

DEVELOPMENT OF A METAVERSE MODEL TO ENHANCE RENU NAKHON PHU-THAI CULTURAL TOURISM IN NAKHON PHANOM PROVINCE, THAILAND

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ABSTRACT

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This research aimed to: 1) develop a metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province 2) assess the suitability of the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism, and 3) study the satisfaction of using the metaverse model of Phu-Thai cultural tourism. This research adopted a qualitative study approach. The research method comprised three steps: 1) developing a model synthesis using document synthesis techniques, 2) assessing the suitability of the metaverse model with input from 9 experts, and 3) implementing the metaverse model for Renu Nakhon Phu-Thai. The target group for the study included 400 tourists in the Mueang Nakhon Phanom area who used the metaverse model of Renu Nakhon Phu-Thai between November 2022 and January 2023, selected through purposive sampling. Data collection tools included: 1) a form for synthesizing the data, 2) a suitability assessment form, and 3) a web application satisfaction questionnaire. Statistical analysis of the collected data involved calculating the mean and standard deviation. The results indicated that the development of the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province comprised three elements: 1) cultural architecture, 2) local wisdom identity, and 3) creative local community. The developed metaverse model of Renu Nakhon Phu-Thai was found to be highly suitable for use (mean = 4.17, standard deviation = 0.54). Moreover, satisfaction with the developed metaverse model was high (mean = 4.30, standard deviation = 0.76). Suggestions for improvement included adding a distance calculation section and a map of nearby places to aid tourists in deciding whether they could travel at their desired time using the metaverse model.

Keywords: Metaverse model; cultural tourism; Renu Nakhon Phu-Thai; community culture

1. INTRODUCTION

The global society is evolving into an information society, with information exponentially increasing in the future. Online access is becoming easier and faster across all channels, facilitating the rapid dissemination of new knowledge into the public domain. The innovations created in the future will lead to innovations in access to information. This information is systematically linked to imports, searches, and exports. Therefore, the reliability of the information is significantly screened. Global and national networks are systematically connected in digital working systems by governments and the private sector. Individuals who have quick access to information and who are able to screen the information effectively will be the leaders and survivors of the global society of the future (Anuntakul, 2017).

The metaverse—a new form of communication channel and platform—is a virtual world that transcends physical borders, creating a virtual world where reality and virtuality coexist. It can take the form of a 360-degree virtual reality. Additionally, users can create an avatar to represent themselves within this virtual space. This technology has been developed to accommodate the needs of people in an era where travel to various places has been restricted due to the pandemic. This has resulted in the development of virtual world technology systems for tourism, which are very popular. The unique experience of the virtual world is presented through mobile devices such as mobile phones and tablets, which are easy to use and convenient to carry to various tourist destinations. Accessing the metaverse has never been easier, anytime, anywhere. The metaverse can be accessed not only through personal computers, but also by using mobile phones. This ability allows people to spend time and participate in various activities. An increasing number of consumers are beginning to view living in the virtual world as if it is like living in the real world (Foutty & Bechtel, 2022). After collecting information about the value of the global metaverse market in 2021 Statista reported that the largest growing market is the Web 2.0 metaverse market, with a global total value of 14.8 trillion USD, followed by the gaming and eSports markets, which have a global value of \$1.98 trillion, followed by Facebook (Meta) with a total global value of 0.9 trillion USD (Sungkorn, 2022).

The global Web 3.0 metaverse market is valued at \$0.03 trillion globally. Virtual tours (virtual trips) involve the use of virtual technology created for viewers who are able to visit a simulated form of a place. These tours are put on websites using virtual reality technologies such as virtual reality (VR) and augmented reality (AR). In addition, this technology has been used in museums, at ancient sites, and even in the ocean, in deep space and in the stars (Boonlue, 2022). Recently, cultural expression has evolved through various communication channels, reflecting the evolution of global society. This expression often takes the form of a tangible culture, which is formed of architectural objects that communicate with society and the cultures of people in different regions of the world. Tangible culture demonstrates a distinctive identity that can be perceived by looking at feelings or experiences and by conveying intangible cultural meanings, such as beliefs, values, languages, customs, and traditions (Lertchanrit, 2011). This type of communication may require transmission or communication by a person or learning through various forms of communication innovations, with the objective of disseminating new ideas or new things into society so that society can accept them (Roger, 1962).

This form of innovation dissemination can be divided into 4 components: innovation, communication, social system, and time. The process starts with a new idea or thing that a person discovers and then tries to communicate or transmit to others in society who still lack knowledge about the idea and experience with new innovations. The perception and understanding of ideas or innovations vary across different social systems, influencing the levels of awareness and acceptance of those innovations. Individuals acquire knowledge about societal innovations through exposure to and interaction with innovation leaders, necessitating time and effort dedicated to learning new concepts. People may accept or reject the innovation or new thing based on their evaluation through the perceptual process. This is affected by behaviors that lead to their decision to accept or reject.

The Renu Nakhon district, Nakhon Phanom Province, is a community with both national and international tourism potential, because of its beautiful cultural lifestyle and unique traditions. The Renu Nakhon district people call themselves “Phu-Thai”, the Phu-Thai tribe, which is in the group of Tai language ethnic or Tai Kadai language families. They originally settled in the town “Na Noi Oi Nu”, which is located in southern China. Later, they migrated down and settled on the east bank of the Mekong River, in what are now the Khammouane and Savannakhet Provinces of the Lao PDR (Laos). Before settling in Thailand in 1841, Thao Petch, Thao Sai, and Thao Pai, as leaders, along with Thao Bud and Thao Intisan, brought the Phu-Thai people from Wang city to set up a village at Dong Wai Sai Bo Kae (later raised to the status of Renu Nakhon city in 1844). Thao Sai received royal favor as Phra Kaew Komol, the lord of Renu Nakhon.

The spotlight of Renu Nakhon Phu-Thai cultural prominence is stated in the motto of Nakhon Phanom Province: "Precious That Phanom, Multi-Cultural, Renu Phu-Thai, Beautiful Fireboats, Attractive Mekong River view." This shows that the Renu Nakhon Phu-Thai people are interesting and unique in Nakhon Phanom

Province, with the Phu-Thai language, Phu-Thai dance, woven fabric, rice noodles, and rice liquor. In addition, there are attractive sites leading to the birth of merit traditions, such as the worship of Luang Por Lord Saen, Pra Tart Renu Nakhon worship, and paying homage to Grandfather Thala. The urban development of the community has been continuous, and many educational attractions have emerged, such as Hue's City Theatre, the Hue's Museum, the Chao Pu Thala Association, the Thao Phet Thao Sai Monument, the Thai Cultural Village, and the Rice Noodles (Nam Nua) and Rice Liquor Learning Center.

Cultural capital is readily available for the development of valuable constructive tourism, as well as for conservation, restoration, and transmission efforts. Through the cooperation of the Thai Cultural Network and related agencies, "World Phu-Thai Day" was subsequently formed and organized. There are Phu-Thai cultural communities, such as the Phu-Thai communities in Sakon Nakhon, Kalasin and Mukdahan Provinces in Thailand, the Phu-Thai community in Savannakhet Province in Lao PDR, and the Phu-Thai community in Nghe An Province of Vietnam, which attend the event and take turns serving as hosts. On the occasion of World Thai People's Day Held during Valentine's Day on, February 14 every year, there are exhibition booths and displays of Thai culture in each area. It is an international tradition. As a result, there will be more tourism in Renu Nakhon District.

The basic concepts are supported in future learning because the world's knowledge has been transformed into digital information. Additionally, individuals must be encouraged to access more digital and knowledge resources. The learning process must focus on creating opportunities and channels for individuals to access information through the internet, and organizing activities to access people's experiences instead (Attanandana, 2019). Moreover, cultural exhibits should prioritize participation and utilize a variety of media to effectively convey cultural expression. These exhibits should not only present information through text, objects, or visuals but also engage the audience interactively.

Cultural stories and cultural heritage outside the venue can also be presented by simulating the atmosphere and by exhibiting samples. There can also be learning activities that are hands-on to make the concepts easier to understand for various groups of customers. There are different interests in each group; therefore, the content is presented as a variety of connected issues (Wongthanawadee, 2015). The communication era has transitioned into the digital world, with the internet providing numerous channels for awareness. This transformation has significantly influenced the process of conveying descriptive meaning, including digital perception patterns, which are rapidly evolving.

It is important to study meaningful guidelines. The analysis of traditional cultural learning transmission approaches is now integrated with digital processes. Therefore, the researchers aimed to study the model of the metaverse that promotes cultural tourism for Renu Nakhon Phu-Thai in Nakhon Phanom Province. The goal is to boost the economy of community foundations through a novel digital access approach. Cultural learning in a virtual space is able to improve the economy of the Renu Nakhon Phu-Thai community, is widely available to people from around the world, and effectively provides information for tourism to the actual area.

2. OBJECTIVES

This research has three objectives:

1. To develop a metaverse model to enhance the Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province,
2. To assess the suitability of the metaverse model for enhancing Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province, and
3. To study the degree of satisfaction with the use of the metaverse model of Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province.

3. RESEARCH FRAMEWORK

This research aims to study the metaverse model that promotes Phu-Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, which is related to the concepts of the following:

1. The components of the metaverse: Kapp (2012), De Choudhury et al. (2021), Tas and Bolat (2022), Chang (2023), and Kim (2021);
2. Tourism models: Matkul (2013), Thongpeng (2011), Wongcharoenchaikul (2018), Jittangwatthana (2005), Cheybumrung (2017); and
3. Renu Nakhon's Phu-Thai cultural activities: Thongsawangrat (1987), Praracharattanakorn (2011), Prince Damrong Rajanubhab (n.d.), Srihaklang et al. (2019), and Onprathum (2013), as shown in Figure 1.

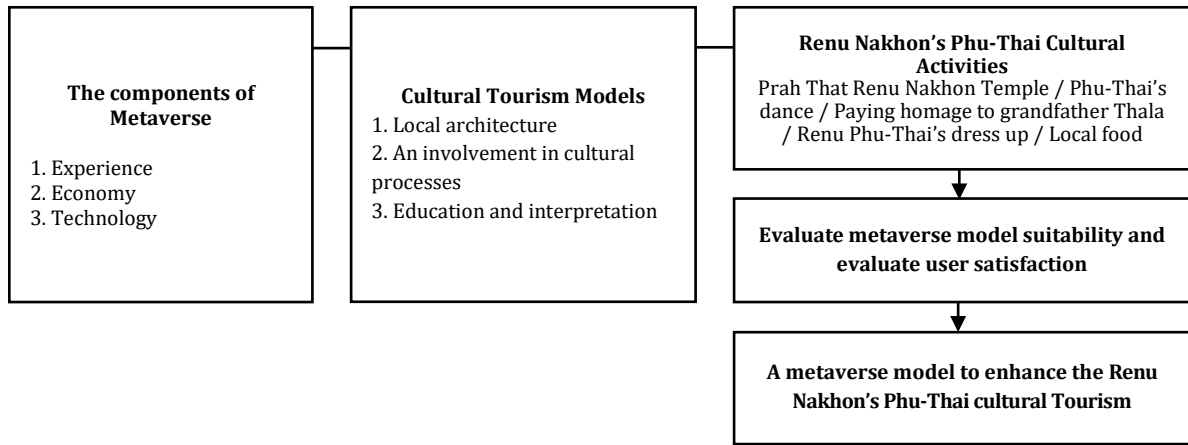


Figure 1: Research framework

4. RESEARCH METHODOLOGY

This research follows a research and development (R&D) model. The process involves collecting qualitative and quantitative research data and is divided into three steps: 1. synthesizing the model, 2. developing the model and assessing its appropriateness, and 3. conducting a trial of the model.

4.1 Target group

The target group comprised 400 tourists who accessed the Phu-Thai cultural tourism metaverse in Renu Nakhon between November 2022 and February 2023. They were selected through purposive sampling.

4.2 Research instruments and validation

1. A document to record and analyze forms was used to record the review and analysis of documents related to principles, theory and research.
2. A 5-level rating scale assessment of the 13-item cultural tourism model was used to determine the IOC value at the level of 0.90.
3. A satisfaction questionnaire of the tourists who visited the metaverse of Renu Nakhon Phu-Thai cultural tourism was constructed, using a 5-level rating scale of 9 items to determine the IOC value at the level of 0.88.

4.3 Data collection

1. The data of the metaverse model used to enhance Renu Nakhon Phu-Thai cultural tourism were synthesized by providing analytical narratives and summarizing interpretations of relevant theoretical principles. It was divided into three parts: the components of the metaverse, Renu Nakhon's Phu-Thai cultural activities, and Renu Nakhon's Phu-Thai culture. Data were collected both domestically and internationally and synthesized on a summary table, with interpretation of analytical narratives during the period between July and September 2022.

2. Assessments regarding the suitability of the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism were collected via email. The researchers sent documents, including an expert courtesy letter and a suitability assessment form, to the panel of experts. This panel consisted of three individuals with expertise in cultural tourism, three in online travel, and three in the metaverse. Additionally, consideration was given to university professors or researchers specializing in qualification issues. A total of nine experts responded and returned the suitability results via email. The data collection period for the assessments was October 2022.

3. During the period from November 2022 to February 2023, 400 individuals accessed and visited the Renu Nakhon Phu-Thai metaverse and participated in an online questionnaire. These individuals included tourists who visited the Renu Nakhon area and those who discovered the region through the tourism website of Nakhon Phanom Province. Tourism satisfaction questionnaires were collected from this target group regarding their experience with the metaverse. The data were obtained through purposive sampling, and the assessment results were summarized in March 2023.

4.4 Data analysis

1. The program recording form was divided into three parts, encompassing the components of the metaverse, Renu Nakhon Phu-Thai cultural activities, and Renu Nakhon Phu-Thai culture. The data were

recorded in a summary table as frequency values and were analyzed by providing an analytical narrative and summarizing interpretations.

2. The assessments of the appropriateness of the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism data were analyzed using descriptive statistics. The statistics employed in the data analysis included percentages and standard deviations. The quantitative analysis involved interpreting assessment forms and considering all suggestions.

3. The tourism satisfaction questionnaire for evaluating the impact of the metaverse model on enhancing Renu Nakhon's Phu-Thai cultural experience was analyzed. The statistics employed in the data analysis were percentage, standard deviation, and quantitative analysis of the interpretation of assessment forms and all suggestions.

4.5 Definition of terms

The metaverse model of Renu Nakhon Phu-Thai refers to elements, processes, and scenarios. It is a principle for internet network communication through ready-made programming channels. The participants will be able to establish themselves and participate in various activities in virtual spaces through metaverse technology.

Renu Nakhon Phu-Thai refers to a tribe of the Tai-Kadia language family that lives in Renu Nakhon district, Nakhon Phanom Province. Language accents, dress, customs and traditions differ from those of the Phu-Thai groups in Mukdahan, Sakhon Nakhon and Kalasin Provinces. They also believe that they pay homage to their grandfather Thala, who is considered the spirit of the ancestors, to ask for blessings to protect Renu Nakhon city. In addition, there is a belief of worship at Phra That Renu, which is considered a significant religious place in Renu Nakhon.

Virtual tourism refers to a system that simulates tourist attractions using technology. These systems are designed to replicate the atmosphere of real locations. Conversely, cultural tourism, offers insights into cultural objects such as ancient sites, artefacts, traditions, lifestyles, and various forms of art. It aims to portray the environment and lifestyle of individuals in different historical eras. Visitors are informed about the history, beliefs, perspectives, ideas, and preferences of people from the past, which are transmitted to present generations through these cultural artefacts.

5. RESEARCH FINDINGS

The conclusions of the research according to the research objectives are as follows:

1. The synthesis results of the metaverse model to promote Renu Nakhon's Phu-Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, are shown in Table 1, and a summary of 3 components is shown in Figure 2.

Table 1: Synthesis results of the metaverse model that promotes Renu Nakhon Phu-Thai cultural tourism

Components of the metaverse (Karl Kapp, 2012) (De Choudhury et al., 2021) (Tas & Bolat, 2022) (Chang, 2023) (Kim, 2021)		Cultural tourism model Matkul (2013) Thongpeng (2011) Wongcharoenchaikul. (2018) Jittangwatthana (2005) Cheybumrung (2017)	Metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism
Model	Components		Metaverse VR tourism
Experience	Content	<ul style="list-style-type: none"> An original local tradition of architecture and buildings Renu Nakhon's Phu-Thai Language 	Cultural architecture element 3D ancient places Video clips presentation Dialect sound clips
<ul style="list-style-type: none"> Collaboratively motivated Discovery 			
Economy	Creator economy	<ul style="list-style-type: none"> The involvement of local communities, with an emphasis on their active participation in cultural transmission processes and activities Lifestyles and costumes Traditions of local food and dining 	Local wisdom identity element <ul style="list-style-type: none"> Welcoming activities e.g., Renu Nakhon's Phu-Thai dancing Commitment and worship, paying homage to grandfather Thala Local products An online space for local products Space for story presentations by local innovators
<ul style="list-style-type: none"> More valueshared Guided tour Marketplace Digital commerce Interactive learning 			

Table 1: Synthesis results of the metaverse model that promotes Renu Nakhon Phu-Thai cultural tourism (continued)

Components of the metaverse (Karl Kapp, 2012) (De Choudhury et al., 2021) (Tas & Bolat, 2022) (Chang, 2023) (Kim, 2021)		Cultural tourism model Matkul (2013) Thongpeng (2011) Wongcharoenchaikul. (2018) Jittangwathana (2005) Cheybumrung (2017)	Metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism
Model	Components		Metaverse VR tourism
Technology	Spatial computing	<ul style="list-style-type: none"> Education on knowledge and meaning of tourism resources preservation Creativity and sustainable application Points of view exchange Masters and local tour guides Tourism resources preservation awareness activities 	Local community participation in creativity <ul style="list-style-type: none"> Creative local community element Channels of communication Virtual reality of access to visitors Check-in opinions expression Photos posted in the actual area



Figure 2: The metaverse model of Renu Nakhon encompassing three key elements and explanations

2. Assessment results of the appropriateness of the metaverse model for enhancing Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province. Nine experts reported that the appropriateness was high, as shown in Table 2.

Table 2: Assessment results showing the appropriateness of the metaverse model for enhancing Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province

Assessment list of the elements	\bar{x}	S.D.	Levels of opinion
1. Cultural architecture element			
1.1 Virtual 3D images	4.78	0.42	Highest
1.2 Video clips of history presentation	4.89	0.31	Highest
1.3 Map of the metaverse routes and directions	4.44	0.68	High
1.4 Recommendations for visiting the metaverse	3.44	0.68	Medium
1.5 Additional information for visitors who prefer to visit the actual area	4.33	0.67	High
Total	4.37	0.55	High
2. Local wisdom identity element			
2.1 Welcoming activities e.g., Renu Nakhon Phu-Thai dancing, local liquor (U Chonchang) drinking	4.11	0.73	High
2.2 Commitment and worship e.g., Paying homage to grandfather Thala	4.78	0.78	Highest
2.3 Local dress (costumes) e.g., costumes of Phu-Thai	4.67	0.67	Highest
2.4 Local product story presentations	3.11	0.57	Medium
Total	4.16	0.60	High

Table 2: Assessment results showing the appropriateness of the metaverse model for enhancing Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province (continued)

Assessment list of the elements	\bar{x}	S.D.	Levels of opinion
3. Creative local community element			
3.1 Channels for expressing opinions and exchanging knowledge between locals and tourists	3.22	0.62	Medium
3.2 Shared (live) online channels of the real-time metaverse	4.67	0.47	Highest
3.3 Channels for recording and disseminating images in a variety of formats	4.78	0.42	Highest
3.4 Channel to stimulate awareness of preserving local culture	3.22	0.42	Medium
Total	3.97	0.48	Medium
Overall average of components	4.17	0.54	High

The interpretation of mean scores was based on the following criteria: means of 4.51–5.00 indicated the highest level, 3.51–4.50 indicated a high level, 2.51–3.50 indicated a medium level, 1.51–2.50 indicated a low level, and 1.00–1.50 indicated the lowest level.

Table 2 presents the assessment results of the appropriateness of the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province. The overall expert assessment was high ($\bar{x} = 4.17$, S.D. = 0.54). When considering composition, it was found that for component 1, the cultural architecture element was at the highest level. There were additional suggestions that the channels of points of view and knowledge exchange between locals and tourists should create more optional programs. Therefore, the awareness of motivation for local cultural preservation can be connected to the well-being and pride in the arts, culture and traditions of the local people.

3. Overall, the results of the assessment of satisfaction with accessing the metaverse of Renu Nakhon Phu-Thai cultural tourism were high ($\bar{x} = 4.30$, S.D. = 0.76). The results are shown in Table 3.

Table 3: Averages and standard deviations of the results of the satisfaction questionnaire regarding access to the metaverse of Renu Nakhon Phu-Thai cultural tourism

Application of the metaverse	\bar{x}	S.D.	Level of satisfaction
1. Access to the metaverse is easy and uncomplicated.	4.29	0.82	Very Good
2. The metaverse has an accurate system of navigation.	3.30	0.88	Good
3. The metaverse is visually appealing.	4.36	0.83	Very Good
4. The metaverse can be accessed at any time.	4.18	0.84	Very Good
5. The metaverse has an interesting virtual presentation.	4.31	0.86	Very Good
6. The metaverse is modern.	4.84	0.43	Excellent
7. The metaverse shows results quickly and accurately.	4.22	0.85	Very Good
8. The metaverse has effective and meaningful interactions.	4.92	0.28	Excellent
9. The metaverse has options to publish in other types of online media.	4.30	0.88	Very Good
Total	4.30	0.76	Very Good

The interpretation of mean scores was based on the following criteria: means of 4.51–5.00 indicated an excellent level, 3.51–4.50 indicated a very good level, 2.51–3.50 indicated a good level, 1.51–2.50 indicated a fair level, and 1.00–1.50 indicated a poor level.

Table 3 presents the results of the satisfaction assessment of access to the metaverse Renu Nakhon Phu-Thai cultural tourism. The results revealed that satisfaction with the effectiveness and meaningfulness of the interaction was excellent ($\bar{x} = 4.92$, S.D. = 0.28), and satisfaction with the metaverse system of navigation was fair ($\bar{x} = 3.30$, S.D. = 0.88). Moreover, there were suggestions for navigational maps, namely, that there should be an overview map displayed at the entrance or starting point to facilitate a participant's avatar's passage in case they wanted to go to an adjacent area.

6. DISCUSSION

The findings of this study indicate the following:

1. The results of the synthesis metaverse model to enhance the Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province revealed 3 elements: 1) the cultural architecture element, 2) the local wisdom identity element, and 3) the creative local community element. Each element is shaped in the creative metaverse according to the context and what needs to be conveyed. Various activities are carried out through

the Spatial Metaverse program, which is an online digital platform designed to create new virtual spaces for organizing a variety of activities. It enables the creation of 3D models to represent ancient sites and objects in the area, showcasing video clips of lifestyles and local wisdom. Furthermore, the platform facilitates channels for the participation of both local residents and online tourists. Administrators have the ability to invite other users to share space and resources. Users are required to create an avatar as their virtual identity to engage with the platform and can choose from various channels for access. The program is accessible through personal computers or smartphones, allowing for diverse and interactive activities. The researchers developed the Spatial Metaverse program to seamlessly integrate all three elements and effectively convey cultural meanings, as shown in Figures 3–5.



Figure 3: Cultural architecture element, e.g., Phra That Renu Nakhon Temple

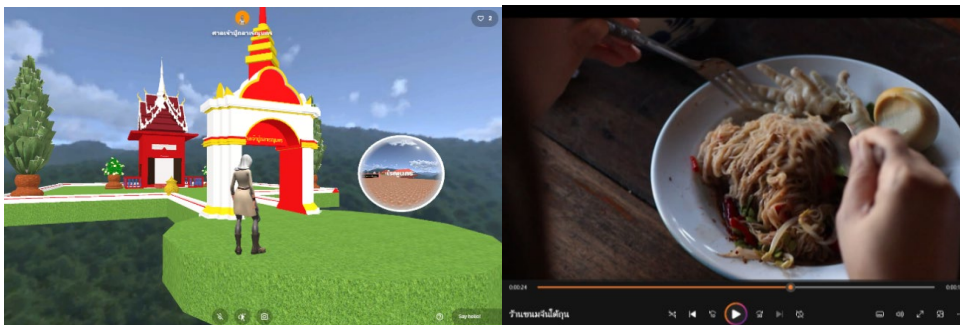


Figure 4: Local wisdom identity element, e.g., paying homage to Lord Grandfather Thala, worshipping and asking for blessings (sound clip), and Renu Nakhon Phu-Thai’s lifestyle and local food, e.g., eating rice noodles with original side dishes, such as steamed egg and vegetables (video clip)

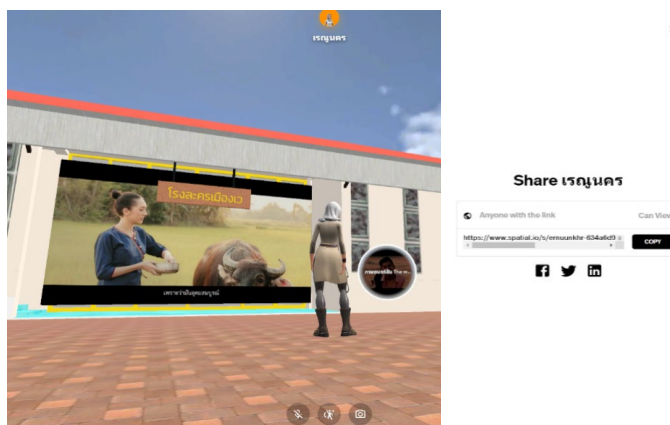


Figure 5: Creative local community element, e.g., a space to present short films produced by local innovators with ways to share to social media platforms

The 3 elements combine to develop a system that creates virtual activities in the metaverse.

The first element, the cultural architecture element, aligns with the findings of Aswasuntrangkul (2019), who studied the factors influencing historical tourism and sustainable development in Ayutthaya. The study revealed that tourist groups considered ancient sites to be the most attractive and significant factors influencing their travel choices.

The second element, the local wisdom identity element, aligns with the findings of Intanoo et al. (2022). This study focused on the guidelines for the development of cultural tourism in the community surrounding Wat Koa Temple, which is located in the Tha Rab Subdistrict, Muang District, Phetchaburi Province. In addition to promoting tourist attractions, community members must unite to preserve the unique cultural heritage of their locality. They contributed to renovation and restoration, and promoted the creativity of street art revealing the uniqueness of the Wat Koa Temple community and their way of life and identity. Moreover, they expressed their readiness to welcome tourists.

The third element, the creative local community element, aligns with the findings of Intamano (2018), who mentioned the historical tourism management model in Songkhla Province. It was concluded that the itineraries must be developed by local sages together with young entrepreneurs in the community who can convey the story in accordance with today's era and technology. The metaverse model is consistent with the cultural tourism model of Cheybumrung (2017). Attractions in cultural tourist attractions include: 1) history and historical traces that are still visible, 2) archaeology and various museums, 3) ancient and traditional architecture in local areas and city buildings including ruins, 4) arts, handicrafts, sculptures, paintings, statues and carvings; 5) religion including various religious ceremonies, 6) music, drama, movies, and various other forms of entertainment, 7) language and literature including the education system, 8) ways of life, clothing, cooking, and eating customs, 9) traditions, culture, folk traditions, customs and festivals, and 10) various types of work or technology that are used in specific localities. Presenting with metaverse technology enables the ability to convey all of what you want to present according to the aforementioned format.

2. Overall, the results of the assessment of the appropriateness of the metaverse model for enhancing Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province were high. When the elements were rated, the first element, the cultural architecture element, was rated the most appropriately. The experts that this element of the metaverse developed and created the architectural environment, for example, the Prah That Renu Nakhon and Lord Grandfather Thala Worship House. These items were innovated and developed from a 3D virtual object creation program, which simulates the size, color, shape and various gradients according to reality.

This is consistent with Kantaboon (2022), who discussed communication patterns through the metaverse for teaching and learning in communication arts. The atmosphere and environment play crucial roles in perception and interpretation. Creating the right atmosphere around avatars was effective in enhancing the learning process, which also depended on the design of architectural structures. Aligning the composition with the context of use ensured that the atmosphere and environment effectively communicated in learning.

3. The results of the tourism satisfaction questionnaire regarding the metaverse model to enhance Renu Nakhon Phu-Thai cultural tourism in Nakhon Phanom Province showed that tourists were satisfied with the meaningful interactions provided by the metaverse. This satisfaction stemmed from the presence of symbols facilitating convenient interactions with users, enabling quick conveyance of meaning, and immediate responsiveness to issues. This aligns with the findings of Joobanjong et al. (2021), who discussed the development of web applications using virtual reality technology for tourism promotion in Tak Province. Through virtual reality technology, travelers or visitors can access various travel information before embarking on their journeys.

The tourist attractions were shown in a 360-degree view and using 3D models. Tourists could also experience simulations of tourist attractions through virtual reality technology that allowed them to visualize and control the view on the screen. This implementation made the visitors feel like they were in a real tourist attraction and were able to interact with it.

7. CONCLUSIONS AND FUTURE PROSPECT

A metaverse model to enhance Phu Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, can be utilized to promote tourism. The elements of the metaverse model for enhancing Phu-Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, are capable of presenting tourist attractions in actual areas. Suggestions for future research include the following:

- Developing cultural communication processes within the metaverse model to enhance Phu-Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, that can be integrated with other virtual reality technology programs, *and*
- Utilizing the metaverse model to enhance Phu-Thai cultural tourism in Renu Nakhon, Nakhon Phanom Province, as a guide for the development of cultural tourism in other areas.

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