	I find it simple to acclimate to the functionalities on the ABC.com page.	0.77	3.43
X5	IFHI	I find it effortless to offer feedback and engage with fellow readers.	0.61	3.40
X6	MEMO	I find it simple to locate the ABC.com page.	0.55	4.15
X7	ENAV	I consider the ABC.com website user-friendly.	0.82	3.89
X8	LNAV	I find it simple to locate certain news articles I wish to search for.	0.65	3.47
X9	UND	I believe the news pages have commendable consistency.	0.68	3.57
X10	EGBO	I find it simple to get back to the ABC.com homepage.	0.58	3.98
Y1	HR 1	The number of adverts on a single page is excessive.	0.06	4.15
Y2	HR 2	I perceive that the news information presented is influenced by the adverts given.	−0.22	3.87
Y3	APPL	I am interested in reading additional news from the ABC.com website.	0.80	3.15
Y4	COMF	I experience ease while use the ABC.com website.	0.82	3.23
Y5	COL	I find the color contrast on the ABC.com page to be satisfactory.	0.62	3.70
Y6	BR	The page's brightness level is comfortable for my eyes.	0.31	3.47
Y7	RELI	I possess confidence in the facts presented by ABC.com.	0.64	3.72
Y8	ATTR 1	I wish to persist in reading news on the ABC.com website.	0.76	3.21
Y9	ATTR 2	Utilizing the ABC.com news page elicits a sense of happiness in me.	0.84	3.21
Z1	Effectiveness	I can utilize the ABC.com page effectively to accomplish my objectives.	0.88	3.77
Z2	Efficient	I can swiftly attain my objectives by utilizing the ABC.com page.	0.85	3.77
Z3	Satisfaction	I am content with use the ABC.com website.	0.86	3.53

### 3.3. Evaluation of Supporting Questionnaire Results

Approximately 45% of users were unable to locate the most recent news presented by ABC.com. This is a significant issue, as the news provided must consistently be current and readily accessible to users. In addition to the challenge of locating the newest news, readers continue to experience difficulties with the search functionality offered by ABC.com. It seems that 24% of users are unable to locate the available search tool. This poses a challenge, as the search tool significantly aids consumers in locating desired news articles.

Furthermore, during the observation, an assessment was conducted on the number of advertisements watched. The advertisements available to users on the main page range from zero to seven. Readers view approximately three advertisements, constituting around

22% of the total ads presented on this page. This indicates that not all advertisements on ABC.com are viewed by readers, with an optimal effectiveness shown at three ads per page.

Users were queried on several aspects of the news to evaluate their comprehension of the content. Nonetheless, a portion of users (13%) encountered challenges in locating the answers. This suggests a deficiency in the present method of news dissemination.

### 3.4. Analysis of Questionnaire and Eye Tracking Data Integration

An analysis of the given data and their processing reveals a correlation that identifies the deficiencies on the current ABC.com website. The deficiencies encompass the markers LEAR 2, EP, LNAV, APPL, COMF, ATTR 1, and ATTR 2. Re-evaluating the HR 1 and HR2 indicators indicates that the volume of advertisements is excessive. This signifies readers who are neither interested in nor influenced by the advertisements on the page. Additional indications are shown in Table 3, which elucidates the correlation of each mined data point. The ATTR 1 and ATTR 2 markers remain unverified at this time using eye-tracking methods or supplementary questionnaire inquiries.

**Table 3.** Correlation between questionnaire data and eye tracking.

Attribute Main Questionnaire	The Issue	Indication	Data From Supporting Questionnaire (SQ) and Eye Tracking
LEAR 2	News content	An incorrect response exists.	13% of respondents provided incorrect answers (SQ).
EP	Error prevention	Obtain the most recent news	45% of respondents were unable to locate the most recent news (SQ). 40% of respondents did not observe AOI 7 (eye tracking).
LNAV	Search engine	Unable to locate Search Engine	25% of respondents did not locate the search engine (SQ). 19% of respondents failed to observe AOI 6 (eye tracking).
APPL & COMF	Displayed perspective	The users' gaze is directed away from the focal section of the page.	37% fixation outside AOI 0 and 19% fixation outside AOI 3 (eye tracking).

Eight indicators above with lower values than others should be rephrased in customer-centric language and subsequently enhanced as follows: accessible news topics (LEAR 2); clarified website features (EP); effective engagement between users and website providers (IFHI); accessible search engine (LNAV); visually appealing web design (APPL); user-friendly website (COMF); engaging news for perusal (ATTR 1); an enjoyable website to utilize (ATTR 2).

Upon assessing the user's requirements, filtration is conducted by examining the design demands, where the ATTR 1 and ATTR 2 signs can be articulated similarly, namely, as a user-friendly page. The APPL and COMF indicators may also be articulated as an appealing aesthetic. The IFHI indicator integrates with the EP and LNAV indicators. Thus, just five needs require resolution. An answer is required that incorporates various design indicators, specifically font, spacing, color, contrast, location, and alignment, based on the identified needs. The relationship between the existing demands and their fulfillment can be determined utilizing the need matrix technique, as illustrated in Figure 4.



Relative Weight	Weight	How						
		What	Typography	Spacing	Color	Contrast	Position	Alignment
19.6	2.5	Accessible News Topics	⊖	○	○	⊖	▲	○
21.1	2.6	Clarified Website features		▲	○		○	
18.1	2.3	Accessible Search Engine			○		⊖	▲
19.8	2.5	Visually Appealing Web Design	⊖	○	▲	○		○
21.4	2.7	User-Friendly Website			▲	⊖	○	▲
Weight/Importance			355.1	139.5	217.6	428.9	309.6	157.8
Relative Weight			22.1	8.7	13.5	26.7	19.2	9.8
Rank			2	6	4	1	3	5

**Figure 4.** Need metrics for design process. Note: ⊖ Strong relationship value of 9, indicating a strong link between Customer Requirement (What) and Technical Requirement (How). ○ Moderate relationship value of 3, indicating a moderate link. ▲ Weak relationship value of 1, indicating a weak link.

The need metrics indicate that the primary means to satisfy the most significant needs are contrast, followed by typography and position. The design will concentrate just on the three most valuable methods. Color will be considered in evaluating the desired contrast, together with spacing in typography arrangement and the alignment of images and text when determining their positioning on the screen. Thus, from the three ways, six combinations are derived, which will be elaborated in Table 4.

**Table 4.** Potentially applicable concepts.

Concept No	Typography	Position	Contrast
1	Serif	2 parts	Orange–white
2	Serif	2 parts	Dark blue–white
3	Serif	2 parts	White–dark blue
4	Slab Serif	2 parts	Orange–white
5	Slab Serif	2 parts	Dark blue–white
6	Slab Serif	2 parts	White–dark blue

Upon the establishment of the existing concept, a paper prototype is created to evaluate whether the resultant concept surpasses the current condition (concept screening). The prototype is presented to multiple respondents for evaluation and feedback. The outcome achieved is a synthesis of idea designs numbers 2, 3, and 6.

The primary distinction from the original design concept of ABC.com lies in the more contrasting heading (page header), a layout divided solely into two sections, the streamlined arrangement of advertisements and reader discussion areas, and the implementation of more straightforward advertisements. The final design depicted in Figure 5 predominantly utilizes the original colors of ABC.com, including orange and dark blue, complemented with white and gray to enhance the contrast between the backdrop and the text. The text is composed in a slab-serif typeface characterized by thick legs, imparting a more aggressive appearance. The font size ranges from 10pt to 18pt, depending on the importance of the content to be emphasized. The layout is bifurcated to facilitate user concentration on their desired content.

The assessment of proposed layout modifications was conducted by selecting 15 respondents who had utilized ABC.com as a sample. The evaluation was performed according to the parameters of efficiency, clarity, aesthetics, readability, and user comfort, which streamline user needs; these parameters were collected previously. The mean increment from the previous design to the new design, according to the established criteria, was 0.16, 0.41, 0.65, 0.32, and 0.54, respectively. The assessment results indicate an improvement in the evaluation of the initial design compared to the proposed final design.

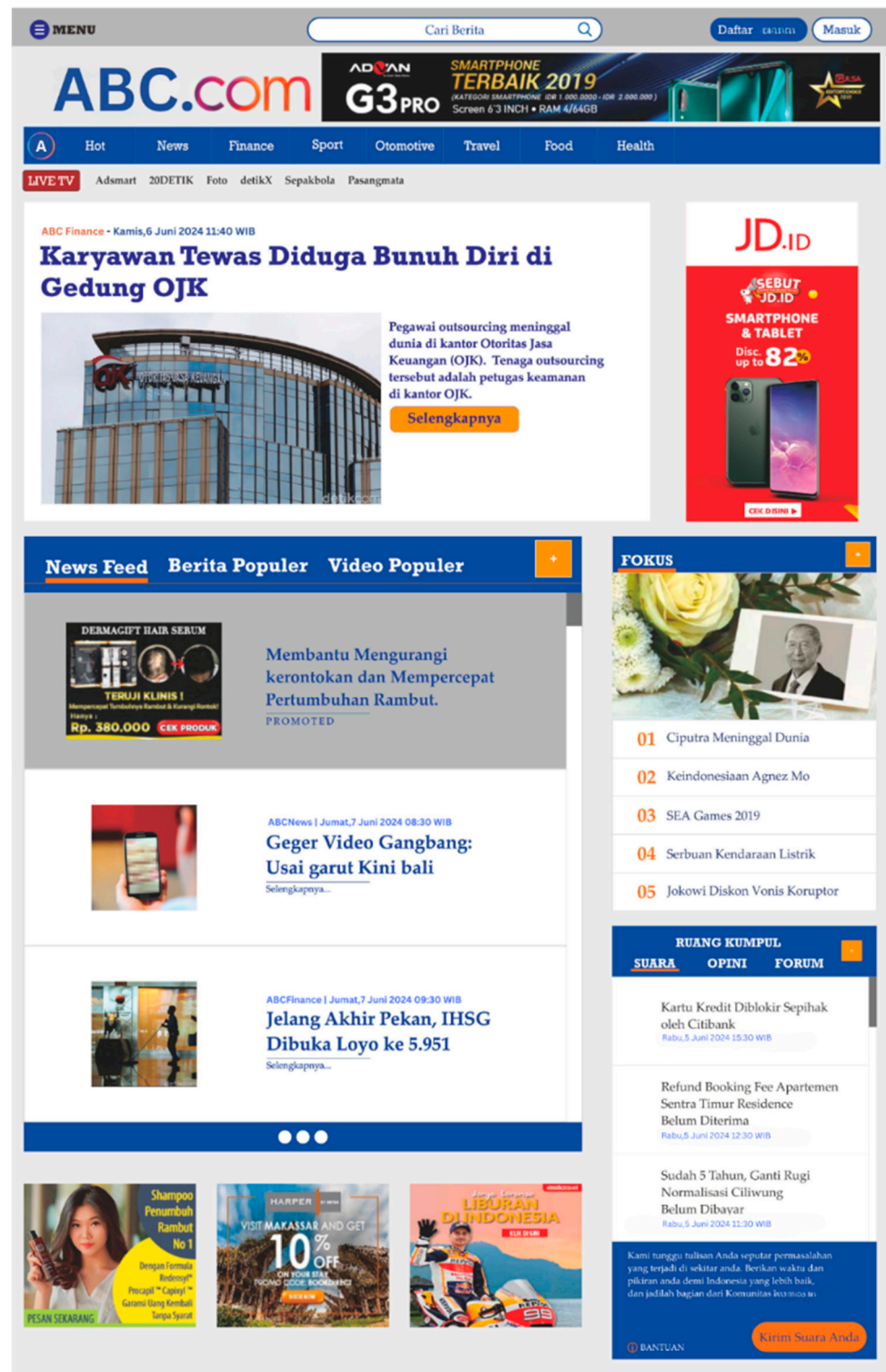


Figure 5. Proposed final design of ABC.com.

#### 4. Discussion

This study on visual design enhancement for the online news platform ABC.com examines the essential function of usability improvements and eye tracking in developing an engaging digital experience for users. Effective visual design in digital media, particularly on news websites, is crucial for attracting and retaining visitors. It influences user experience by designing an interface that is both aesthetically pleasing and user-friendly. Priyadarshini stated that sensible layouts, clear navigation, attractive visual aesthetics, and

responsive interactions enhance seamless user experiences that engage users' attention and promote exploration. Effective UI design not only enables job completion but also cultivates emotional connections, trust, and satisfaction, resulting in heightened user engagement and loyalty [16].

This ABC.com study employs eye tracking and usability testing to demonstrate how user input can identify problematic areas, such as users' challenges in locating recent news or utilizing the search function. Visual hierarchy and white space management are essential for reading, facilitating a seamless navigation of text without clutter.

From a psychological standpoint, a more robust visual hierarchy may indicate that information directing overt attention is being conveyed more effectively. The resulting cognitive ease may enhance aesthetic pleasure, hence elucidating the connection between visual hierarchy and perceptions of effective design [17].

The proposed enhancements in this study seek to establish a unified, user-centric digital experience by including visual aspects that are both useful and emotionally impactful, ultimately augmenting user engagement and loyalty.

## 5. Conclusions

This study successfully employed usability testing and eye-tracking methods to evaluate and improve the design of the online news portal ABC.com. The findings revealed several critical issues, including difficulties in locating the latest news and the search engine, as well as challenges related to advertisements obscuring the content. The integration of questionnaire results and eye tracking data provided insights into user behavior, confirming the need for design adjustments to enhance the overall user experience.

Key indicators such as content accessibility, error prevention, and visual appeal were identified as areas requiring improvement. The proposed design enhancements focused on optimizing typography, contrast, and layout, which were validated through user testing. These improvements are anticipated to increase user satisfaction by creating a more intuitive, engaging, and visually appealing website with potential for adaptation on similar online news platforms in Indonesia.

This study was conducted with a sample of 47 respondents, providing valuable insights into user preferences and design improvements. Future research may benefit from a larger and more randomized sample, as well as an exploration of mobile phone user experiences to gain a broader understanding of design impact across different devices.

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