

From Vernacular Architecture of Sim to Digital Narrative: Imaging Isan Cultural Heritage for Tourism and Intergenerational Memory

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Abstract

This project aimed to develop an appropriate conceptual framework and an effective digital narrative medium (a 360° virtual tour website) to safeguard and promote the vernacular Sim architecture and cultural legacy of Wat Sema Tha Kho. The study initially identified the fundamental cultural and architectural elements that would be utilized in the creation of digital content. These encompassed the 150-year-old "Sim Thueb" edifice, the distinctive "Naked Man" motif carving, and the Long-Tail Boat Racing tradition. Experts evaluated the conceptual framework, encompassing design thinking and identity design, as "most suitable" ($\bar{x} = 4.56$). This system facilitated media production while rigorously adhering to regulations for content authenticity, Isan-specific color palettes, and enhanced accessibility. The most recent 360° Virtual Tour received a "Highest Level" rating in the Expert Quality Assessment ($\bar{x}=4.71$) and indicated that 382 general users expressed high satisfaction ($\bar{x}=4.58$). This result demonstrates that the media successfully communicated cultural significance and offered an engaging experience. The effort provides a systematic approach to transform Isan's cultural past into enduring, interactive digital assets. This enhances conservation initiatives and promotes local cultural tourism.

Keywords: *Digital Narrative, Isan Cultural Heritage, User-Centered Design, Vernacular Architecture, 360° Virtual Tour.*

Introduction

In an era of swift industrialization and technological progress, safeguarding and disseminating regional cultural heritage is essential. [1], [2]. This research investigates the vernacular architecture of the Sim (ordination hall, or Ubosot in central Thai) of Wat Sema Tha Kho, located in Roi Et province, Thailand. This Sim is a significant and unique representation of Isan Buddhist art and traditional craftsmanship. It demonstrates that the local populace has maintained a robust sense of identity, faith, and architectural ingenuity for centuries. The references [3], [4], [5], [6], [4], [5], [6], and [7] provide additional context and support for this statement.

The primary issue identified in our study is the pressing necessity to preserve and disseminate Sim's extensive cultural and artistic heritage to a broader audience, encompassing both residents and visitors, in an engaging and efficient manner. [6], [8]. Traditional methods of interpreting heritage often fail to adequately communicate complexities or engage the diverse audience necessary for sustainable knowledge transfer, particularly in the context of the rapidly changing media consumption landscape and digitally enabled tourism. [1], [2].

The primary objective of this study is to utilize virtual media to develop a digital narrative that facilitates cultural education. This digital initiative aims to achieve two objectives: to foster sustainable cultural tourism by providing virtual access to the site and to safeguard intergenerational memory by creating a durable and engaging record of the Sim's architectural and cultural significance. [1], [2], [9].

The research employed the Sim as a case study in digital representation, incorporating several pictures, thereby conforming to contemporary discussions in architectural image studies concerning the influence of visual narratives on cultural importance inside quotidian constructed spaces [1, 2, 4, 5]. The research advances discussions on cultural tourism and heritage management by integrating virtual tours, structured visual metadata, and community-informed interpretation, proposing a replicable model for image-based documentation and engagement for analogous vernacular sites in the Mekong region. [2], [5], [6], [8], [9].

This project employs and enhances previous academic research to address the preservation and digital interpretation of the unique history of the Sim at Wat Sema Tha Kho. This literature review systematically examines key areas of research, including cultural and religious tourism, the complexities

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of Sim Architecture (vernacular Isan architecture), methodologies in digital media and heritage preservation, and fundamental design principles for effective digital storytelling.

Literature Review

The study employed an analysis of pertinent materials and research to develop a conceptual framework encompassing cultural tourism, vernacular architecture, and digital preservation technologies.

Cultural and Religious Tourism

Cultural and religious tourism constitutes a significant aspect of contemporary travel and community development. This phenomenon is particularly evident in Buddhist contexts, where sacred locations and pilgrimages attract tourists and bolster the local economy [10], [11], [12]. Research in Northeastern Thailand (Isan) demonstrates that Buddhist heritage sites offer spiritual benefits to tourists while simultaneously increasing local revenue and promoting community cohesion, contingent upon management that incorporates community participation and honors local traditions [11,12]. This form of tourism is increasingly favored for fostering sustainable regional development, if planning emphasizes authentic cultural assets, such as the Sim, as primary attractions and integrates them into broader cultural circuits and community-oriented tourism initiatives [12], [13], [14].

Sim Architecture (Vernacular Isan Architecture)

The research confirms that vernacular Sim buildings are architecturally and ritually unique to the Isan region of Thailand, reflecting a distinct Tai-Lao cultural heritage within Thai Buddhist architecture [15], [16], [17], [15],[16],[17],[18]. Sims function as ordination halls and cultural artifacts that embody local identity, spiritual beliefs, and Buddhist cosmology through architectural designs, color schemes, and decorative elements, often expressed through locally sourced materials and region-specific symbolic motifs. Research indicates that certain Sims possess significant artistic worth and talent among the community. The Sim at Wat Sema Tha Kho is an outstanding case due to its intricate composition, mural program, and artisanal techniques, which necessitate meticulous documentation and preservation using both traditional and digital methodologies [17, 18].

Digital Media and Heritage Preservation

The rise of online digital media has become an essential tool for promoting both conservation and widespread dissemination in the field of heritage preservation, especially in tourism and museum settings [19], [20], [21]. Comprehensive assessments of immersive technologies in tourism demonstrate that Virtual Reality (VR) and 360° virtual tours significantly enhance presence, engagement, and pre-visit understanding of cultural sites. [19], [20]. These technologies enable individuals to engage in realistic, immersive encounters that facilitate an understanding of the cultural significance of a location without physical presence. They are increasingly utilized to narrate the story, establish the ambiance, and illustrate the configuration of endangered heritage sites. [19], [20], [21]. Such immersive solutions can save delicate regions from harm while also enhancing accessibility for individuals residing at a distance. Such an approach promotes inclusive cultural tourism and education.

Design Principles

To create an effective digital narrative for heritage, it is essential to implement recognized design methodologies that integrate materials, users, and technology. Design thinking and identity-driven design are two exemplary of human-centered design methodologies that effectively foster meaningful digital heritage experiences for visitors by prioritizing their needs and promoting collaborative creation. This perspective regards digital media not merely as aesthetically pleasing artifacts, but as frameworks for information interpretation that must be transparent, user-friendly, and faithful to the original narrative [22, 25]. At Wat Sema Tha Kho, it is essential to utilize graphic elements (such as lines, colors, shapes, and textures) judiciously and to establish a distinct Isan graphic identity (including earth-tone palettes, local textile motifs, and religious symbols) to ensure the virtual environment incorporates recognizable regional indicators [22, 23, 25]. The design process must prioritize the user and use iterative prototyping, stakeholder feedback, and usability testing to ensure that the final 360° virtual tour is accurate, aesthetically pleasing, and user-friendly for individuals from the US and other nations [21, 22, 23, 24, 25, 26, 27].

Research Gap

Sim is an essential component of culture; nevertheless, it is also necessary to create a contemporary and beneficial digital platform that enables everyone to explore Isan Sim's architectural, historical, and artistic information. A 360° virtual tour website that integrates traditional culture with contemporary technology addresses the issue. Ultimately, this project will enhance religious and cultural tourism in the region and safeguard its unique cultural heritage.

The identified gaps—particularly the pressing necessity to shift from conventional heritage interpretation to interactive digital media to guarantee the sustainable preservation and extensive dissemination of the Sim's distinctive cultural assets—highlight a significant shortcoming in the existing literature and practice. Thus, the research aims and inquiries for this study were formulated to directly address these deficiencies by utilizing virtual media to construct a digital story that adheres to the principles of cultural education, sustainable tourism, and the conservation of intergenerational memory.

Research Objective and Research Questions

The goal is to develop and assess a digital narrative/virtual media initiative, specifically a 360° virtual tour website focused on the vernacular architecture of the Sim at Wat Sema Tha Kho, which aims to promote Isan cultural heritage for tourism and reinforce intergenerational memory. The research questions pertain to several components of the study. 1. What are the historical, cultural, and architectural characteristics of the Sim at Wat Sema Tha Kho? 2. What is the most effective method for planning and creating a digital narrative or virtual media for the Sim? 3. What is the quality of the produced digital narrative medium, and how satisfied are its users? The study's aims and inquiries focused on creating an effective and highly rated digital narrative for the Sim at Wat Sema Tha Kho, which directly shaped the research design and operational stages. The Methods section outlines the systematic, multi-phase strategy employed to achieve these objectives, including document analysis, expert interviews, media development, and quantitative assessment.

Methods

The analytical findings delineate the executed procedures, indicating that a mixed-methods approach consists of two principal phases:

Phase 1: Data Collection and Concept Validation

Prior to developing a media prototype, this phase necessitated the systematic collection of critical data and qualitative assessment. This phase encompassed the analysis of documents and literature, conducting several interviews, and doing a quantitative evaluation of concepts.

Instrument for Data Collection

The data collection employed a mixed-methods approach. Primary data was gathered through in-depth interviews conducted by the researchers, who are also residents. This was supplemented by document analysis (secondary data). A subsequent evaluation of the generated ideas was performed using a five-point Likert scale questionnaire.

Key Informants and Sampling

This study employed purposive sampling, often referred to as judgmental sampling, to select important informants for comprehensive interviews. It was evident that they excelled in both content and design. The primary sources of information included subject matter experts such as the abbot, local scholars referred to as "Praj," cultural academics, and design professionals with extensive knowledge in visual information design and digital media.

Data Analysis (Qualitative)

This study employed typological and content analysis to systematically assess the material gathered from interviews and secondary sources. This facilitated the identification of significant cultural components, design recommendations, and thematic concepts pertinent to religious tourism, Sim architecture, graphic design, and the philosophy of digital media creation.

Concept Evaluation and Data Analysis (Quantitative)

Nine experts, selected via purposive sampling, assessed the proposed conceptual framework and design principles to validate their suitability for the media production process, which includes the Learn,

Play, and Pride stages. The quantitative data acquired from this evaluation was analyzed using descriptive statistics, namely the mean.

Validity Check (Qualitative)

Data triangulation was employed to ensure the accuracy of qualitative data obtained from interviews and documents. This was accomplished by synthesizing and cross-referencing findings from document analysis, subject matter experts, and design specialists to validate the identified cultural and design attributes.

Phase 2: Media Development and Evaluation

This phase focused on developing the prototype and subsequently conducting quantitative testing.

Development

The verified conceptual framework from Phase 1 was utilized to develop the digital media prototype, encompassing the 360° Virtual Tour and its graphic identity.

Expert Quality Assessment

Nine experts, selected via purposive sampling, evaluated the overall quality and suitability of the developed virtual media using a five-point Likert scale questionnaire. The assessment included critical components, such as User Experience (UX), User Interface (UI), graphics, photographs/videos, and 360° features.

User Satisfaction Assessment

A five-point Likert scale questionnaire was employed to assess the satisfaction of 382 general consumers about the media's effectiveness, design, and overall presentation. Non-probability sampling, specifically convenience sampling, was employed to select the users.

Data Analysis (Quantitative)

This study employed descriptive statistics, namely the mean, to analyze all quantitative data gathered from the questionnaires (Concept Evaluation, Expert Quality Assessment, and User Satisfaction).

Reliability and Validity Checks (Quantitative)

The nine experts who completed the initial phase of the study demonstrated that the quantitative questionnaires were content-valid. We employed Cronbach's Alpha coefficient to assess the reliability of the tool (its efficacy in isolation). The result obtained was 0.78, which is beneficial. The systematic approach detailed in the Methods section, including document analysis, expert consultation, media production, and quantitative assessment, directly produced the conclusions reported in the Results of the Study section.

Results of the Study

Historical, Cultural, and Architectural Elements of the *Sim* at Wat Sema Tha Kho

A comprehensive examination of historical archives and discussions with subject matter specialists provided a complete understanding of *Sim*'s cultural and physical significance, which served as the foundation for the digital narrative content.

Historical and Cultural Context

The *Sim* at Wat Sema Tha Kho is a prominent local landmark constructed in B.E. 2412 (1869 CE), rendering it around 100 years old. The Isan designation for it is "Sim Thueb," signifying "solid-walled *Sim*." Constructed by Isan native artisans in collaboration with Yuan (Vietnamese) craftsmen, its construction exemplifies the significant commercial activity in the region. In B.E. 2542 (1999 CE), the Fine Arts Department underwent a significant reform to ensure its sustainability. It is recognized as the temple's oldest and most significant structure. The temple's proximity to the Chi River is significant to the region's culture. The site required soil to reinforce the foundation, and the temple grounds were selected as the venue for the annual Long-Tail Boat Racing ceremony on the Buddhist holy day of Ok Phansa or The End of Buddhist Lent Day (Figure 1). The digital narrative incorporates significant elements of this community's identity, such as the yearly long-tail boat racing tradition, individuals

adorned in traditional Isan attire engaging in daily activities and leisure, including playing Isan musical instruments, and the human motif representing the region's rich historical heritage.



Figure 1. The annual long-tail boat racing rite on the Buddhist holy day of Ok Phansa or the End of Buddhist Lent Day.

Architectural Elements

Sim's edifice exemplifies Isan architecture, being 147 years old. It exhibits both conventional form and symbolic artistry. The structure is constructed of brickwork and features a rectangular floor plan. It rests atop a "Than Ew Khan" (waistband base) like a Paan (tray). The Sim Thueb structure features a singular eastern-facing door and a gabled roof constructed from baked clay tiles. The ornaments possess significant meaning.



Figure 2. Sim Wat Sema Tha Kho and staircase of stucco Naga statues.

The shown structure is a Sim, the ordination hall of a Wat, a Buddhist temple. It is a holy site for the Uposatha ceremony and new monks' ordination. This diminutive, traditional stucco Sim (ordination hall) from the Isaan region of Thailand exhibits distinctive architectural elements, including a tiered roof, intricately carved wooden eaves (Rung Phueng), and decorative corbels and handrail arms (Kanthuay/Khaen Nang) adorned with mythological and human figures, such as Nagas and a "Naked Man" motif. Two stucco Naga sculptures are positioned at the entrance. These statues symbolize the guardians of Buddhism and the link between the terrestrial and celestial realms. A distinctive artistic element is the corbels/handrail arms (Kanthuay/Khaen Nang), which support the roof and are intricately carved to resemble Naga (serpentine guardian deities) and other characters. The "Naked Man/Woman" motif is a renowned and distinctive symbol, believed by historians to embody folk elements, innocence, or an apotropaic function, in contrast to the more prevalent Buddhist figures, such as those depicted in a Phanom Mue (devotional) position.



Figure 3. The Sim and its Architectural Ornaments.

The shown Sim (ordination hall) exemplifies the architectural style typical of traditional Lanna or Isaan districts in Northern or Northeastern Thailand. It possesses a raised, sturdy base (perhaps stucco over brick or stone) and a steep, multi-tiered timber roof marked by low walls and a unique roofline. This hallowed edifice showcases numerous wooden sculptures of considerable cultural and symbolic importance. The intricate eaves, known as Rung Phueng (Honeycomb), are essential to the architecture. The carvings feature complex designs of intertwined vines and Rahu devouring the Moon (Rahu Om Chan), clearly depicting the fusion of Buddhist and Brahmin cosmological ideas. The roof ridge has Chofa (finials), resembling the mythological Garuda, which represents protection and the celestial realm, and Chatra (layered umbrellas), denoting spiritual sovereignty.

The following section examines the origins of concepts in the digital storytelling medium, including the design principles and prevailing cultural elements that shaped them. This section is based on a thorough analysis of Sim's history, culture, and architecture.

Conceptual Framework and Design Approach for Developing the Digital Narrative/Virtual Media of the Sim

This section discusses the conceptual framework and design strategies developed for digital narratives. It utilizes the cultural and architectural outcomes from the final segment. This section comprises two components: Conceptual Framework, Design, and Core Cultural Elements, which addresses the theoretical methodology and established design principles; and Website and Virtual Media Development, which discusses the implementation of these concepts, including UX/UI design, coding, and the creation of 360° virtual tours.

Conceptual Framework, Design, and Core Cultural Elements

Conceptual Framework and Process

The project established a development plan grounded in fundamental design principles endorsed by experts as effective. Table 1 presents the principal concepts, the selected media type, and the outcomes of the expert appropriateness assessment.

Table 1: Conceptual framework and process for the digital narrative development.

Element	Description
Core Concept	The project employs design thinking and identity design to ensure that media output aligns with user behavior (user-centered design).
Media Format	The format is a 360-degree virtual tour website that provides users with information about architecture, history, and local culture in an engaging manner that simulates an authentic experience.

Suitability Certification	Nine experts examined the conceptual framework and practical methodology, which was divided into three components: Learn, Play, and Pride. The overall score was "Very Suitable" ($\bar{x}=4.18$). The presentation of the 360° virtual tour material received a rating of "Most Suitable" ($\bar{x}=4.56$).
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Design Concept Validation

The process of deconstructing and translating real-world and architectural elements, such as ornamental carvings and photographic subjects, into simpler, stylized, and vibrant graphic representations for expert evaluation is illustrated in Figure 4 below.

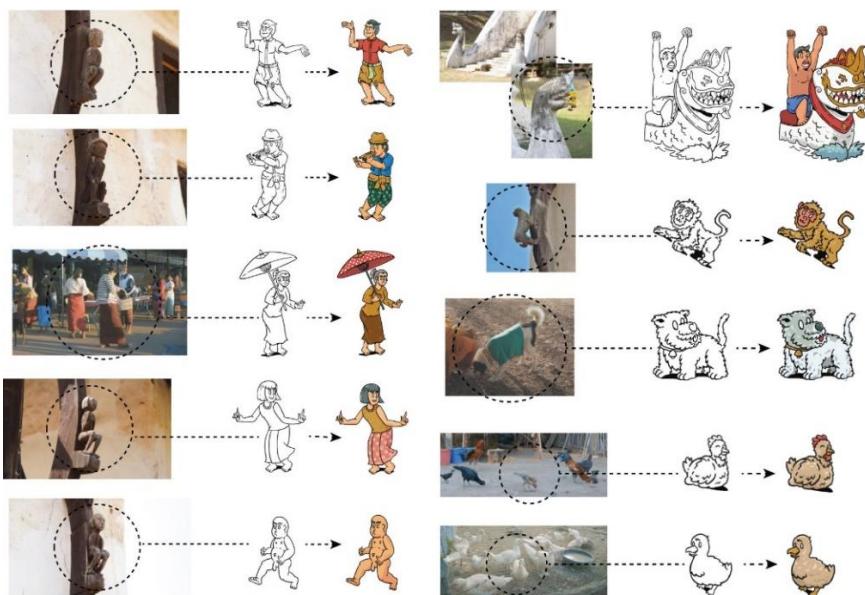


Figure 4. Extraction/Deconstruction of Components into a Graphic Image.

The graphic comprises two halves, each depicting a movement through three columns:

Source Material (Column 1): This column contains cropped images of Isaan architectural sculptures, potentially from a Sim or Wat structure, such as the monkey sculpture referenced previously, among photographs of humans and animals in cultural contexts.

- Outline Graphic (Column 2): This illustrates the source content as a basic, monochromatic line drawing or outline. This phase streamlines the original image by eliminating some elements, rendering it more representative of its true nature.
- Colored Graphic (Column 3): This portion incorporates color and fundamental shading into the line drawing, resulting in a stylized, polished graphic representation suitable for educational, research, or descriptive materials.

The image sequences illustrate the source of the graphics:

- Architectural Motifs: This category encompasses an individual mounted on a mythological beast, a monkey, and other human forms intricately carved into wooden pillars, including a "Naked Man" representation.
- Actual Subjects: These encompass a monkey, a dog, chickens, ducks, and individuals adorned in traditional attire or engaged in various activities.

This thorough analysis disassembles complex, frequently antiquated, or intricate source material into clear, comprehensible graphic components that archaeologists, historians, or cultural specialists may readily assess, categorize, and discuss.



Figure 5. Composition of All Extracted Elements.

Figure 5 is a full-color illustration that narrates the history of the Sema Tha Kho Community and its diverse identities through depictions of ancient edifices and cultural practices. The Ancient Sim (2), a 150-year-old historical item of significant importance, is the primary attraction. Scenes significant to the community's traditions surround it. One such custom is the annual longboat racing event, typically conducted in vessels resembling Naga figures. Diverse individuals embody the culture and daily life: men in traditional attire (3) play Isaan musical instruments, while women don the customary sarong (4). The naked male figure (5) is a straight graphic extraction from the Sim's Khaen Nang corbels, which constitutes a significant element of the composition. This unique architectural theme is rendered the Sim renowned in archaeological circles. Monkeys (6) are featured to indicate their presence during the temple's construction, while various domestic and livestock animals (7) are used to illustrate the community's economy and daily life. This comprehensive figure provides a visual picture of the community's history, culture, significant traditions, and distinctive architectural features of its most revered historical site.

Subsequently, professionals reviewed the design. All participants concurred that the conceptual framework, overall design, and cultural study material represented the "highest level" of appropriateness ($\bar{x} = 4.82$).

Design and Content Approach Guidelines

Table 2 provides an overview of the specific design requirements derived from expert interviews and document analysis.

Table 2. Appropriate design and content approach guidelines for the digital narrative.

Component	Appropriate Design Guidelines
Content Accuracy	To avert misconceptions, historical, architectural, and belief-related material must be precise and reliable.
Visual Presentation	Use real, high-quality images that show the details of the carvings, like corbels and eaves, along with simple visuals that are easy to understand.
Color/Graphics	Individuals ought to utilize hues that evoke the essence of ancient Isan or possess a sacred aspect, such as brown, gold, and dark green, to foster a connection to their cultural heritage.

Video/Multimedia	The narration must encompass Sim's background and significance, together with films that depict the lifestyle and activities of the local populace.
Background Music	Omit background music from the homepage of your website. It may divert visitors' attention and impede their reading comprehension.
Media Accessibility	Facilitate accessibility by placing a QR code at the temple or on pamphlets, disseminating links across many platforms, and employing appropriate keywords in Google Search.
User Experience (UX)	The options and pathways for accessing information should be clear and user-friendly.

Website and Virtual Media Development

UX/UI Design and Website Elements

User experience and user interface design (UX/UI) utilized Adobe Experience Design to create aesthetically pleasing, clear, and user-friendly prototypes. Table 3 below provides a comprehensive analysis of the UX/UI design, emphasizing its aesthetics, clarity, and usability.

Table 3. UX/UI elements and design implementation for the digital narrative website.

UX/UI Element	Design Implementation Details
Logo & Navigation Menu	Aims to facilitate the retrieval of essential information and enhance the company's branding.
Hero Image	Employs a bespoke graphic identity image as its primary visual to distinguish itself and capture attention.
Content	Upon reviewing the documents, the selected text is accurate, lucid, and concise.
360° Virtual Tour	The tour allows users to rotate the view 360 degrees, allowing for an immersive exploration experience.
Information Popup	The tour enables viewers to rotate their perspective 360 degrees, facilitating an immersive experience that allows for in-depth exploration.
Video Windowed Mode	Videos do not occupy the entire screen; rather, they are displayed in a little window. This enables individuals to access or browse additional content while the video is playing.
Contact Info/Map Online	The system provides travelers with precise directions by supplying their address and web-based maps.
Mobile-Friendly Design	The product is designed to function effectively on PCs, smartphones, and tablets through its responsive design.
Font	Employs IBM Plex Sans Thai Looped, selected for its readability, aesthetic appeal, and open-source licensing, rendering it suitable for professional material presentation.
Color Scheme	Employs a color palette of white, brown, gold, and black that emphasizes the historical value of Isan. This ensures that the writing is coherent and comprehensible.

Website System Development and Coding

This study utilized Visual Studio to develop the website system and employed Vue.js Version 3, an efficient and robust JavaScript framework, for its creation. We utilized Visual Studio Code to develop the website system and employed Vue.js Version 3 for coding. Vue.js Version 3 is an efficient and highly beneficial JavaScript framework. Table 4 delineates the various methodologies and data employed.

Table 4: Website system development and coding techniques.

Development Technique	Implementation Details
System Structure	Vue.js version 3 was employed to ensure the system design is coherent and manageable.
Screen Size Adjustment	This code modifies the dimensions of a webpage across desktop, tablet, and mobile platforms.
Visual Depth	The Parallax Effect code was employed to enhance the image's appearance and impart depth.

Deployment	Upon completion of the coding, the system is constructed and deployed on a server for universal access.
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Virtual Media Development (360° Virtual Tour)

This study utilized the Pano2VR application to create the virtual tour, which presents architectural data dynamically, allowing for a comprehensive examination from all perspectives. We utilized the Pano2VR software to create an interactive, comprehensive virtual tour that showcased architectural data. Table 5 delineates the procedures undertaken to create it.

Table 5: Development steps for the 360° virtual tour media.

Virtual Tour Development Steps	Implementation Details
Image Import	The user imported panoramic or 360° image files and configured them to align with the real environment.
Hotspot Linking	Additional links facilitate seamless transitions for users between various views by effortlessly connecting images.
Additional Hotspots	Incorporate hotspots containing additional information, such as images or text, to provide a comprehensive overview of the architecture.
Mini-map and Orientation	Create a mini-map and a method for viewing it to facilitate navigation within the virtual environment.
Theme Definition	Aligned the theme with the overall website design.
Testing and Publishing	Prior to submitting the data to a web host for public access, the web browser was tested.

After establishing the conceptual framework and design guidelines in Section 4.2, the next step, outlined in Section 4.3: Quality and User Satisfaction of the Developed Digital Narrative Media, involved following these principles to create the 360° Virtual Tour website and then evaluating its quality and user satisfaction.

Quality and User Satisfaction of the Developed Digital Narrative Media

The 360° Virtual Tour website was developed in the final phase, receiving evaluations on its quality and user satisfaction from both professionals and the public (Figure 4).

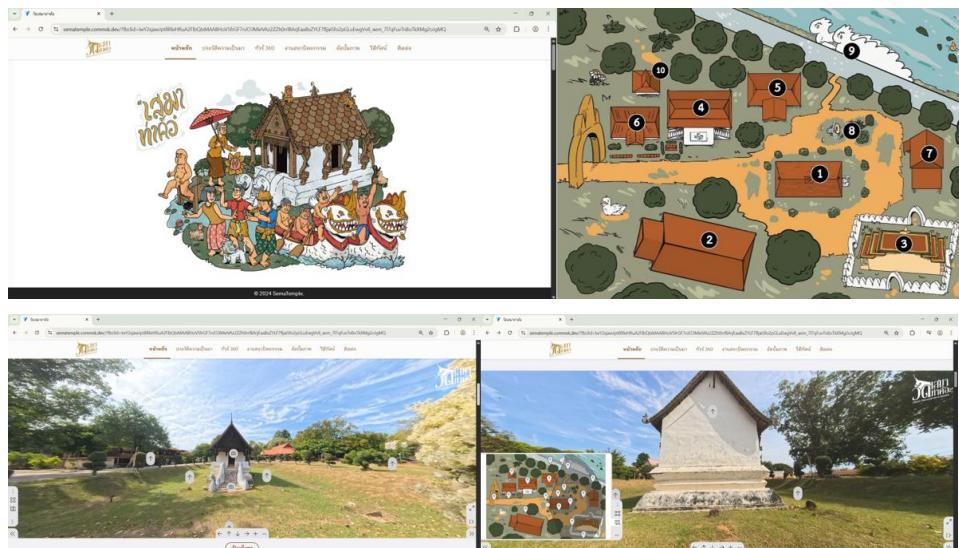


Figure 6. 360° Virtual Tour.

Expert Quality Assessment

Nine experts assessed the overall quality and use of the produced digital storytelling assets. The comprehensive findings of this expert assessment are shown in Table 6. The assessment confirmed that all quality and appropriateness criteria met the highest standard. The results indicated that the media's quality was assessed at the highest level across all dimensions.

Table 6. Expert assessment of the developed digital narrative media quality.

Aspect of Quality Assessment	\bar{x}	Rating
Overall Suitability of the Media	4.71	Highest Level
Quality of Website Components (UI, UX)	4.75	Highest Level
Quality of 360° Virtual Tour Content & Functions	4.69	Highest Level

Table 6 presents the experts' evaluations regarding the quality and utility of the developed 360° Virtual Tour website. The findings indicate that the media consistently received the "Highest Level" grade in all three critical domains: Overall Suitability, Quality of Website Components (UI, UX), and Quality of 360° Virtual Tour Content & Functions. The elevated mean scores (\bar{x}) indicate that the media fulfilled the requisite professional and technical standards.

Results of User Satisfaction Evaluation

Three hundred eighty-two individuals expressed their satisfaction with the produced media. The results for overall customer satisfaction received the highest possible rating. Table 7: Overall User Satisfaction with the Developed Digital Narrative Media indicates that the overall user experience received the highest score. Table 8: User Satisfaction with Specific characteristics of the digital narrative media indicates that users exhibit greater satisfaction with some characteristics, including video quality and the capability to undertake a 360° tour.

Table 7: Overall user satisfaction with the developed digital narrative media.

Aspect of User Satisfaction	\bar{x}	Rating
Overall User Satisfaction	4.58	Highest Level

Table 7 presents the comprehensive results of the user satisfaction survey administered to the public utilizing the new digital narrative medium. The findings indicate that overall user satisfaction was rated at the "highest level" ($\bar{x} = 4.58$), signifying that the digital media fulfilled the needs and expectations of the target audience.

Table 8 illustrates the level of satisfaction individuals have about many facets of digital media, including video quality, 360° functionality, and visual design. This figure contributes to the elevated total consumer satisfaction indicated in Table 7.

Table 8. User satisfaction with specific features of the digital narrative media.

Specific Feature	\bar{x}	Rating
Video Content: Ordering of content is easy to understand	4.71	Highest Level
Video Content: Voiceover and sound are pleasant to listen to	4.68	Highest Level
360° Functions: Ease of use and functionality of the 360° tour	4.63	Highest Level
Graphic Design: Graphics, information, and content are complete	4.55	Highest Level
Aesthetics: Overall components are appropriate and beautiful	4.52	Highest Level

Table 8 illustrates user satisfaction levels about several components of the produced media. It additionally presents the overall satisfaction score from Table 7. The findings indicate that consumers expressed "Very Satisfied" ratings across various components, including the organization of video

content (with the highest score of ($\bar{x} = 4.71$), the quality of the narration and audio, the capability to undertake a 360° tour, the thoroughness of the graphic design, and the overall aesthetic appeal. The results demonstrate the effective utilization of design concepts across various multimedia components.

All evaluated aspects of the digital storytelling medium consistently achieved the highest satisfaction ratings, confirming the successful development and positive reception of the platform designed to promote the Isan cultural heritage of the Sim at Wat Sema Tha Kho. The study successfully met its goal of creating and testing a digital story for the Sim at Wat Sema Tha Kho, as shown using research data.

Discussion

This research primarily concentrated on the pressing necessity to adequately preserve, clarify, and communicate the extensive cultural and creative heritage of the Sim at Wat Sema Tha Kho, a notable instance of vernacular Isan Buddhist building [3], [4], [17], [18]. Traditional techniques occasionally neglect architectural complexities and fail to engage the diverse audience essential for effective information dissemination [1], [6], [8]. This study's successful development and favorable assessment of a 360° Virtual Tour Website illustrate a feasible digital solution that adeptly connects endangered heritage with contemporary dissemination technology.

The elevated scores in both Expert Quality Assessment ($\bar{x} = 4.71$) and Overall User Satisfaction ($\bar{x} = 4.58$) unequivocally indicate that the medium is proficient in delivering an engaging, user-friendly, and high-caliber experience. This discovery corroborates existing evidence indicating that immersive technologies, such as 360° virtual tours, significantly enhance individuals' sense of presence and comprehension of cultural sites prior to their visitation [19], [20]. This aligns with the project's objective of fostering cultural education and safeguarding memories throughout generations [19].

The validated conceptual framework, which received a rating of "Most Suitable" ($x = 4.56$), intricately connects to the project's success. This methodology, which combined design thinking (user-centered design) with identity design, ensured that the digital narrative transcended mere aesthetics, serving as an effective means of comprehension [22]. The study highlighted a graphic identity specific to Isan by employing Isan-specific colors (brown and gold) and deliberately incorporating unique cultural motifs, such as the "Naked Man" carving, thereby adhering to the design literature's mandate for cultural fidelity and user-centered transparency [23], [25]. This systematic approach yielded media that was both beneficial and profoundly pertinent to the regional identity.

The digital narrative aligns seamlessly with the objectives of sustainable cultural and religious tourism [12], [13]. The study enhances regional development by transforming Sim, a significant cultural treasure, into a resource for promotion and education. This enables both domestic and international tourists to comprehend the significance of the site [12]. digital confirms a replicable methodological framework for heritage management in the Mekong region, illustrating that the incorporation of structured visual data and community-informed interpretation into digital media constitutes an exceptionally effective strategy for cultural preservation and dissemination.

Conclusion

This study effectively constructed a suitable conceptual framework and created an outstanding digital narrative medium (360° Virtual Tour Website) to promote and preserve the vernacular architecture and cultural legacy of the Sim at Wat Sema Tha Kho, Roi Et province. This achievement was founded on a robust Cultural Heritage Foundation, which identified and preserved significant architectural and cultural elements, including the 150-year-old "Sim Thueb" building, the distinctive "Naked Man" motif carving, and the Long-Tail Boat Racing tradition, to enhance the digital content. This foundation was translated via an appropriate design methodology. Experts concurred that the conceptual framework, which incorporated design thinking and identity design concepts, was deemed "most suitable" ($\bar{x} = 4.56$). The resultant digital media adhered rigorously to standards for informational accuracy, employed Isan-specific colors (brown and gold), and enhanced accessibility (such as mobile-optimized design and QR code integration).

The developed medium attained an exceptional quality output, confirmed through assessment of all key characteristics. The Expert Quality Assessment awarded the medium the maximum score ($\bar{x} = 4.71$). Additionally, 382 general users evaluated the media's efficacy in transmitting cultural value and delivering engaging user experience, expressing high satisfaction ($\bar{x} = 4.58$). The digital narrative adeptly connected fragile, centuries-old traditional architecture with contemporary distribution

technology, establishing a durable instrument for disseminating cultural knowledge and fostering legacy.

Implication and Contribution

The results of this study have significant ramifications for tourism, cultural preservation, and academic inquiry. The study presents a practical and reproducible methodological framework for cultural heritage preservation, demonstrating the effective transformation of both tangible (architecture) and intangible (traditions, beliefs) cultural assets from the Isan region into interactive digital resources, thereby promoting the sustainable conservation of at-risk sites. The 360° Virtual Tour created effectively educates and promotes the cultural significance of Wat Sema Tha Kho to both domestic and international visitors. This direct access enhances the viability of cultural tourism and enables the community to generate revenue. The study exerts a direct influence on culture and simultaneously provides a significant academic contribution by supporting the design methodology. The elevated scores for appropriateness and satisfaction unequivocally demonstrate that user-centered design and design thinking can effectively provide engaging cultural educational resources. This significantly facilitates its application in forthcoming historical endeavors across many cultural and academic domains.

Limitations

The study achieved its primary objectives; yet, it is essential to acknowledge its shortcomings. The study focused solely on the architectural characteristics and cultural context of a single site (the Sim at Wat Sema Tha Kho), suggesting that the relevance of specific cultural motifs and design elements may be limited when applied to other temples or regions without careful local adaptation. The emphasis on immediate gratification indicates that the assessment of user satisfaction solely considered the user's immediate feelings and experiences with the product, neglecting its long-term effects, such as sustained engagement, acquisition of new knowledge, or behavioral changes, such as returning to the site after viewing the virtual tour. Ultimately, the report lacked sufficient information regarding the expenses associated with technology and maintenance. The primary emphasis was on development and testing, with less consideration for the long-term resources required to keep the Vue.js V3 and Pano2VR systems operational and current for decades.

Future Research

To expand upon the findings of this study, below are a few suggestions for further research. Comparative research is proposed using the established framework to analyze analogous vernacular Sim structures in Roi Et or other provinces within the Isan area, with the objective of refining the design model and assessing its scalability beyond a single locality. Future studies should include contemporary technologies, such as augmented reality (AR). Technology would enable individuals to overlay historical material onto the actual Sim structure while present, or a comprehensive Virtual Reality (VR) version might be developed for a more immersive experience. Future research should include economic and educational impact assessments to examine the direct and indirect economic consequences of digital media for the Tha Kho community and measure the educational efficacy and knowledge retention of users. Ultimately, we must consider strategies for sustaining the system over the long term. This entails employing strategies such as open-source preservation protocols and community-driven content management frameworks to ensure the continued functionality of digital assets in the future.

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Conflict of Interest

The authors declare no conflicts of interest.

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