HOW DOES THE DESIGN ELEMENT OF A NEWS WEBSITE INFLUENCE USER EXPERIENCE?

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ABSTRACT. *In the digital age, many people are receiving news via the Internet. The purpose of this study is to investigate how the design of news websites affects user experience. We analyzed the effects of seven analyzed design factors on usability and affect by using data from an online evaluation, in which subjects assessed their satisfaction with the usability and affect of these factors on five Korean news websites. Using multiple regression analysis and analysis of variance, we developed the usability and affect satisfaction model based on the website design and identified the design elements with the highest influence. This study is significant in terms of identifying the design characteristics of news websites with high user experience and creating a user experience model. The results of the research can be used as a basis for designing news websites or reorganizing existing ones.*
Keywords: News website, Usability, Affect, User experience, Design element

1. **Introduction.** In the digital age, news is being delivered using a variety of platforms, such as the Internet, radio, television, and newspapers. It was in the 1990s, as PCs became more popular, that receiving news from the Internet became common; according to [1], the Internet became the second most frequently accessed platform after television. Internet news has many advantages over other platforms – users can search for news information directly, so they have high selectivity for information, and information is provided using various forms of information expression such as text, audio, and video [2,3]. People can also express their opinions on the information in real time and produce and distribute their own news information.

In Korea, starting with the JoongAng Daily in 1995, traditional media companies such as Digital Chosun, Seoul News, and Maeil Business have also provided Internet news services, and most media companies now operate news websites. The editorial design of an Internet news site is evaluated based on the criteria of aesthetic sense, organization, convenience, readability, and visibility [4]. According to the findings of this study, high scores are received when the contents are well-organized with restrained typography, graphics are actively utilized through the use of icons, and convenience is considered in the design process through elements such as navigation.

In [5], news service user interface design elements were classified into amount and density of information, grouping of information, alignment of information, spatial relation between information, grid system, depth of hierarchy and interaction, and analyzed by focus group interview. In [6], user experience (UX) of digital news improved over time during a week. However, despite the popularity of Internet news, there are not many studies that have analyzed the user experience (UX) of websites that provide news.

The purpose of this study is to examine the effect of news website design on UX. Experiments were conducted on five Korean news websites, and UX was collected through online surveys. UX was subdivided into usability and affect, and we developed the model by using multiple regression analysis to deduce which design factors had a significant influence on each.

2. Define the UX and Design Elements of the News Website.

2.1. **UX.** UX describes all the direct and indirect experiences of a user as they interact with a particular product. It is categorized into usability, affect, and user value [7,8]. Usability refers to the degree to which the user can efficiently and effectively use the product/service, and affect refers to the feeling the user has about the appearance of the object that they interact with. User value is the value that a user feels when using a product or service – this was excluded from this study, considering that it would be affected more by content than external design elements. In this study, usability and affect were defined as in Table 1, reflecting the features of news websites.

TABLE 1. The definition of usability and affect of news website

UX Elements	Definition
Usability	The degree to which news websites are efficient and effective in navigating information.
Affect	The degree to which the user is emotionally satisfied with the external design elements of the news website.

2.2. **Design elements.** There have been many studies on the design elements of general websites. In [9], website design is defined to include information architecture such as layout, information design related to clarity of information delivery, visual design related to aesthetic design, and navigation design related to ease of navigation. In [10], website design is defined as consisting of information design, navigation design, and graphic design. Information and navigation design include the relationship between the entire website and its individual pages, and graphic design focuses on visual communication using elements such as color, image, typography, and layout. With reference to existing studies, the detailed design elements of the news websites used in this study are defined as Table 2. The questionnaire used in the experiment is summarized in appendix.

3. Method.

3.1. **Participants.** A total of 66 subjects participated in the 5-day online questionnaire. Data were collected from 50 subjects (11 men and 39 women) after subject verification. The average age of the subjects was 36.58 years (standard deviation: 14.13), and the distribution of occupations was 20 students (40%), 10 workers (20%), 13 housewives (26%), 3 self-employed (6%), and 4 others (8%). Forty-eight users (96%) were exposed to Internet news through web portals, and 32 (64%) were subscribed to daily Internet news.

3.2. **Targeted news websites.** A total of five Korean news websites (DongA Daily, Chosun Daily, Dispatch, MBC News, and JTBC News) were surveyed. We selected well-known news websites with diverse design elements. For example, in the case of "Advertisement" in Table 2, the DongA Daily and Chosun Daily websites provide pop-up advertisements, while Dispatch, MBC News, and JTBC news websites do not. In the case of "Layout", DongA Daily and Dispatch provide a two-stage grid layout, while Chosun Daily, MBC News, and JTBC News provide a three-stage one.

The questionnaire was composed of 10 questions, which took into consideration the design factors defined in Table 2. The subjects checked the landing pages of five websites

TABLE 2. Design elements of news websites

Design Elements	Definition	Related UX Elements
Advertisement	Additional content for commercial revenue, which is unrelated to the nature of the website.	Usability
Font	The font, space between letters, line spacing, etc. that express the title and content of news articles.	Affect
Layout	Placement of text, images, etc.	Usability
Amount of information	The amount of text/images in a particular unit.	Usability
Category	An element that allows the grouping of similar content on a website to enable easy navigation.	Usability
Representative color	Representative colors that make up the website.	Affect
Title expression method	How the titles of articles are listed using text and images.	Usability, Affect

and filled in 10 scores per website. Each question was evaluated using a 0-100 scale (0 = least satisfied; 100 = most satisfied).

4. Results.

4.1. **UX model of news website.** We performed multiple regression to analyze the usability and affect of a news website. To analyze usability, it was taken to be the dependent variable, and the independent variables were taken to be six design elements of news websites – the number of pop-up advertisements, the number of banner ads, layout, title expression method, amount of information, and the category. As a result, Adj. R-sq was 70.0% and the variance influence factor (VIF) in all cases was less than 4.

$$\begin{aligned}
\text{Usability} = \ & 9.04 + 0.04 \times (\text{number of pop-up advertisements}) \\
& + 0.04 \times (\text{number of banner advertisements}) + 0.37^* \times (\text{layout}) \\
& + 0.14^* \times (\text{amount of information}) + 0.15^* \times (\text{category}) \\
& + 0.17^* \times (\text{title expression method}) \\
& (^*p < 0.05)
\end{aligned}$$

To analyze affect, it was considered as an dependent variable, while three news website design elements were considered as the independent variables – the font, title expression method, and the representative color. The results of the multiple regression analysis showed that Adj. R-sq was 73.3%, and the VIF in all cases was less than 2.

$$\begin{aligned}
\text{Affect} = \ & 4.93 + 0.11^* \times (\text{font}) + 0.40^* \times (\text{representative color}) \\
& + 0.42^* \times (\text{title expression method}) \\
& (^*p < 0.05)
\end{aligned}$$

4.2. **Analysis of major design elements.** We conducted the analysis of variance (ANOVA) on the significant design factors derived from the UX model in Section 4.1. As a post-hoc analysis, Tukey analysis was used.

4.2.1. *Usability related design element.* Figure 1(A) shows the layout-related survey results. The results of ANOVA ($\alpha = 0.05$) show that the type of news website has a statistically significant effect on the layout ($p = 0.003$). In the Tukey analysis results, (JTBC, MBC, Dispatch), (MBC, DongA Daily, Dispatch), (DongA Daily, Dispatch, Chosun Daily) show significant differences.

Figure 1(B) shows the survey results based on the amount of information. The results of ANOVA ($\alpha = 0.05$) show that the type of news website was statistically significant ($p < 0.001$). In the Tukey analysis results (JTBC, MBC, Dispatch), (MBC, DongA Daily, Dispatch), (DongA Daily, Dispatch, Chosun Daily) show significant differences.

Figure 1(C) shows the category-related survey results. The results of ANOVA ($\alpha = 0.05$) show that the type of news website has a statistically significant effect on the category ($p < 0.001$). In the Tukey analysis results, (JTBC, MBC, DongA Daily, Chosun Daily), (Dispatch, Chosun Daily) show significant differences.

Figure 1(D) shows the survey results based on the title expression method. The results of ANOVA ($\alpha = 0.05$) confirm that the kind of news website has a statistically significant effect on the title expression method ($p < 0.001$). In the Tukey analysis results, (JTBC, MBC, Dispatch), (Dispatch, DongA Daily, Chosun Daily) show significant differences.
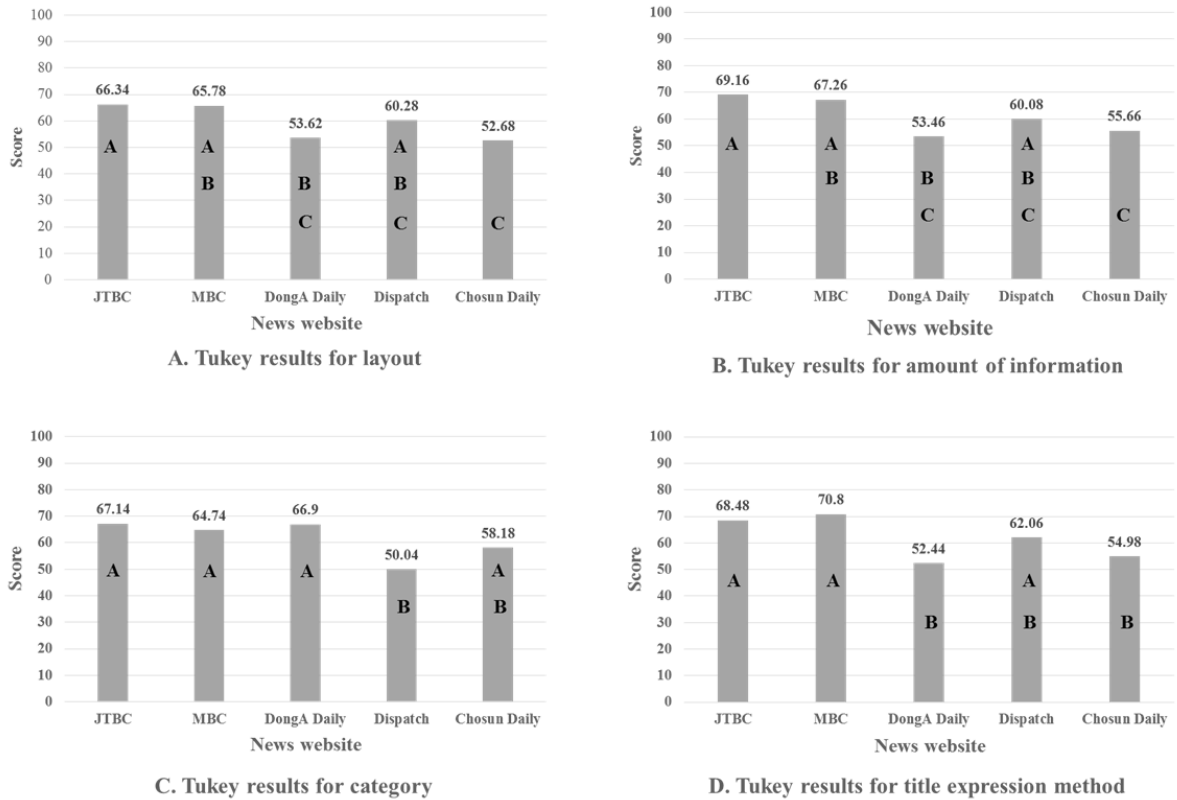

FIGURE 1. Tukey results for usability related design element (Different letters indicate a statistically significant difference)

4.2.2. *Affect design elements.* Figure 2(A) shows the survey results relevant to the font of the news websites. The results of ANOVA ($\alpha = 0.05$) show that the type of news website has a statistically significant effect on font satisfaction ($p = 0.01$). In the Tukey analysis results, (JTBC, MBC, Dispatch), (DongA Daily, Chosun Daily) show significant differences.

Figure 2(B) is the survey result of the representative color. The results of ANOVA ($\alpha = 0.05$) show that the type of news website was found to have a statistically significant

effect on representative color satisfaction ($p < 0.001$). In the Tukey analsis results, (JT-BC, MBC, Dispatch), (MBC, DongA Daily, Dispatch), (DongA Daily, Dispatch, Chosun Daily) show significant differences.

Figure 2(C) is the survey result according to the title expression method. The results of ANOVA ($\alpha = 0.05$) confirm that the type of news website has a statistically significant effect on the title expression method ($p < 0.001$). In the Tukey analysis results, (JTBC, MBC, Dispatch), (DongA Daily, Dispatch, Chosun Daily) show significant differences.
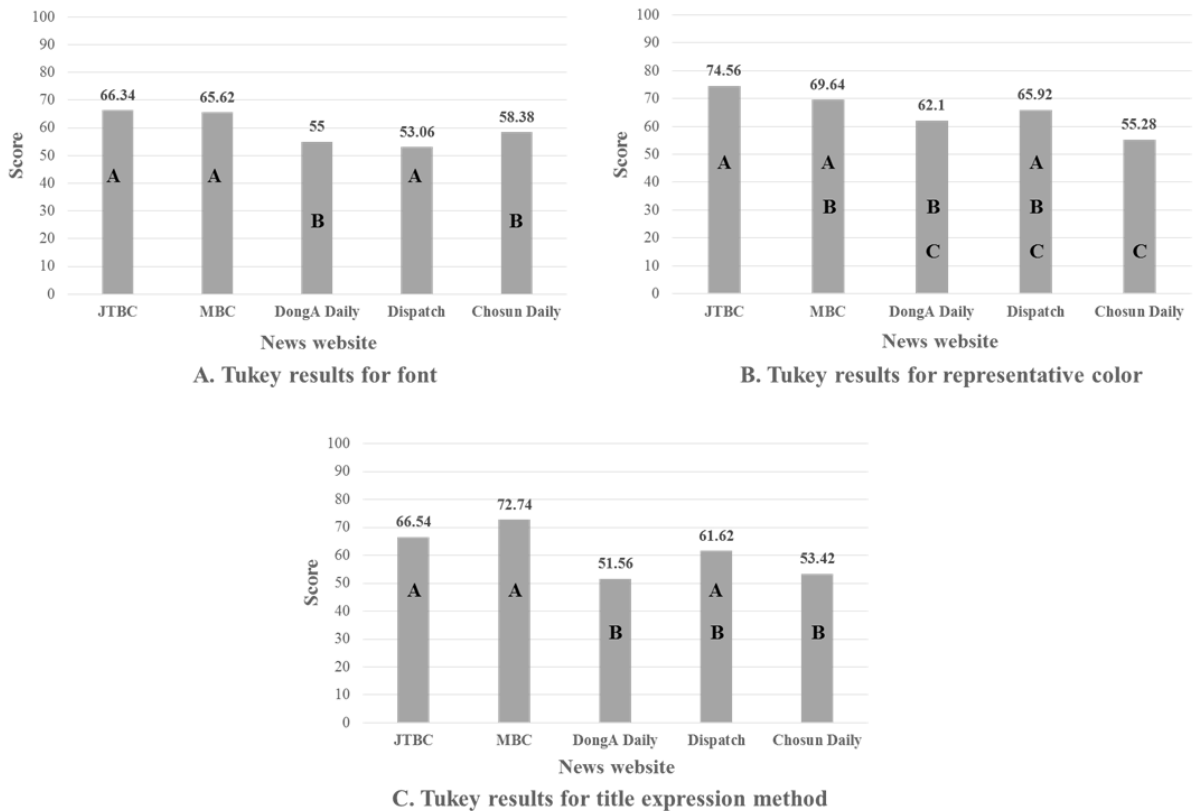

A. Tukey results for font

B. Tukey results for representative color

C. Tukey results for title expression method

FIGURE 2. Tukey results for affect design elements (Different letters indicate a statistically significant difference)

5. **Discussion.** Design factors influencing usability were analyzed in the order of layout, title expression method, category, and amount of information. In the case of layout, it was found that utilizing the same area to compose the content of each article was more important than the grid type (2 or 3); in the case of the title expression method, high usability was reported when the website displayed the article title with a photograph. In the case of the category, higher usability was seen when the depth of menu structure was 2 than when it was 1. Therefore, we can infer that when designing a news website, making content configuration area of every article identical, displaying the title of the article and the photograph together, and configuring the menu structure of the category to depth 2 will improve usability.

Design factors influencing affect were analyzed in terms of title expression method, representative color, and font. In the case of the title expression method, the website that displayed the article title alongside a photograph showed positive affective satisfaction, identical to the usability result. In the case of representative colors, the websites in the blue series showed higher affect than those in the red series. No correlations could be made between the fonts on the websites that showed high affect scores. It is useful to note that the color blue is generally known to be associated with wealth, trust, and security [11].

Moreover, in previous studies related to web advertisement colors, users were found to prefer the colors in the blue series [12]. Thus, we can deduce that, when designing a news website, displaying the title of an article alongside a photograph and using blue as the representative color is recommended to improve affect.

6. **Conclusion.** The purpose of this study was to analyze the effect of website design on the UX of Korean news websites. Various design factors related to the usability and affect of the news website were derived, and their influence was confirmed using multiple regression analysis.

Through ANOVA and Tukey's post-hoc analysis, we identified the websites with the best UX in terms of each design element and analyzed the characteristics of the most preferred design elements. We can conclude that when designing the landing page of news websites, it is recommended that the content composition area be the same for all articles, titles displayed alongside a photograph, the depth of the category menu structure set to 2, and the blue series be utilized for the representative color. Future research will analyze additional design elements related to the usability and affect of news websites.

This study is significant in terms of the characteristics of news websites with high UX, and the results can be used as a basis for planning new news websites or improving existing ones.

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Appendix. Questions Used in the Study.

Relative Design Elements	Questionnaire
Advertisement	– Do you think pop-up ads on this site help you identify site information? – Do you think the number of ads on this site is appropriate and easy to get information?
Font	– Does the site have a proper font and space between letters? – Does it make you easy to understand and feel design satisfaction?
Layout	– Do you think the layout of the site is easy to understand the content of articles?
Amount of information	– Do you think that the amount of information helps you to understand information?
Category	– Do you think the detailed menu is well organized and easy to find the information you want?
Representative color	– Does the representative color used in the design of the site provide design satisfaction?
Title expression method	– Does this layout of screens that list the titles of the articles on the main screen provide design satisfaction? – Does this layout of screens that list the titles of the articles on the main screen make it easier to understand the content of the articles?