

REVITALIZATION OF THE INDONESIAN POSTAL MUSEUM WEBSITE THROUGH THE DESIGN THINKING APPROACH

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ABSTRACT

The Indonesian Postal Museum is facing challenges in attracting the attention of younger generations. The purpose of this study is to create an interactive website based on artificial intelligence (AI) that maximizes the user's digital experience. This method will use Design Thinking Approach. Empathize, define, ideate, prototype, and test those the five steps in this approach, which uses a qualitative descriptive approach. To collect data, observation, interviews, questionnaires, and literature review were employed. The research findings indicate that the use of AI features such as chatbots, content personalization, and other interactive components can enhance user engagement online and encourage them to visit the museum in person. It is hoped that this project will serve as a model for digital revitalization for other museums in Indonesia.

Keywords: Indonesian Postal Museum; Artificial Intelligence; Interactive Website; Design Thinking; Digital Experience.

INTRODUCTION

In the digital age, museums are evolving from mere repositories of artifacts into interactive spaces that can be used for education and recreation (Istina, 2022). Using technologies like artificial intelligence (AI), augmented reality (AR), and virtual reality (VR), the learning experience becomes more engaging and appealing to visitors (Wild & Povroznik, 2025). In this regard, websites are seen as a crucial platform for information dissemination, accessibility improvement, and user experience enhancement, particularly in the Internet of Things (IoT) era. (Sumpeno et al., 2015).

The Indonesian Postal Museum, established in 1931, has great historical value, but its outdated appearance, lack of interactivity, and lack of digital infrastructure. These conditions reduce public participation, especially from the younger generation. This study suggests a revitalization strategy that focuses on user needs and improves the digital experience by becoming a scalable model for the digitization of other museums in Indonesia. This strategy uses a Design Thinking approach to create an AI-based interactive website.

RESEARCH METHODS

Development Model

The procedure and outcomes of using this strategy are thoroughly explained at this point in the study framework using a design thinking approach (Pande & Bharathi, 2020). These consist of;

a) Empathize

- **User Research**

To conduct this research, the researcher observed and interviewed website users. The aim was to explore their real experiences when using the features available on the website.

- **360-Degree Data**

The data obtained during observations and interviews were compiled into a 360-degree chart, covering both internal and external factors.

- **Empathy Mapping**

The results of the user research were compiled into an Empathy Map to categorize users' thoughts, feelings, statements, and actions. This helped in comprehensively understanding users' motivations and frustrations.

b) Define (Problem Formulation)

- **User Persona**

Based on the empathy results, real user representations (personas) are created to represent the main demographics of the website users, such as teachers, active students, BEM administrators, and new members. Everyone has their own goals and challenges.

- **SWOT Analysis**

SWOT analysis is then conducted to identify internal and external strengths, weaknesses, opportunities, and threats.

- **PEST Analysis**

This is followed by an external analysis from the Political, Economic, Social, and Technological perspectives. The data obtained will serve as a reference for the needs in this design.

- **User Journey Mapping**

Measuring the user journey from the initial visit to the website until completing a specific goal, such as downloading a form or reading an announcement. This helps identify areas for improvement and friction points in the user experience.

c) Ideate (Idea Development)

- **Mind Mapping**

Considering the personas and task analysis results, an idea mapping process is conducted. This includes aspects of UI, UX, feature requirements, and internal or external factors.

- **Big Idea**

The Big Idea is the main idea or message that forms the foundation of the entire design solution and is an important step in guiding and unifying initial ideas into a strong and meaningful core vision. It becomes a focal point that aligns with the project's objectives, meets user needs, and has narrative power that can inspire and differentiate the project from others.

d) Prototype (Prototype Creation)

- **Wireframing**

A rough sketch of the website layout without final visual elements. The purpose is to determine the structure, layout, navigation, and information flow of the content. This research uses wireframes to redesign the main page, navigation menu, announcements, and important documents. Designers will find it easier to plan user interactions comprehensively before creating the final design through this process.

- **UI Design**

After obtaining the sketches, the visual design will be created digitally, ensuring it is easy to understand and maintains the museum's values and consistency, while preserving user visual comfort. Colors, typography, icons, and other visual elements are adjusted to align with the organization's identity. Factors affecting accessibility, such as color contrast and text size, are considered in this design.

- **Testing**

The final stage evaluates the user experience (UX) and the effectiveness of the interface (UI). This testing demonstrates how visitors interact with the system using subjective methods (interviews, questionnaires) and objective methods (Task Performance, Error Rate). This evaluation ensures that the design is truly responsive to user needs.



Figure 1. Research and Development Design Thinking Model

Research Subject

The two main groups that are the subjects of this study are the internal parties of the Indonesian Postal Museum, particularly its managers. In this case, Mr. Zamzam is the main source of information, followed by potential users of the museum website, consisting of teachers, students, and visitors aged 18 to 40 years old, who represent the museum's target audience digitally.

Purposive sampling was used to select respondents based on their connection to educational activities, their interest in museums, and their level of digital literacy. Usability testing involved 5 people (Ntoa, 2024).

Data Collection and Analysis

1. The quantitative and qualitative data collection process included:
 - Field observations: Conducted directly at the Indonesian Postal Museum, as well as through examination of the current website.
 - In-depth interviews: Conducted with museum managers to determine the needs and expectations for website development.
 - To measure UX perceptions of the prototype, an online questionnaire was distributed to participants via the Maze.co platform.
 - Usability Testing: Used to evaluate the success of interactions through task scenarios such as chatbots, virtual tours, and reservation features.
2. The data was analyzed using quantitative and descriptive qualitative techniques:
 - Qualitative analysis examined user motivations, challenges, and needs using empathy mapping, user personas, and user journeys.
 - Questionnaire results and task performance were evaluated quantitatively by calculating success rates, satisfaction levels, and open feedback.
 - Next, the results from both methods were compared and synthesized to generate design insights. These were translated into low-fidelity sketches and high-fidelity prototypes using Figma. Design evaluation was conducted through a combination of objective and subjective testing, as recommended by usability evaluation methods.

RESULTS AND DISCUSSION

1. Emphatize

Data was collected from observations, interviews, and literature studies. The data was summarized in a mind map, covering several perspectives. The Empathize stage revealed that the Indonesian Postal Museum website is still traditional and not interactive, making it difficult for users to find information and make reservations. As a result of interviews with managers, it became clear that a website with comprehensive educational and digital features is urgently needed. However, end users such as educators need quick access to visual content and digital interactions that support learning. These findings were used as the basis for developing a design that is more focused on user needs.

- 360-degree data

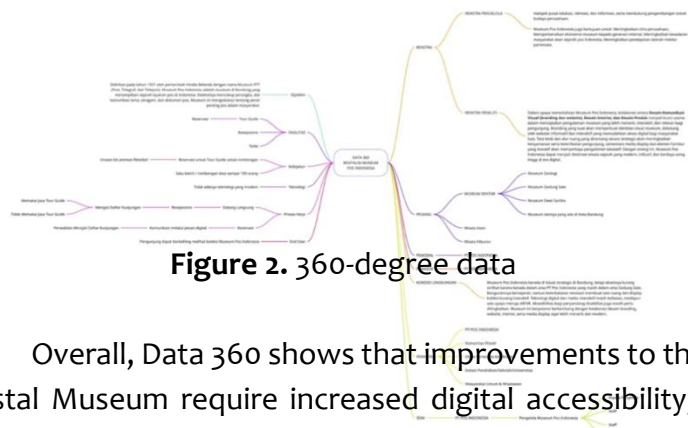


Figure 2. 360-degree data

Overall, Data 360 shows that improvements to the Indonesian Postal Museum require increased digital accessibility, inter-sector collaboration, and changes to communication strategies. The museum can be transformed into an attractive and modern historical education center with the ability to reach more segments of society through integrative methods such as these.

2. Define

- SWOT Analysis

Table 1. SWOT Analysis

Strengths	Weakness
<ul style="list-style-type: none">• A rich and authentic collection of communication history.• Institutional support from Pos Indonesia.	<ul style="list-style-type: none">• The website is not yet independent and is still integrated with Pos Indonesia.

<ul style="list-style-type: none"> • Visitors' interest in cultural education. 	<ul style="list-style-type: none"> • The interface is monotonous and lacks interactivity. • Digital features are minimal.
Opportunities	Threats
<ul style="list-style-type: none"> • The development of AI and interactive digital technology. • A young generation that is familiar with technology. • Potential for collaboration with cultural and educational institutions. 	<ul style="list-style-type: none"> • Competition from other museums that have been digitized Limited budget and human resources Digital content managers. • Rapid changes in technology trends.

According to SWOT analysis, the rich historical collection and educational potential support the development of the Indonesian Postal Museum website. However, the current weaknesses of the website include a monotonous appearance and limited digital features. Although the trend toward digitization and advances in AI have created great opportunities, they still face digital competitiveness issues and resource limitations.

- PEST Analysis

PEST analysis is used to determine the influence of external macro components that affect the development plan for the Indonesian Postal Museum website. These include:

- a. Politics

- Government regulations on digitization support progress toward the digital era.
- It is necessary to align with national education and cultural policies.

- b. Economy

- Limited funds for museum management.
- Artificial intelligence technology can be an effective solution for limited human resources.

- c. Social

- Increasing public interest in interactive museums and digital experiences.
- A technology-based educational approach is needed for the younger generation.

d. Technology

- Innovations such as chatbots, AI, and VR help transform the visitor experience.
- Difficulty in adopting and monitoring new technologies.

PEST analysis shows that government policies are politically encouraging the digitization of the cultural sector. Economically, challenges arise from limited budgets for technology development, but AI can be a solution for human resource efficiency. Socially, there are great opportunities because the public, especially the younger generation, tends to prefer interactive educational experiences. From a technological perspective, the rapid advancement of AI, VR, and interactive digital systems offers great potential, although it requires readiness for technology adoption and maintenance.

- User Persona

USER PERSONA



Adinda Permatasari (24 Tahun)

Tentang

Saya bekerja sebagai guru dan staf kurikulum di SMK Bogor. Saya dari Generasi Z, yang aktif menggunakan teknologi, dan saya berusia 24 tahun. Saya biasa menggunakan perangkat dan laptop, dan saya sering menggunakan Google untuk mencari bahan pelajaran atau referensi.

Needs

- Informasi pendidikan yang menarik dan dapat diakses
- Website yang ramah pengguna dan mudah dipahami
- Konten pembelajaran yang dapat disesuaikan untuk siswa sekolah menengah kejuruan
- Sedikit informasi kontak dan reservasi yang jelas untuk kolaborasi institusional
- Akses ke tur virtual atau koleksi yang dapat digunakan di kelas

Pain Points

- Website museum tidak ramah pengguna dan memiliki informasi yang tidak lengkap.
- Tidak ada kontak atau reservasi yang jelas.
- Sulit untuk memasukkan konten edukatif ke dalam kurikulum sekolah.
- Kurangnya sumber daya interaktif yang dapat digunakan untuk mendukung pendidikan alternatif

Goals

- Menyediakan pendekatan pembelajaran yang menghibur bagi siswa
- Membantu siswa memahami informasi secara visual dan kontekstual
- Meningkatkan minat siswa dalam belajar melalui pengalaman belajar yang tidak konvensional
- Memfasilitasi kunjungan pembelajaran yang berkaitan dengan industri dan komunikasi

Skenario

Adinda sedang mencari cara lain untuk mengajarkan siswanya di sekolah menengah kejuruan sejarah komunikasi. Dia mencari kata kunci di Google dan menemukan situs Museum Pos Indonesia. Namun, saat ia dapat diakses, ia menghadapi kesulitan mencari konten yang tepat untuk dibagikan kepada siswa dan tidak menemukan cara yang mudah untuk memesan. Agar pendidikan menjadi lebih menyenangkan dan tidak membosankan bagi siswanya, dia berharap ada komponen pembelajaran seperti tur virtual atau sumber pembelajaran digital.

Figure 3. User Persona

As a young Gen Z teacher, Adinda needs a museum website that is interactive, visual, and accessible. Currently, the Indonesian Postal Museum website is considered uninformative and does not meet institutional requirements such as visit reservations and learning materials. The museum cannot be used as an alternative learning method due to these limitations. Therefore, it is very important to optimize the website with features that support education and enable access to the institution.

3. Ideate

- Mind Mapping



Figure 4. Mind Mapping

Based on the results of empathy and user journey analysis, the mapping of ideas for this website section was carried out using the mind mapping method. This mapping considers:

1. Collection information, reservation systems, and learning materials are user needs.
2. Relevant digital technologies, such as chatbots, virtual tours, e-modules, and interactive multimedia content.
3. UI/UX components, including visually appealing designs, clear navigation structures, and exceptional accessibility.
4. External factors, such as educational regulations and museum digitalization trends

The results of this mind mapping serve as the foundation for developing a digital solution that addresses user issues comprehensively.

- Prototype
 - a. Low-Fidelity (Sketch)

In the early stages of prototyping, low-fidelity testing was conducted using hand-drawn sketches that illustrated the structure and flow of the Museum Pos Indonesia website. These sketches provided an initial idea of the page layout, basic navigation, and how key components such as menus, buttons, collection content, and reservation features would be positioned.

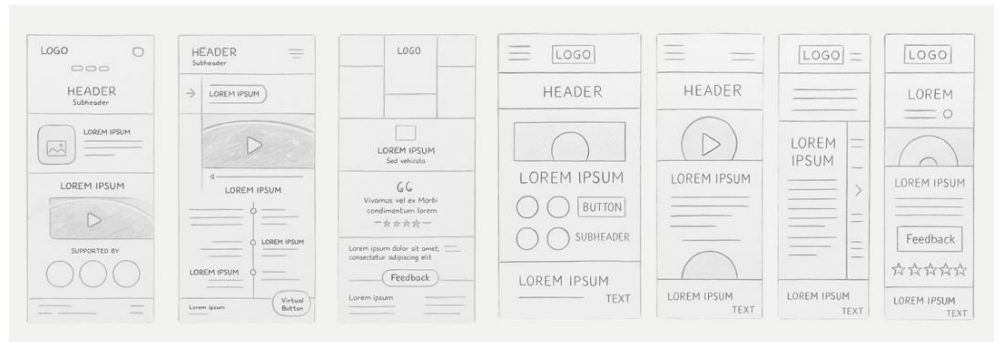


Figure 5. Sketch

For the next design iteration, preliminary sketches are essential. User input is very helpful in defining feature requirements and reorganizing the information hierarchy to make it more accessible.

b. Medium-Fidelity (Digital Wireframe)

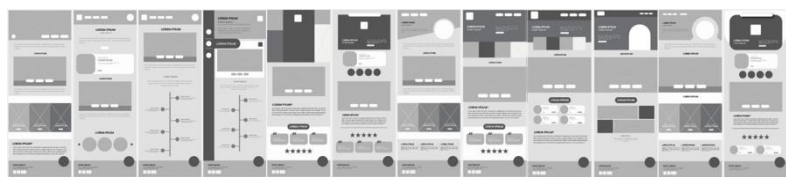


Figure 6. Wireframe

Digital wireframes are created using Adobe Illustrator and Figma. At this stage, attention is given to interaction flows, navigation structures, and functional element placement, without adding visual elements such as colors, illustration placement, or final typography. At this stage, around 12 wireframes are created, and the top 3 will be selected and visually implemented until the high-fidelity stage.

c. High-Fidelity

This stage continues from medium fidelity, where the website wireframe is developed into its final visual form with user experiences. This high fidelity prototype includes design elements ranging from the Museum's branding colors, typography, icons, illustrations, and chatbots.



Figure 7. UI Prototype

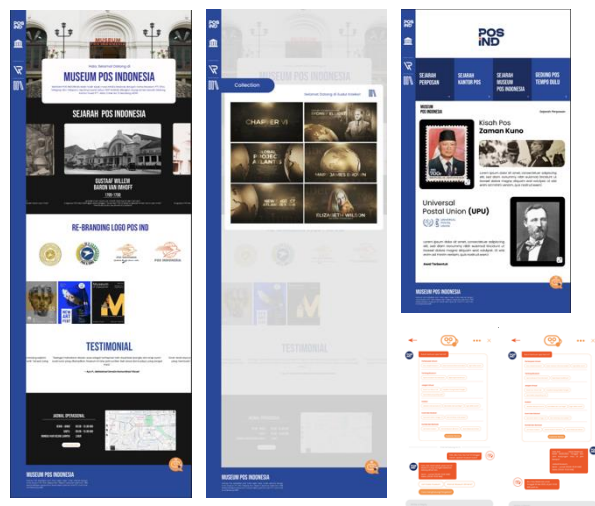


Figure 8. UI Design

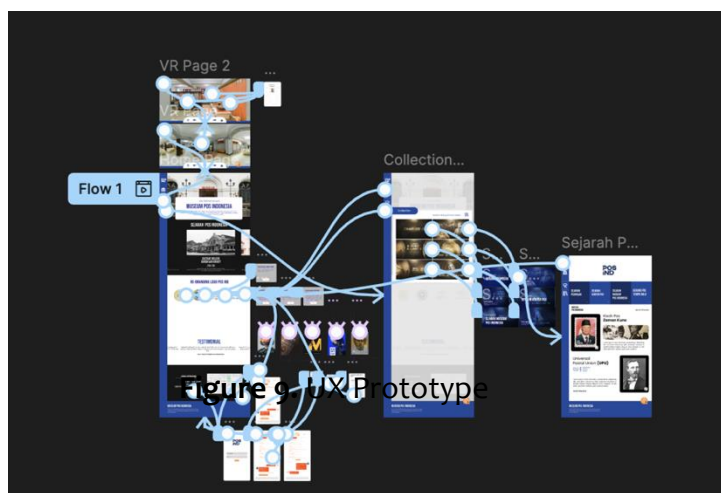


Figure 9. UX Prototype

- Testing

This stage is the last in the Design Thinking process used to create the interactive website for the Indonesian Postal Museum. The effectiveness of the user interface (UI) and user experience (UX), which were developed using top-notch prototypes, is assessed through testing. Both subjective and objective methods are used in the evaluation, as detailed in the methodology section.

1. Subjective Testing (Qualitative Usability)

This stage involves open-ended interviews and questionnaires via the Maze.co app for potential users, such as teachers, students, and museum visitors aged 18 to 30 years. They were asked to evaluate features such as ease of navigation, visual appeal, clarity of information, and comfort in using features like chatbots and virtual tours.

2. Objective Testing (Quantitative Usability)

This was conducted by observing users as they completed specific tasks, such as:

Table 2. Usability Testing

No.	Task	Result
1.	Steps to make a reservation	96%
2.	Accessing the digital collection	92%
3.	Using the Chatbot	88%
4.	Finding the Virtual Room Tour	96%

The following table shows the level of ease perceived by ten users regarding four key features:

1. Reservations (96%) said that the prototype showed a clear navigation design and buttons, making it very easy to find and make reservations for visits.
2. Museum Collection (92%) The museum collection page is usually easy to find for most users; however, there

were a few suggestions to make the content more visual or separated by category.

3. Chatbot (88%) The chatbot features work well, but user comfort is slightly lower than other features. This indicates that conversation flow or response speed needs improvement.
4. Virtual Tour (96%) The virtual tour feature is highly valued; the high rating indicates that viewing and using this feature is already straightforward.

ANALYSIS/DISCUSSION

By using technology to enrich visitor experiences, museums in the digital age can transform into dynamic educational institutions, especially for Generation Z. Technologies such as Augmented Reality (AR), Virtual Reality (VR), and website platforms significantly enhance the digital experience while accelerating independent learning and information seeking (Istina, 2022).

It can be concluded that museums in the digital age can enhance their visitors' interactive experiences by embracing technology, organizing engaging activities, and fostering communities through social media. This is especially true for tech-savvy Gen Zers. This strategy fulfills educational goals and generates interest in visiting museums. A rich and engaging virtual museum experience is created through user-centered display design. These interactive components create a stronger connection between visitors and cultural heritage and improve access to museums. To enable a personalized experience, virtual museum design focuses on user preferences. Visitors can choose various learning styles and interests to interact with the content, such as guided tours or self-exploration (Sumpeno et al., 2015).

The book entitled **Museums' digital identity: key components** (Wild & Povroznik, 2025) emphasizes that museum websites are the main gateway for online visitors to museums. Considering the categories of Forte and Franzoni in the book, effective UI is associated with the types of virtual museums available;

- b. Museum Simulation (an experience similar to the real world),
- c. Information Museum (for obtaining additional information),
- d. Real Virtual Museum (digital content and experiences that are entirely on the internet).

The change in the museum's web page display from showing the physical museum building to highlighting digital collection objects demonstrates an effective UI. In addition, the use of virtual assistants will make museum websites more attractive and interactive. The guide will then direct users to features on the website and guide them through the group visit reservation process. This enables quick and

easy reservation and coordination (Sumpeno et al., 2015). Povroznik said that the digital presence of museums is no longer limited to providing basic information through websites, but has evolved into a digital ecosystem that encompasses various technology-based platforms and interactions, such as social media, mobile applications, and virtual content such as digital tours and online exhibitions. This can be seen as a digital initiative demonstrating the museum's readiness for: AI applications like chatbots, virtual reality (VR) tours, and 3D collection reconstructions. As;

- a. Interactive and personalized user experiences,
- b. Increasing online community participation,
- c. Promoting cultural and educational values in an engaging manner.

When using the Design Thinking approach, it is essential to understand the user experience when creating a functional and user-friendly website design. Talking directly with users and continuously considering their needs is crucial to creating effective design solutions (Pande & Bharathi, 2020). Using SWOT and PEST analyses, this design found that the Indonesian Postal Museum has major strengths, namely its extraordinary historical collection and great educational potential. However, weaknesses such as a monotonous website and a lack of interactive features make it less attractive. The growing interest of younger generations in digital learning experiences and the trend toward cultural digitization present significant opportunities, though there are also threats such as resource constraints and competition from more contemporary museums. Externally, economic issues and workforce readiness act as barriers; government policy support and technological advancements like artificial intelligence and virtual tours serve as drivers.

The results of this discussion indicate that flexible digital strategies and user-centric approaches are crucial for museums to remain relevant in the era of digital transformation. However, the results of the empathy phase show a significant difference between the ideal situation at the Indonesian Postal Museum and what is actually happening. A physical visit to the museum shows that it still gives a “quaint” impression. More importantly, observations of the existing website show that its appearance is “monotonous,” the data presented is “incomplete,” and its status is not independent because it is still integrated into the Indonesian Postal Service's corporate website. When compared to competitors, such as the Geological Museum website, which already has an independent virtual tour feature, this difference becomes even more apparent. This shows that the issues of functionality and digital experience (UX) on the MPI website are currently very urgent.

During this testing period, users will be involved in providing subjective assessments of the features available on the website. Subjective evaluations refer to user experience (UX) assessments based on personal opinions, feelings, and perceptions. These capture how users feel about their interactions with the system,

which may include emotional responses, satisfaction levels, and overall impressions of usability. These evaluations take the form of surveys/questionnaires, interviews, and user comments.

CONCLUSION

Empathize, Define, Ideate, Prototype, and Test are the five steps of the Design Thinking approach that this research used to successfully rejuvenate the Indonesian Postal Museum website. Chatbots, virtual tours, personalized information, and online bookings are examples of AI-based interactive systems that have been shown to improve user engagement, accessibility, and learning.

The new design satisfies both functional and emotional user needs, as evidenced by the usability testing findings, which demonstrate high levels of user satisfaction in terms of navigation clarity (96%), visual appeal (92%), and interaction performance (88–96%). These results demonstrate how user-centered digital design combined with AI may turn conventional museums into vibrant, instructive, and captivating cultural venues.

Additionally, by providing a scalable model for similar institutions looking to connect historical legacy with contemporary technology, this project adds to the larger context of museum digitalization in Indonesia. It is advised that future studies incorporate AR/VR experiences and create adaptive AI systems to further customize interactions with digital museums.

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