

Design thinking approach in Radya Pustaka Museum website interface as an information medium

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Abstract:

Radya Pustaka Museum in Surakarta, is one of Indonesia's oldest museums which preserves ancient manuscripts and Javanese historical relics, yet its current digital information distribution relies primarily on social media and does not provide a single, structured source for museum information. If neglected, it will reduce appreciation of cultural heritage and the museum will lose its relevancy in the digital era. This study aims to develop a user interface (UI) for a museum website that presents content in a way that is accessible, useful, and visually coherent. Structured as a design-oriented project, the study follows the five stages of design thinking: empathize, define, ideate, prototype, and test. Formative data were gathered through interviews with one museum staff member and three visitors, direct observation of the museum's existing information medium, comparative analysis of museum websites, and literature research on visual communication and UI design. The insights gathered were used to develop information architecture, wireframes, visual design choices, and an interactive prototype. The prototype was evaluated by 25 respondents aged 16 to 50 through a five-point Likert scale, yielding 121 Agree or Strongly Agree responses out of 125 total (96.8%), with the item on interest in visiting the museum attracting the most neutral replies. This study demonstrates how design thinking can connect identified museum information needs to interface structure, visual identity, and user evaluation within an applied visual communication design context.

Introduction

Museums have historically functioned as archives of culture, history, and art, serving simultaneously as distinctive portals into the past. The early 21st century witnessed the emergence of digital media technology, which transformed museum operations by offering new resources and technologies that could provide richer, more customized, and interactive experiences (Dong, 2024). To keep up with the digital era, museums must adapt through digital information media and stronger social media presence. Digital information media, in particular, have emerged as a vital extension of the museum experience, given their capacity to provide useful information, showcase ongoing events, present collections, and promote public engagement both before and after a physical visit. The Radya Pustaka Museum which is located in Surakarta, is one of the oldest museums in Indonesia that is crucial to the preservation of Javanese culture as it contributes to ensuring that future generations can discover and value Indonesia's rich cultural legacy by preserving these artifacts.

On October 28, 1890, Kanjeng Raden Adipati Sosrodingrat IV founded Radya Pustaka Museum with the intention to preserve historical heritage and provide educational resources for future generations and has been in existence for 134 years since then (Disporapar Provinsi Jawa Tengah,

2022). This museum's original purpose was to serve as a place to store royal letters, though as time went on, its role expanded to include preserving important objects from Keraton Surakarta, such as Javanese manuscripts, Javanese musical instruments, wayang puppets, masks, statues, keris, traditional weapons, miniatures, books, ceramics, and glassware. While some of the artifacts in the original collection came from Sosrodiningrat's personal collection, the majority were gifts from the king or were obtained through donations and purchases (Florida, 2018).

The museum's visitors rose from 19,291 to 34,211 in 2023 after the COVID-19 pandemic, showing the increase in its popularity amongst the public. However, from this study's interviews revealed an information gap; two of the three visitors said that there wasn't enough information about the museum digitally, and the museum staff informant clarified that the institution's former website had been shut down in 2023. Through observation, this study also found that current information distribution by UPTD Museum Surakarta is only concentrated on Instagram and Facebook, thus, limiting public access to various information.

For audiences to fully grasp what a museum offers and its cultural identity, digital communication needs to guide them efficiently toward essential information. This becomes a problem when content is scattered across social media, leaving users struggling to find consistent, reliable details about collections, services, events, location, and other visitor needs. This evidence weakens the assumption that physical visitor growth alone ensures adequate digital information access, framing accessibility as a design challenge in its own right.

The challenges faced in museum management are not limited to the maintenance of collections, moreover include sustaining their relevance in modern society, considering that visiting a museum is more than simply viewing historical objects; it is also a form of education, cultural preservation, and appreciation of history and art. Limited accessibility to information poses a dual risk: the deterioration of historical knowledge within the public eye and the declining relevance of museums as institutions in the digital age. Therefore, conserving collections alone is not enough for museums to remain relevant in a digital world.

A successful case of museum digitization can be seen in Yogyakarta's Sonobudoyo Museum, which combines an interactive website with educational social media content Sitepu & Atiqah, 2022). Websites are the fastest, most precise, and most accurate medium for sharing information since all content on a website can be conveyed clearly and easily understood (Andriyan et al., 2020). What sets a museum website apart from its physical counterpart is digitalization; the ability to deliver comprehensive exhibition information to the public entirely in digital form (Hsieh & Chen, 2020). A museum website can also provide cultural content to huge audiences by transcending linguistic and geographic barriers (Boneva, 2023). Digital technology empowers museums to exceed the limitations of physical space, reaching wider audiences, and enriching the visitor experience through tools such as virtual tours, online catalogs, and AR/VR-based interactive exhibitions.

While Radya Pustaka Museum's social media platforms have proven effective, they cannot fully substitute for a more comprehensive and professional information medium such as a website. In response, this study proposes a website as a solution for presenting essential information about the museum. Based on interview and observation findings, this study frames its design problem through two questions: how can the Radya Pustaka Museum website user interface be designed as an accessible and coherent digital information medium, and how can its visual and supporting media maintain a recognizable connection with the museum's identity? Through a design thinking process, this study seeks to convert the information needs identified from both users and the institution into concrete outputs: information architecture, interface components, visual design, and supporting communication media.

Methods

This study was conducted as a design-oriented research project, with design thinking serving as the primary framework guiding the development of the Radya Pustaka Museum website user interface. Its early stages use qualitative techniques to uncover the existing information context and understand user needs, while the final stage turns to prototype evaluation to gather descriptive feedback from users. This structure reflects a deliberate combination of qualitative inquiry for problem definition and an applied design process with user-based evaluation, rather than a purely qualitative investigation.

In-depth interviews were conducted for this study which includes two different participant groups. Bangkit Supriadi, a staff member of the Radya Pustaka Museum, was interviewed to learn more about the museum, its current communication methods, and how public information is distributed. Three museum visitors were interviewed as part of an effort to understand their experiences, information needs, and expectations regarding digital museum information. They were selected as representatives of both the institutional provider and the potential users of the information medium. Through these interviews, recurring needs and particular informational requirements for the interface were identified.

Direct observation was conducted at Radya Pustaka Museum and on its current information media, specifically Instagram and Facebook. A comparative observation was enacted on the websites of Sonobudoyo Museum, the National Museum of Indonesia, and the Egyptian Museum in Cairo. The main areas of comparison were information structure, menu layout, collection presentation, visitor information, and other interface components that could influence the Radya Pustaka Museum website without merely replicating the visual form.

The literature review was utilized to support design decisions concerning layout, graphic design, interface structure, typography, information media, and the design thinking process, used alongside interview and observation data rather than standing alone as theory. The problem outline, sitemap, wireframes, visual components, and prototype were created by integrating structured data from identifying information problems and user needs. Together, they created a solid foundation that directed the development of the design project and offered a baseline to evaluate the results.

The design process followed five design thinking stages: empathize, define, ideate, prototype, and test, focusing on understanding user needs by considering aspects of form, relationships, behavior, interaction, and human emotions in order to generate optimal solutions (Soedewi et al., 2022). The empathize stage gathered information from stakeholders and existing media; the define stage converted these findings into a focused design problem; the ideate stage developed the information architecture and interface concepts; the prototype stage translated the concepts into visual and interactive interface designs; and the test stage evaluated user responses to the prototype. This sequence functioned as an iterative design framework, allowing later findings to be checked against the initial needs identified in the earlier stages.

Result and Discussion

The connection between evidence, design choices, and the final interface is the primary subject of discussion, however the findings are presented through the five stages of design thinking. Design thinking method was used since it functions as a human-centered approach that focuses on creating solutions based on a deep understanding of user behaviors, needs, and motivations (Erico & Wicaksono, 2024). This method places a strong emphasis on user empathy and promotes iterative testing and prototyping, making it suitable for designing interfaces that are both functional and user-friendly.



The design thinking process consists of five iterative key stages: empathize, define, ideate, prototype, and test. The primary question throughout the process is how established museum and visitor demands are translated into information hierarchy, navigation, visual identity, and interface elements.

Empathize

The first stage, empathize stage, is a process of deeply understanding and paying close attention to users in order to better understand their needs and desires through direct user interaction, analysis, and observation (Ansori et al., 2023). Interviews and direct observation were then handled as sources of design evidence rather than mere documentation of the research process. Interviews were conducted with a staff member and three past visitors of Radya Pustaka Museum were conducted in order to learn about their experiences with museum information, their familiarity with the museum, and their expectations with a museum website. While direct observation examined the museum's existing approach to displaying information, the literature review provided guidelines for creating an accessible and functional web interface. Using these sources, the design process was able to distinguish between institutional information, visitor-oriented information, and visual presentation needs.



Figure 1. Interview with one of the staff members managing the Radya Pustaka Museum

Source: Personal Documentation

The empathize stage revealed a frequent information-access problem. Two of three past visitors stated that there wasn't enough digital information provided by the museum. The staff mentioned Radya Pustaka Museum used to have a proper website, however, it was deactivated in 2023 and there hasn't been any reliable source of information ever since except their social media. Observation further indicates that the public information in their social media didn't show details about book borrowing services and many events that were held by the museum. Based on these findings, the purpose was not to develop yet another advertising channel, but to consolidate generally stable museum material into one location and make it easier to access.

Define

The define stage establishes focus and directions for the solutions by identifying and formulating issues from the previous stage's data (Rabbani, 2021). Rather than treating the absence of a website as the core problem, this study identifies the real issue as the lack of a comprehensive, structured, and accessible digital information medium accommodating both museum information and visitor needs, for which a website serves as the proposed solution.

Based on the previous stage, the interviews and observations indicated that people needed a digital medium to support practical visitor information while also presenting the museum's collections, services, history, and activities in one coherent structure for easier access to museum information. Rather than focusing merely on constructing web pages, this approach redirected the design emphasis toward structuring information so that users could clearly understand what the museum offers and

how it can be accessed. Jefkin and Franks argued that information media, as a tool, must be targeted effectively so that information can be conveyed successfully and practically to its intended audience (Soufitri, 2023). This can be achieved through a website, which is user-friendly across all segments of society and serves as the fastest, most accurate, and most precise information medium by presenting content through text supplemented with images or videos (Andriyan et al., 2020). This capacity mattered in this study, as the core problem identified was the fragmentation and poor discoverability of museum content, rather than a shortage of visual marketing.

Therefore, the resulting design questions were formulated as follows: (1) how should the Radya Pustaka Museum website user interface organize information for museum visitors and prospective visitors, and (2) how should supporting visual media introduce and direct users to the website? The interviewees specifically identified the necessity of incorporating Google Maps-linked location information, contact details, and photographic documentation of the museum's collection. These user needs and the primary objective of developing an efficient information platform would serve as the foundation for all future design decisions.

Ideate

In the ideation stage, various concepts that were obtained through brainstorming sessions would be developed in the form of solutions for the users' problem (Rabbani, 2021; Soedewi et al., 2022). The Egyptian Museum in Cairo website was used as structural reference as its navigation separates institutional information, visiting information, collections, education, activities, media, and contact information. A similar navigation structure was also found on the website of Yogyakarta's Sonobudoyo Museum and the National Museum of Indonesia, which included museum profile, activities, and exhibition rooms, among others. However, Sonobudoyo's website did not display detailed information about its collections, a gap that could pose a problem for prospective visitors seeking to know what the museum holds. These categories were not copied directly; they were adapted to the content and needs of Radya Pustaka Museum. The resulting sitemap (Figure 2) prioritizes seven sections, Home, About, Collections, Services, Activities, Gallery, and Contact, while also placing frequently needed details like opening hours, tickets, a brief history, selected collections, upcoming events, articles, and route information on the Home page.

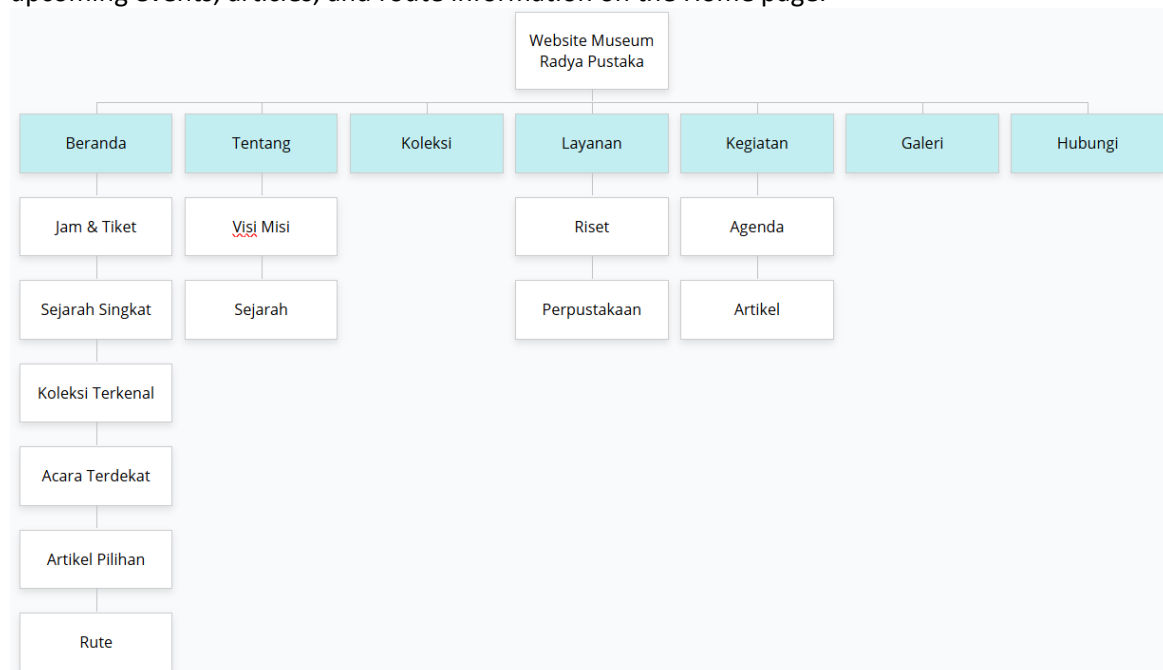


Figure 2. Sitemap UI website of Radya Pustaka Museum

Source: Personal Documentation

While the sitemap defines how information is structured, it does not yet determine how users will actually see and interact with that information, which is where the role of the user interface becomes essential. User Interface (UI) is the most crucial component of any computer system since it includes everything that the user can see, hear, touch, communicate with, understand, and control about the computer and its software (Galitz, 2002). A well-designed UI plays a crucial role in providing the best user experience and to make software easier to use (Aziza et al., 2024). With the sitemap established, the emphasis switches to converting this structural framework into an interactive, visual format that users can interact with directly.

A wireframe is then created based on the sitemap's structure. Designers use a wireframe to plan UI layout and structure before adding other components since it shows the position of each component without other distractions such as the use of colors, fonts, or images (Yudhanto & Susilo, 2024). The wireframe is split into low-fidelity wireframe and high-fidelity wireframe. Low-fidelity wireframe has low precision on accuracy with low details while high-fidelity wireframe is highly precise in depicting interactions and workflows (Aziza et al., 2024).

The wireframe comprises ten pages derived from the sitemap structure. The homepage contains ticketing information, operational hours, and the museum's location to help users easily find practical information about museum operations. Furthermore, the earlier interviews mentioned a lack of collection photos, which led to the creation of a dedicated page describing each collection along with its accompanying photos. Since designing an interface requires careful consideration of user experience, the wireframe structure of this interface was arranged based on the user needs identified during the earlier define phase.

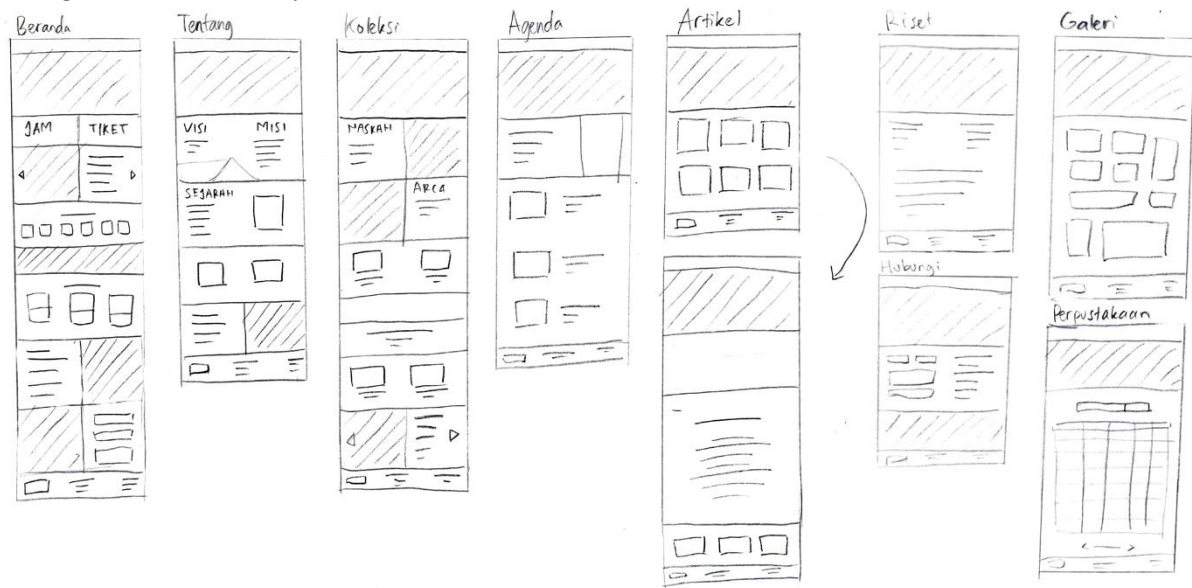


Figure 3. Low-fidelity wireframe
Source: Personal Documentation

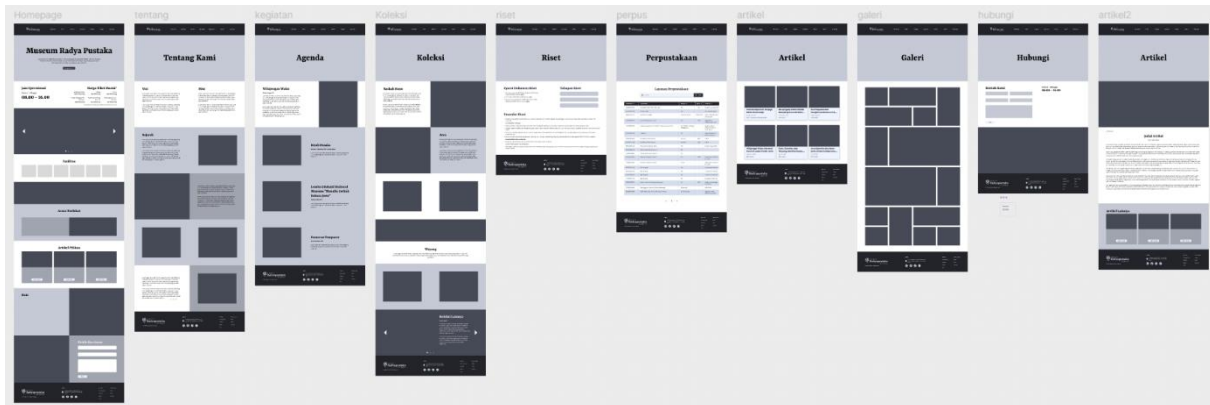


Figure 4. High-fidelity wireframe
Source: Personal Documentation

Prototype

The prototype phase transformed ideas from the previous stage into more concrete and tangible designs to test various aspects of the design solution (Soedewi et al., 2022). This stage provided a testable form of the proposed digital information medium, allowing navigation, content hierarchy, and visual communication to be examined together. Its visual components, drawn from observations, literature reviews, and interviews, were chosen not merely for decorative purposes but to balance two key requirements: keeping the interface clear for practical information seeking while maintaining a recognizable connection to Radya Pustaka Museum's identity as a historical and cultural institution.

Rasa

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm
Nn Oo Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy
Zz 1 2 3 4 5 6 7 8 9 0 ! @ # \$ % ^ & * () -
_ = + { } [] \ | ; : ' " , . < > / ?

Poppins

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn
Oo Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 1 2 3
4 5 6 7 8 9 0 ! @ # \$ % ^ & * () - _ = + { }
[] \ | ; : ' " , . < > / ?

Figure 5. Typography used in the headline and body copy of the Radya Pustaka Museum's user interface design
Source: Personal Documentation

As shown in Figure 5, the typographic system pairs Rasa for headlines with Poppins for body text. Rasa's serif style lends a traditional visual character fitting for the museum's historical identity, whereas Poppins supports better readability for longer passages of digital text while staying consistent with the typeface used in the museum's emblem. Rather than using one typeface throughout, this pairing purposefully balances cultural character at the heading level with functional readability at the body level.

COLOR PALETTE

Primary Color



Secondary Color

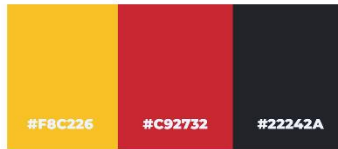
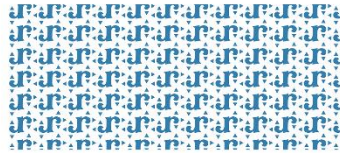
**PHOTOGRAPHY****PATTERN****ILLUSTRATION**

Figure 6. Non-verbal visual strategies in the user interface design of the Radya Pustaka Museum website
Source: Personal Documentation

Figure 6 illustrates the nonverbal visual system used within the interface. The primary palette consists of blue and white, supported by yellow, red, and black. Blue was chosen to extend a color already associated with the museum's existing digital communication, providing visual continuity across the interface, while white creates contrast and breathing space for information-dense pages. Yellow is used sparingly as an accent, and red is preserved specifically in the Rajamala illustration to maintain its character identity, while black serves mainly to support text readability. Rather than depending purely on color symbolism, this design approach is guided by principles of consistency, contrast, hierarchy, and recognition.

Instead of generic decorative visuals, actual photographs of the museum's rooms and collections were used to give direct evidence of the institution, and a warm photographic tone was applied to reinforce a historical mood. Repetition across the interface was achieved through pattern elements drawn from the museum's logo, while the Kyai Rajamala illustration was placed more sparingly within supporting media, functioning as a distinct cultural marker that does not overwhelm the informational content. As shown in Figures 7 and 8, these elements come together in full-page layouts where a dark-blue navigation bar and footer maintain visual continuity, while photographs, headings, cards, and white space guide users through the hierarchy of content, making the overall interface easier for users to read and navigate.

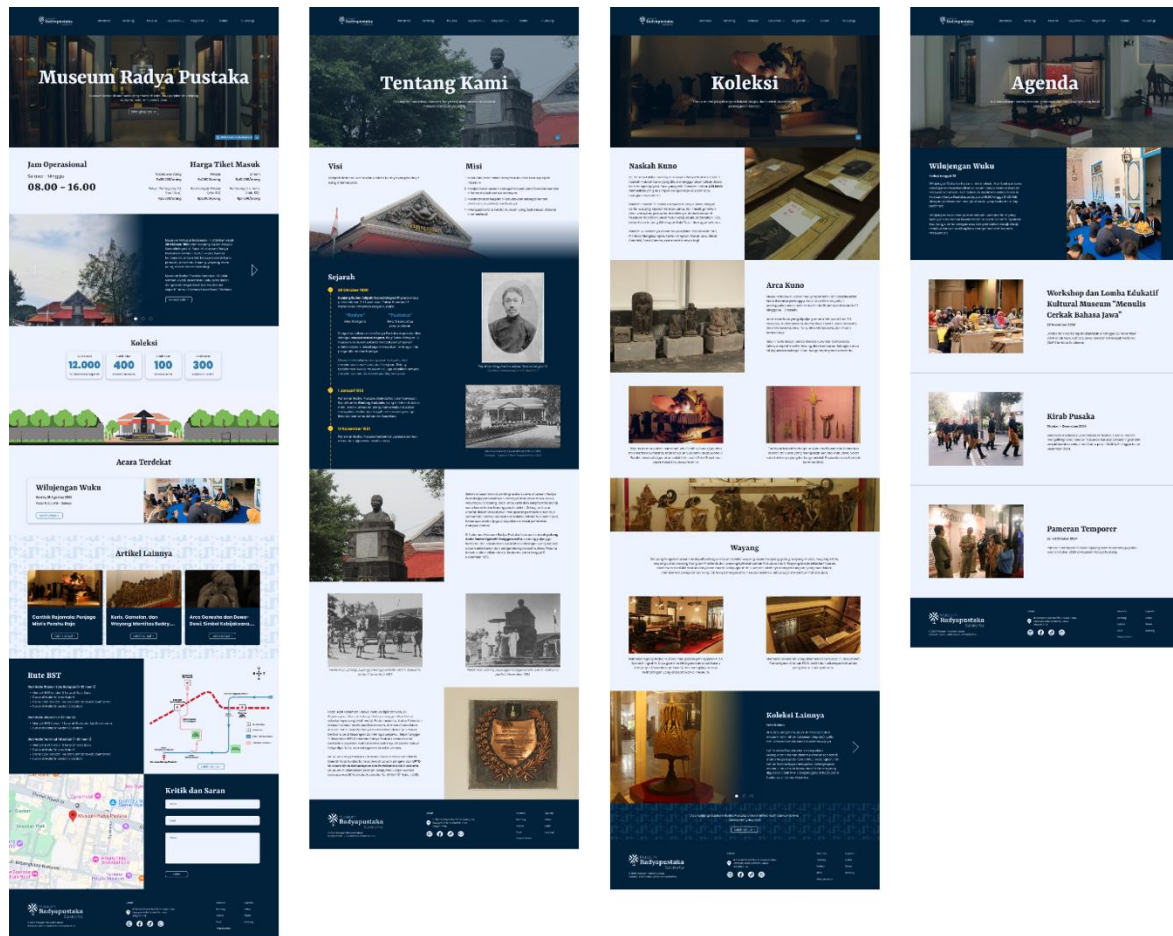


Figure 7. User Interface prototype design for the Radya Pustaka Museum website using Figma
Source: Personal Documentation

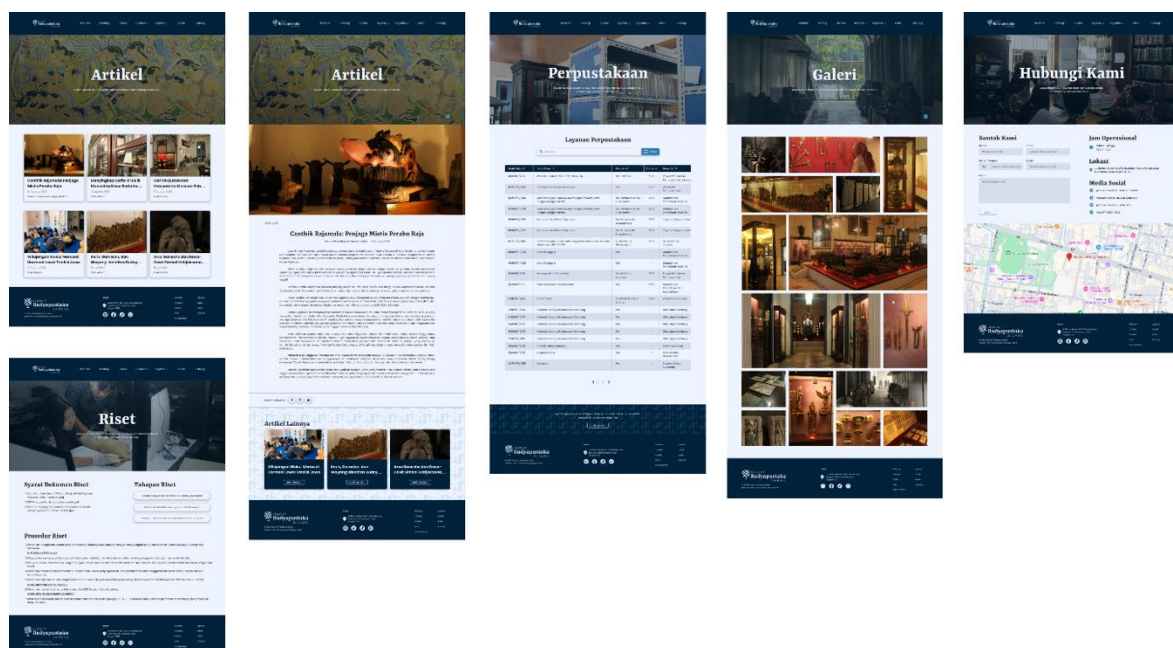


Figure 8. User Interface prototype design for the Radya Pustaka Museum website using Figma
Source: Personal Documentation

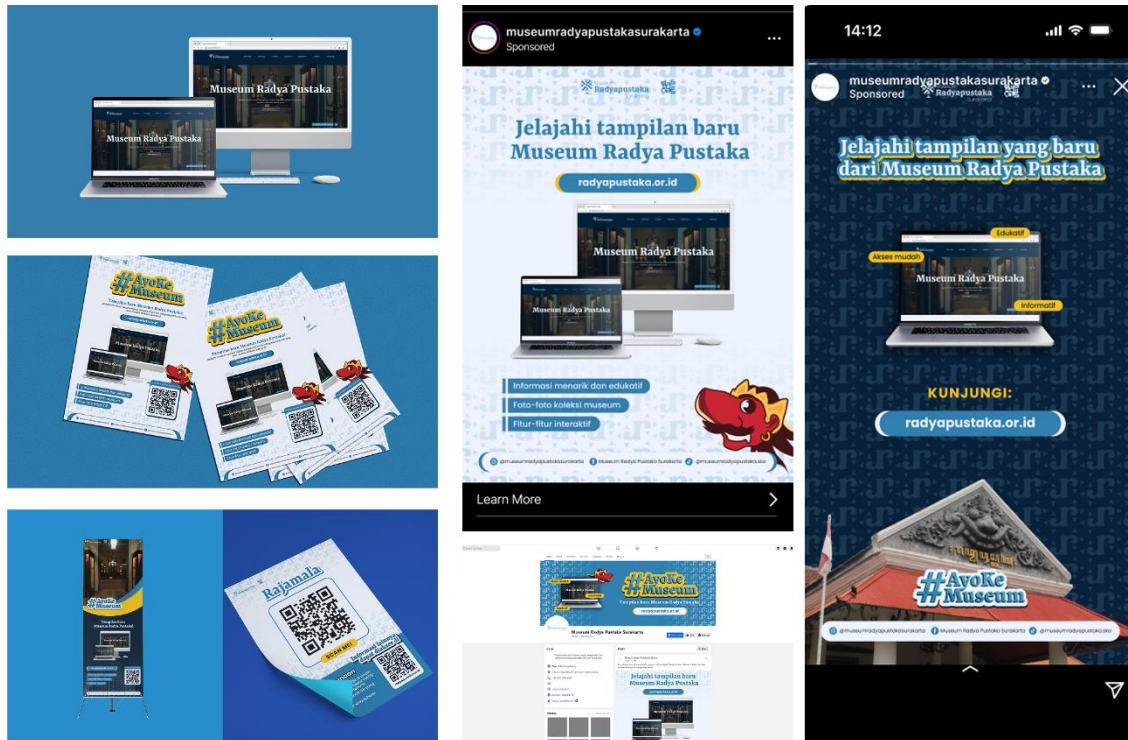


Figure 9. Supplementary Media Design for the Radya Pustaka Museum Website User Interface
Source: Personal Documentation

Beyond the interface itself, the visual system carries over into supplementary media, as shown in Figure 9. Items such as A3 posters, X-banners, collection stickers, Instagram advertisements, and online banners share the same color palette, typography, imagery, and website reference, allowing offline and social-media touchpoints to consistently guide audiences back to the central information platform. Rather than serving as independent communication tools, these materials work to reinforce visual continuity and improve the discoverability of the website across the museum's promotional touchpoints.

Test

The test stage examined how users responded to the finished prototype. As the evaluation used an online questionnaire rather than a standardized tool such as SUS or UEQ, the results are treated as descriptive findings on perceived functionality, information value, visit interest, and suitability as an information medium.

Table 1 UI Beta Test Results

No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1.	Does the Radya Pustaka Museum website User Interface prototype free of errors?	13	12	0	0	0
2.	Are the buttons on the Radya Pustaka Museum website User Interface functional?	14	11	0	0	0
3.	Does the Radya Pustaka Museum website User Interface increase your knowledge about the history and collections of the museum?	15	10	0	0	0
4.	Does the Radya Pustaka Museum website User Interface make you interested in visiting the museum?	5	17	3	0	0

5.	Is the Radya Pustaka Museum website User Interface suitable for use as a medium of information for the Radya Pustaka Museum?	15	9	1	0	0
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Source: Personal Documentation

A total of 25 respondents aged 16 to 50 took part in the evaluation, involving museum visitors, potential visitors, and members of the public who could reasonably be expected to use the website for museum-related information. Each respondent evaluated the prototype and completed a Google Form questionnaire. The purpose of this evaluation was to assess whether the proposed interface and its features were considered useful and informative at the prototype level, not to test a fully developed live website.

Respondents rated five items on a five-point Likert scale ranging from strongly agree to strongly disagree, with 96.8% (121 of 125) falling into the agree or strongly agree categories. The highest levels of agreement were recorded for button functionality and the perceived improvement in understanding museum history and collections, both endorsed unanimously. Interest in visiting the museum, however, showed more varied results, with 22 positive and three neutral responses, indicating that the prototype functioned more as an information tool than as a direct predictor of visit intention.

Conclusion

This study reveals that the core design challenge facing Radya Pustaka Museum extends beyond the mere absence of a website, but also the necessity to arrange scattered museum content into a cohesive digital communication structure. Through the design thinking process, the research translated interview and observation findings into a sitemap, wireframes, visual identity decisions, an interactive UI prototype, and accompanying materials. The final interface integrates essential visitor information, museum history and collections, services, activities, galleries, and contact details, all while preserving visual coherence with the museum through consistent typography, color, photography, patterns, and carefully chosen cultural illustrations.

The user evaluation produced 121 favorable responses out of 125 ratings (96.8%); however, this figure is best understood as descriptive evidence of perceived prototype quality rather than a generalizable measure of usability. The study's main contribution is therefore an applied visual communication design contribution, tracing the connection between identified information needs, information architecture, visual decisions, and prototype evaluation within a cultural institution. Several limitations should be acknowledged in this study, the limited number of formative interview participants, the relatively small sample of 25 respondents used for prototype evaluation, the absence of a standardized usability instrument, and the evaluation of a prototype rather than an actual, deployed website. Future studies could expand on this design by conducting more extensive user testing, incorporating task-based usability measurements, and evaluating the deployed website across a broader range of visitor groups.

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