



## GIS and DIKW Integration for Creative Tourism Policy in Historic Phitsanulok

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### Abstract

Creative tourism serves as a vital engine for sustainable economic growth and urban revitalization, especially in historic cities endowed with rich cultural heritage. However, development in these areas frequently encounters a crucial challenge: integrating effective heritage conservation with robust economic expansion. This study aims to analyze the potential for creative tourism development in four historic old-town communities of Phitsanulok, Thailand, by proposing an integrated methodological framework to systematically address this imbalance. The research employed a sequential mixed-methods design, conducting a comprehensive spatial census of 1,518 historic building units across the four communities using Geographic Information Systems (GIS) and the QField fieldwork tool. Quantitative findings confirm a significant potential for adaptive reuse, inventorying 16.07% (n=244) of vacant or abandoned buildings which constitute a critical physical resource for conversion into creative hubs. Planning challenges, however, stem from the predominantly two-story profile (87.8%) and the high rate of owner-occupancy (80.70%), which demands customized incentives and direct negotiation rather than reliance on market rental mechanisms. By applying the DIKW (Data–Information–Knowledge–Wisdom) Model, the generated spatial data were transformed into actionable insights, pinpointing opportunities to establish Creative Mixed-use Zones and commercial-cultural initiatives, particularly in high-density areas such as the Ruam Jai community.

The study concludes with policy recommendations for integrated spatial management, including the implementation of Smart Zoning and the development of creative tourism routes. This approach provides a practical, evidence-based framework with clear implications for other historic cities seeking to achieve a strategic balance between heritage conservation and sustainable tourism and economic growth.

**Keywords:** 1) Creative Tourism 2) GIS 3) DIKW Model 4) Adaptive Reuse 5) Historic Urban Landscape

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## Introduction

Creative tourism plays a significant role in driving economic growth and promoting sustainable urban development, particularly in historic cities endowed with cultural heritage (Richards, 2021, p. 2). The expansion of creative tourism reflects a shift in tourist behavior from conventional sightseeing toward the pursuit of meaningful experiences (Benhaida, et al., 2024, p. 7; Richards, 2021, p. 4), which are closely linked to emotions, memory, and learning (Tomaz, 2022, p. 62). Contemporary tourists increasingly value authentic local identity by engaging with local culture, traditions, and arts. The creation of unique, meaningful, and co-created experiences has contributed to a growing segment of tourists seeking participatory engagement (Zhang, 2013, p. 178; Doyle and Kelliher, 2023, p. 2). Such tourism generates psychological and social value that surpasses materialistic or consumption-oriented tourism (Gil-Cordero, et al., 2023, p. 3). While experiences are central, other emotions play a significant role as well. (Ratasuk and Naing, 2025; Gil-Cordero, et al., 2023, p. 6)

At the same time, the phenomenon of nostalgia acts as a crucial motivator, driving tourists to revisit and reflect on the past through architecture, traditions, rituals, and historical narratives of communities. Creative tourism leverages cultural capital, storytelling, and experiential activity design to foster memorable experiences and long-term emotional attachment between tourists and destinations (Duxbury, Bakas and Castro, 2021, p. 319).

Phitsanulok Province has played a significant role in Thai history since the Ayut-

thaya and Lanna periods, serving as a political and religious center (Dejpawuttikul, 2022, p. 36; Choompolpaisal and Skilton, 2022, p. 13). Its geographic location, connecting Northern and Central Thailand and situated along the Indochina economic corridor, established it as a critical transportation hub (Kokkhangplu, Koodsela and Onlamai, 2024, p. 22). Thereby becoming a strategic point for trade and governance (Navapan and Oonprai 2019, p. 27). Phitsanulok also functions as a cultural and commercial center for diverse ethnic and religious communities, including Thai-Muslim, Thai-Chinese, and Thai-Christian populations (Jongsuksomsakul, 2024, p. 4). Contributing to its rich cultural diversity.

The province's unique architectural heritage reflects its historical and cultural legacy, while its local culinary traditions demonstrate connections with ASEAN countries, emphasizing shared food practices and beliefs (Jongsuksomsakul, 2024, p. 49). These distinctive cultural assets provide substantial potential for promoting sustainable cultural tourism. Integrating historical and cultural knowledge is therefore essential for enhancing the creative tourism potential of the region.

However, despite its high potential in cultural heritage, tourism development in Phitsanulok faces challenges, particularly in managing historic urban areas where conservation and economic development have yet to be systematically integrated. As a result, this underscores the need for comprehensive and sustainable policy approaches to genuinely promote historical and cultural tourism in the future. (Esichaikul and Chansawang, 2022, p. 899)

Although Phitsanulok possesses significant cultural heritage and valuable historic urban landscapes, urban development has predominantly focused on economic growth and physical infrastructure rather than designing a livable and investment-friendly city. As a result, the architectural and historical value of the city—such as ancient buildings, temples, and traditional communities—has been diminished or overlooked in quantitatively-driven development projects that neglect cultural dimensions. This has led to the loss of cultural landscape identity and adversely affected the potential of the city as a historic tourism destination, which relies heavily on visible heritage value as its key attraction (Ashworth and Tunbridge, 2021, p. 4). Consequently, the development of Phitsanulok must balance historical preservation with urban livability, ensuring that economic growth does not undermine the city's invaluable cultural capital (Navapan and Oonprai, 2019, p. 28).

However, a clear research gap persists in establishing a practical methodological framework to address this imbalance. Existing literature acknowledges the strategic necessity of data-driven urban development (Batty, 2018, p. 3; Panagiotopoulou, Somarakis and Stratigea, 2020, p. 3) and the potential of GIS (Wei, 2024, p. 13; Vuković, 2022, p. 55), yet fails to present an integrated, systematic approach for heritage management. Specifically, there is a lack of applied research detailing the operational process that links modern field data collection technologies (e.g., QField) with the DIKW framework to generate structured 'Knowledge' about neglected architectural and

historical urban landscapes. This study aims to fill this gap by developing and validating a methodology that transforms raw spatial data into reliable knowledge, thereby supporting policymakers in making informed, strategic decisions to effectively balance economic growth with the essential preservation of Phitsanulok's cultural capital.

Therefore, data-driven city development represents a novel approach for historic urban development by leveraging insights from cultural information, tourism business infrastructure, and building utilization to assess area potential and design urban growth that balances residents' quality of life, investment, and creative tourism (Bibri, 2021, p. 3). Bibri (2021, p. 3) highlights that tourism-driven urban development serves as a critical framework linking heritage conservation, tourism, and sustainable enhancement of urban living standards. Crucially, the use of spatial data through Geographic Information Systems (GIS) provides a powerful analytical tool for managing information, creating maps, and efficiently allocating tourism resources, ensuring that development aligns with cultural preservation and sustainability objectives (Wei, 2024, p. 13).

The necessity of this robust geospatial analysis is rooted in the integration of urban big data with these geospatial technologies, which is fundamental to designing historic districts that strategically meet the complex needs of tourists, investors, and residents. GIS is instrumental in supporting creative tourism, not only by facilitating visitor co-creation of meaningful experiences (Doyle and Kelliher, 2023, p. 3) but, more importantly, by enabling the stra-



tegic planning necessary to establish a Smart Creative Tourism City (Tomaz, 2022, p. 62; Richards, 2021, p. 3). This development hinges upon a systematic data collection and processing mechanism that aligns perfectly with the DIKW (Data–Information–Knowledge–Wisdom) hierarchy. Tools like QField serve as a critical operational component, executing the foundational transition from raw Data (spatial facts gathered in the field) to structured Information through real-time contextualization. This generated spatial information is subsequently analyzed within the broader GIS environment to produce Knowledge (e.g., historical identity patterns, visitor flows), ultimately forming the essential basis for the informed decision-making recognized as Wisdom needed to preserve historical identity while simultaneously enhancing sustainable tourism competitiveness.

### Research Objectives

1) To analyze the physical characteristics and land-use patterns of buildings in the historic communities of Phitsanulok Municipality using GIS (Geographic Information System).

2) To evaluate the creative tourism potential of these communities through the DIKW (Data–Information–Knowledge–Wisdom) framework.

3) To propose policy recommendations and integrated spatial management strategies for sustainable creative tourism development.

### Literature Review

#### The Concept of Creative Tourism

Creative tourism is a concept developed to address the needs of contemporary tourists, who seek more than mere sightseeing.

Tourists increasingly desire deep engagement with the culture and daily life of local communities through meaningful and creative activities, such as collaborative art-making with residents, learning traditional crafts, or participating in local festivals and rituals (Tomaz, 2022, p. 64). These activities transform the tourist's role from that of a spectator to an active participant, making them an integral part of the co-creation process with the host community. Through such participation, creative tourism fosters strong relationships between visitors and local communities, building mutual trust and understanding, thereby contributing to sustainable development across economic, social, and environmental dimensions (Suriyankietkaew, et. al., 2025, p. 2). Preserving the authenticity of the locale remains a core principle of creative tourism, as communities seek to safeguard the cultural practices and traditions that form the foundation of tourism from being degraded or altered to the point of losing their original meaning.

Moreover, creative tourism provides opportunities for historic urban communities to leverage their existing cultural assets, such as heritage sites, historic buildings, traditional arts, and local narratives, to generate innovative and distinctive experiences. This approach not only attracts niche and specialized tourist segments but also directly stimulates the local economy by creating employment and increasing community income (Yang and Wall, 2022, p. 1074). Despite these benefits, a common challenge faced by historic urban communities is the lack of systematic management and clear data to support tourism devel-

opment planning, which makes conservation and development efforts more difficult and increases the risk of losing cultural identity.

### **The Use of GIS in Tourism Planning and Development**

Geographic Information Systems (GIS) are essential tools for planning and developing smart creative tourism cities, enabling the collection, analysis, and visualization of spatial data to support efficient decision-making by urban policymakers (Panagiotopoulou, Somarakis and Stratigea, 2020, p. 4). Research by Liu, et al. (2024, p. 2) indicates that GIS can identify the potential of tourism areas, analyze tourist movement patterns, and assess the impacts of physical development on cultural landscapes. Furthermore, GIS can facilitate the planning of tourism infrastructure and creative initiatives (Suwanno, et al., 2023, p. 417). However, De Bernard, Comunian and Viganò (2023, p. 39) note that the majority of GIS applications have focused primarily on mapping and analyzing physical dimensions, while integration with creative tourism—which emphasizes cultural experiences and local identity—remains limited.

A study by Sieng, et al. (2023, p. 3) on cultural tourism routes using Geographic Information Systems (GIS) found that GIS can design routes that sustainably connect tourism assets. However, it is necessary to incorporate data on tourists' behaviors and perceptions to better support creative experiences. A review of the literature indicates that successful smart tourism cities in Europe often integrate GIS with urban, cultural, and creative activity data, using GIS-derived insights to continuously manage

tourism areas (Zavettieri and Al-Mulla, 2024, p. 495; Fang, et al., 2025, p. 6). In contrast, research by Sidiq (2021, p. 191) notes that cities in Southeast Asia primarily use GIS for land-use management and transportation planning.

Thus, the literature suggests that GIS has greater potential when integrated with cultural values and urban creative systems to develop smart creative tourism cities that balance economic growth, cultural preservation, and tourists' experiential engagement (Sidiq, 2021, p. 191; Richards, 2021, p. 4). The goal of applying GIS in urban development is not only to enhance technological intelligence but also to foster creativity grounded in local identity and community sustainability (De Bernard, Comunian and Viganò, 2023, p. 41); Panagiotopoulou, Somarakis and Stratigea, 2020, p. 5).

### **GIS and Housing Stock in the Context of Creative Tourism**

The integration of Geographic Information Systems (GIS) with housing stock analysis is a key approach for managing historic urban areas in the context of creative tourism. Housing stock, which includes the physical and functional characteristics of buildings, is a crucial part of cultural heritage. Understanding its distribution and usage is essential for identifying the potential of historic neighborhoods for tourism development (Yang and Wall, 2022, p. 1076). GIS provides a powerful tool to collect, analyze, and visualize spatial data on buildings, enabling a comprehensive assessment of the built environment (Sieng, et al., 2023, p. 4; Liu, et al., 2024, p. 3). In the context of creative tourism, such analyses are crucial for identifying areas where adaptive reuse or cultural



activities can be introduced without compromising the historic fabric (Bakas, Duxbury and Castro, 2021, p. 320; Doyle and Kelliher, 2023, p. 4). Several studies highlight the role of GIS in linking housing stock with creative tourism. For example, GIS-based mapping of historic buildings can help design cultural tourism routes (Sieng, et al., 2023, p. 6), while data on underutilized properties can identify spaces for workshops or accommodations (Yang and Wall, 2022, p. 1978). Despite its potential, challenges remain. Many historic cities, particularly in Southeast Asia, lack systematic data on building conditions, and most GIS applications focus on physical rather than cultural or social dimensions (Sidiq, 2021, p. 194; De Bernard, Comunian and Viganò, 2023, p. 41; Zavettieri and Al-Mulla, 2024, p. 496).

#### **The Role of Housing Stock and the DIKW Model in Creative Tourism Development**

The integration of Geographic Information Systems (GIS) with housing stock analysis is a key approach for managing historic urban areas in the context of creative tourism. Housing stock, which includes the physical and functional characteristics of buildings, is a crucial part of cultural heritage. Understanding its distribution and usage is essential for identifying the potential of historic neighborhoods for tourism development (Yang and Wall, 2022, p. 1079).

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fying areas where adaptive reuse or cultural activities can be introduced without compromising the historic fabric (Duxbury, Bakas and Castro, 2021, p. 322; Doyle and Kelliher, 2023, p. 4). Several studies highlight the role of GIS in linking housing stock with creative tourism. For example, GIS-based mapping of historic buildings can help design cultural tourism routes (Sieng, et al., 2023, p. 8), while data on underutilized properties can identify spaces for workshops or accommodations (Yang and Wall, 2022, p. 107).

Despite its potential, challenges remain. Many historic cities, particularly in Southeast Asia, lack systematic data on building conditions, and most GIS applications focus on physical rather than cultural or social dimensions (Salimi, Bahramjerdi and Tootoonchi, 2025; De Bernard, Comunian and Viganò, 2023, p. 39; Zavettieri and Al-Mulla, 2024, p. 499).

However, recent studies show a growing trend toward integrating GIS-based housing stock analysis with cultural and socio-economic datasets. By combining GIS with frameworks like the DIKW model, planners can transform raw data into actionable insights for creating authentic tourism experiences (Panagiotopoulou, Somarakis and Stratigea, 2020, p. 6; Tomaz, 2022, p. 63). This integrated approach supports sustainable heritage management and community participation, ensuring tourism aligns with local cultural identity.

In conclusion, GIS-based analysis of housing stock provides a strategic platform for creative tourism in historic urban areas. When integrated with cultural knowledge and community-centered planning, it can guide sus-

tainable interventions that preserve heritage, foster economic growth, and enrich tourist experiences (Bibri, 2021, p. 4; Suriyankietkaew, et. al., 2025, p. 3). Future research should focus on developing better data collection methods and evaluating the long-term impacts on both tourism and community well-being.

### Research Methodology and Data Analysis

This study employed a sequential mixed-methods design with three distinct phases. Phase one used qualitative methods, including focus group discussions with 40 community members selected via purposive sampling and in-depth interviews with key informants, including municipal executives, alongside field inspections, to explore housing stock and socio-cultural capital. The data collected from these methods were analyzed using Content Analysis to systematically categorize information. The data from this phase were analyzed to inform the subsequent quantitative survey in Phase 2. This phase applied quantitative methods, utilizing GIS and QField to conduct a comprehensive spatial census to survey 1,518 housing stock records across four old-town communities. For the quantitative

analysis, descriptive statistics were employed, consisting of Frequency and Percentage Distribution, which was complemented by interviews, questionnaires, and secondary municipal data to build a comprehensive database. Finally, Phase 3 returned to qualitative methods with a stakeholder workshop that brought together 150 participants. This integrated approach allowed for a comprehensive investigation, seamlessly connecting the research design with its execution.

Consistent with the sequential design, this research utilized a three-phase sequential mixed-methods design, directly mirroring the methodology. The five-step quantitative process in Phase 2 involved data collection from multiple sources, cleaning, processing with GIS, and conducting both spatial and statistical analysis. Phase 3 concluded the study with a stakeholder workshop to validate the findings and collaboratively create sustainable strategies for community development. This integrated approach resulted in a comprehensive and robust analysis of the data, ensuring the findings were well-supported. (Figure 1)

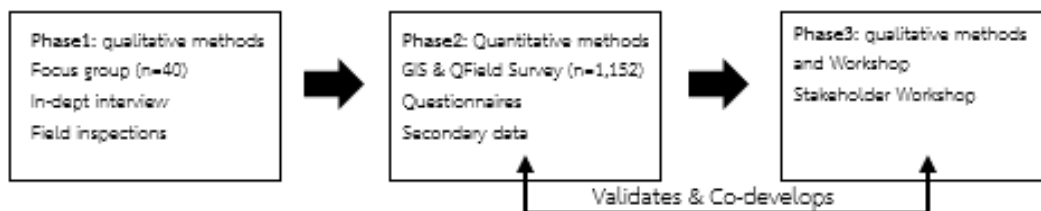
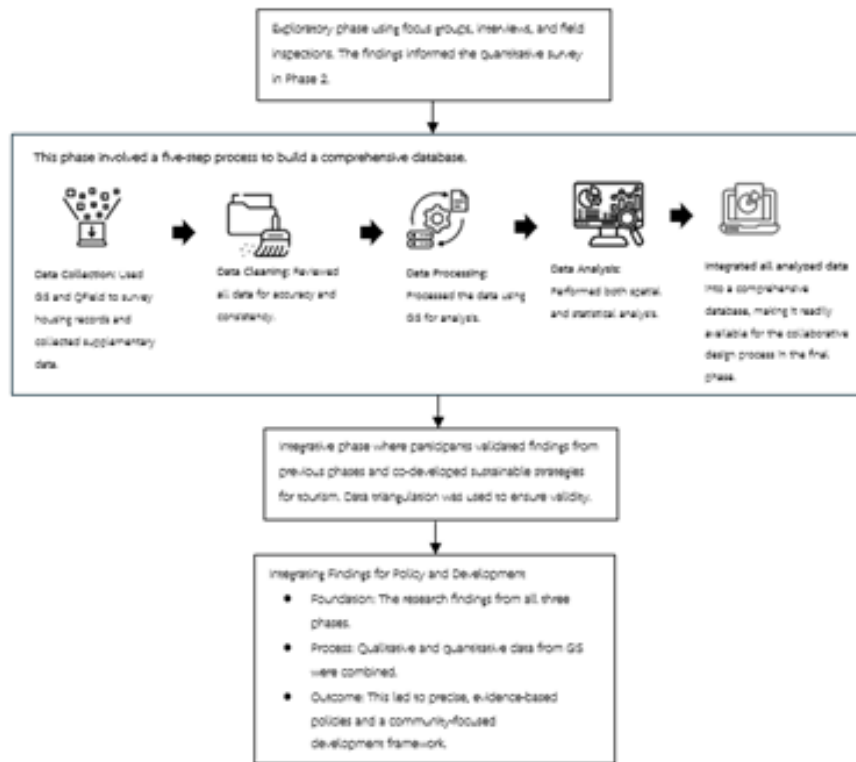


Figure 1 Sequential Mixed-Methods Research Design



This study employed a sequential mixed-methods design, with the analysis of data directly mirroring the three-phase methodology. The process began with qualitative exploration, which informed the subsequent quantitative survey. The final phase integrat-

ed the findings from both quantitative and qualitative methods to validate the research outcomes and collaboratively develop sustainable strategies. The entire research process, from data collection to analysis, can be visualized in the diagram below. (Figure 2)



**Figure 2** Flowchart of the Multi-Phase Research Methodology

Figure 2 The provided flowchart illustrates the multi-phase research methodology employed to build a comprehensive database and inform policy for community-focused development. The process began with an Exploratory phase utilizing qualitative methods (focus groups, interviews, field inspections) to inform the subsequent Data Collection and Processing phase. This second phase involved a five-step process, beginning with data acquisition using GIS and QField for surveying and collecting supplementary data. Subsequent steps includ-

ed Data Cleaning, Processing (via GIS), Analysis (spatial and statistical), and Integration into a comprehensive database. The methodology progressed to an Integrative phase, where participants validated findings and co-developed sustainable tourism strategies, ensuring data triangulation for validity. Finally, the Integrating Findings for Policy and Development step combined qualitative and quantitative data from GIS across all three phases, resulting in precise, evidence-based policies and a community-focused development framework.

### Ethical Approval

This study was approved by the Human Research Ethics Committee of Naresuan University under protocol number P2-0413/2568. All participants provided informed consent prior to their participation in the study, in accordance with the ethical guidelines for research involving human subjects.

### Research Result

The comprehensive quantitative spatial and functional survey of 1,518 historic buildings, conducted using a GIS-based approach, confirms the significant potential for creative tourism development within the target area (see Table 1). The analysis of utilization patterns reveals a high concentration of activity in Chumchon Ruam Jai (n = 736, 48.48%), establishing it as the primary commercial center. Structurally, the built environment demonstrates high stability, as evidenced by 79.78% (n = 1,211) of structures being of reinforced concrete construction, with over one-

third (n = 508) date from the post-rehabilitation era (1957–1976), which underscores their enduring integrity. A key finding for adaptive reuse is the inventory of 16.07% (n = 244) of vacant or abandoned buildings (while 83.47% are occupied), representing a critical physical resource for conversion into creative hubs.

However, planning must address two critical constraints: first, the predominantly two-story building profile (over 78% lack a third floor), which necessitates a horizontal development approach; and second, the management challenge posed by 80.70% of buildings being owner-occupied, requiring direct negotiation and customized incentives for successful space activation rather than reliance on rental markets. Overall, the physical and functional characteristics affirm the communities’ identity as an “old town” possessing significant architectural and tangible capital suitable for sustainable heritage development.

**Table 1** Overview of Building Characteristics and Land Use in the Old Town Communities of Phitsanulok

Issue/Category	f	%	Issue	f	%
<b>Community</b>			<b>Building Status</b>		
Chao Phraya	190	12.52	Occupied Building (In Use)	1,267	83.47
Tha Maprang	292	19.24	Information Not Provided	2	0.13
Phutthabucha	300	19.76	Unoccupied Building	5	0.33
Ruamjai	736	48.48	Deteriorated/Dilapidated	50	3.29
<b>Total</b>	<b>1,518</b>	<b>100</b>	Vacant	194	12.78
<b>Construction Period (A.D.)</b>			<b>Total</b>		
A.D. 1957–1976	508	33.46	<b>Building Usage Characteristics</b>		
A.D. 1977–1996	214	14.10	Residential (Primary use of 1st–2nd floors)	1,332	87.75
A.D. 1997–2025	231	15.22	Business/Shop Use	545	35.90



Issue/Category	f	%	Issue	f	%
Year of Construction Unknown	565	37.22	Rental/Other Commercial Space	84	5.53
<b>Total</b>	<b>1,518</b>	<b>100.00</b>	Workplace/Warehouse/Dilapidated/Vacant	103	6.80
<b>Building Type/Structure</b>			Structures Without Floors Above the Second Level (3rd-5th)	>1,190	>78.65
Half-Wood, Half-Concrete	4	0.26	<b>Total</b>	<b>1,518</b>	<b>100.00</b>
Half-Wood, Half-Reinforced Concrete	172	11.33	Rental Rate Range (Baht/Month)		
Reinforced Concrete Building	1,211	0.26	Not Rented (Owner-Occupied/Residential)	1,225	80.70
Wooden Building	92	79.78	Less than 10,000 Baht	238	15.68
Steel Frame and Glass Building	6	6.06	10,001 – 20,000 Baht	36	2.37
Other Types	33	2.17	20,001 – 30,000 Baht	11	0.72
<b>Total</b>	<b>1,518</b>	<b>100.00</b>	More than 30,000 Baht	8	0.53
			<b>Total</b>	<b>1,518</b>	<b>100.00%</b>

The spatial analysis derived from land-use maps of the four communities reveals several key issues, which are further reinforced by the qualitative analysis, as shown in Table 2.

**Table 2** The spatial analysis derived from land-use maps of the four communities reveals several key issues

Community	Analysis Findings	Spatial Analysis of Housing Stock
Phutthabucha	The community exhibits a mixed-use character encompassing residential, commercial, and supporting spaces, with a relatively balanced allocation across these functions. Residential areas are dispersed throughout the majority of the community, while commercial activities tend to cluster along main roads and access points. Additionally, the community contains rental spaces and other facilities like parking areas, vacant rooms, and recreational spaces, which enhance flexibility and support diverse land-use patterns.	

Community	Analysis Findings	Spatial Analysis of Housing Stock
Chao Phraya	<p>The community demonstrates a mixed-use character encompassing residential, business, and supporting functions. The spatial arrangement reflects the social and economic roles of each zone, with the central area serving as the primary residential core, while the periphery and road corridors are accommodate for commercial and service activities. Rental spaces and other supporting facilities provide flexibility in land use and accommodate hidden labor forces or temporary visitors. This spatial pattern highlights the potential for developing a creative mixed-use environment that can be further leveraged into creative economy initiatives or community-based commercial-cultural activities.</p>	
Tha Maprang	<p>The community exhibits a mixed-use character comprising residential, business, and supporting spaces, thereby accommodating a wide range of economic and social activities. The distribution of these activities reflects the socio-economic roles of different zones. Rental units and other supporting facilities enhance spatial flexibility, enabling the accommodation of hidden labor forces and temporary visitors. This mixed-use nature demonstrates potential for developing a Creative Mixed-use Zone or creative economy initiatives such as co-working spaces, co-living, and creative retail.</p>	



Community	Analysis Findings	Spatial Analysis of Housing Stock
Ruam Jai	<p>The community demonstrates a mixed-use character integrating residential, business, and supporting spaces, thereby accommodating a wide spectrum of economic and social activities. The distribution of these functions reflects the socio-economic roles of different zones. The presence of rental spaces and a hidden labor force enhances flexibility and ensures the continuity of community activities. The community’s mixed-use pattern and relatively high density indicate strong potential for transformation into a Creative Mixed-use Zone or the development of commercial-cultural initiatives within the framework of the creative economy.</p>	

**Findings from the DIKW Model Application**

Spatial data on housing stock in the four communities—Chao Phraya, Tha Maprang, Phutthabucha, and Ruam Jai—were collected using QGIS and the QField fieldwork tool to establish a systematic database of buildings and land use. The data were subsequently

analyzed through the conceptual framework of the DIKW Model (Data–Information–Knowledge–Wisdom), which is widely applied in knowledge management and spatial development Jarrahi, et. al., 2023)

The application of the DIKW Model in this study is presented in Table 3

**Table 3** Application of the DIKW Model to Housing Stock Analysis in the Four Communities

DIKW model	Result	Communities			
		Phutthabucha	Chao Phraya	Tha Maprang	Ruam Jai
Data	Buildings and Housing	2–4 stories, mixed-use (residential–commercial), dispersed along northern–central streets	2–3 stories, old (More than 50 years), mixed-use, near temples/state property	2–4 stories, medium–low density, businesses along main roads	2 stories, low-rise, highest residential density, businesses along main roads, scattered rental housing
	Rental Spaces	Southern–south-west zone	Southeast	Near commercial areas	Dispersed
	Vacant/Recreational/Parking Areas	Scattered	Near business areas	Some locations	Very limited

DIKW model	Result	Communities			
		Phutthabucha	Chao Phraya	Tha Maprang	Ruam Jai
Information	Primary Land Use	Central zone as commercial hub, residential interspersed along streets, some upper floors vacant	Commercial clustered along peripheral roads, co-existing residential, some upper floors vacant	Businesses along main roads, dense residential areas, vacant upper floors	High residential density, businesses along main roads, scattered rental housing, upper floors vacant
	Potential Features	Vacant upper floors suitable for co-living, studios, or learning spaces	Historic buildings suitable for museums, cultural cafés	3–4 story buildings adaptable for mixed-use or vertical commercial hub	Vacant buildings suitable for co-working, pop-up stores, or creative retail
Knowledge	Commercial Potential	Creative & Cultural Learning Zone	Adaptive Reuse / Creative Tourism Hub	Vertical Commercial Hub / Mixed-use / Contemporary Arts	Comprehensive Zoning / Community Governance / Creative Retail
Wisdom	Urban Development Strategies	Smart Zoning, Soft Power, Creative Learning Zone	Adaptive Reuse, PPP/ MOU with public–private sectors, Creative Tourism Hub	Revitalization of upper floors, traditional markets, linkage to Creative Tourism Route	Integrated community development, Old Town Development Fund, Pocket Park/Creative Plaza, Storytelling & Soft Power

Based on the spatial analysis of land-use maps in the four historic communities of Phitsanulok, the study findings are synthesized through the DIKW Model, with the results detailed as follows:

**Data:** The survey of housing stock across the four communities revealed that most buildings are 2–4 story reinforced concrete shop-houses constructed between

1957 and 1977 (B.E. 2500–2520). While some buildings remain in good condition, others are underutilized or vacant. Land use within the communities is categorized into several types, including residential, commercial, rental spaces, public/recreational areas, and parking. Notable variations were observed in both the density and spatial distribution of activities across the four communities.



**Information:** Spatial analysis revealed distinct characteristics across the four communities: (1) Phutthabucha: residential units are interspersed within the northern–central zones, with the central area serving as a hub for commercial and other community activities; (2) Chao Phraya: commercial buildings cluster along the peripheral roads, with many upper floors vacant. Their location on state or temple property indicates physical development constraints but potential for cultural tourism. (3) Tha Maprang: the highest number of 3–4 story buildings, with businesses distributed linearly along main roads; and (4) Ruam Jai: the densest residential community, with businesses along main roads and scattered rental housing. These findings reflect a mixed-use land pattern and highlight variations in the commercial potential of each neighborhood.

**Knowledge:** The analysis of information allows for the synthesis of knowledge for economic and tourism-oriented development. Upper floors and vacant spaces can be transformed into co-living and co-working areas, art studios, or creative retail spaces to stimulate the local economy. The adaptive reuse of historic buildings—such as establishing heritage museums, cafés, or Creative Tourism Hubs—can generate commercial value while promoting cultural tourism. Furthermore, the development of a Creative Tourism Route connecting the four communities, leveraging unique themes and assets of each neighborhood, can enhance the identity of the historic districts and stimulate economic activities.

**Wisdom:** Development strategies aligned with the study findings and community

potential include the implementation of Smart Zoning to clearly delineate conservation, commercial, and creative tourism areas. The use of Soft Power and storytelling can enhance the branding and image of historic neighborhoods. Sustainable development should leverage public–private partnerships (PPP) and active community participation. Additionally, revitalizing vacant or underutilized spaces into pocket parks or creative plazas can provide public areas, stimulate community activities, and strengthen the connection between residents and the urban environment.

Spatial analysis using the DIKW Model reveals a mixed-use building pattern across the four communities, with commercial structures distributed along main streets and some upper floors remaining vacant. These findings, particularly the variations in residential density, reflect each community’s commercial potential, creative tourism opportunities, and sustainable development pathways (see Figure 3).

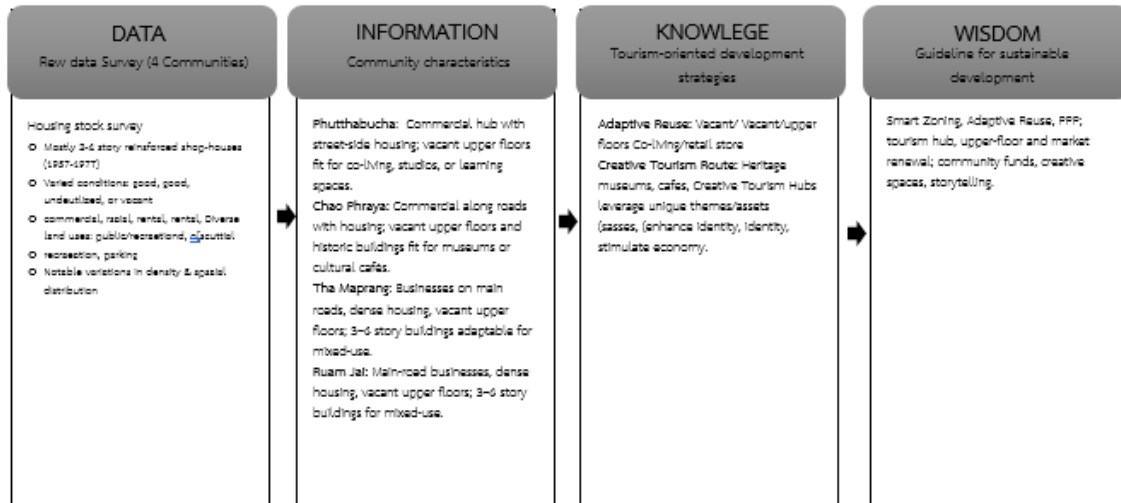


Figure 3 DIKW Framework for Housing Stock Assessment in Phitsanulok's

### Research Summary

The analysis of housing stock using QGIS and QField revealed spatial variations and potential for creative tourism development across the four communities, reflecting a mixed-use land pattern. The study indicates that historic buildings and existing physical infrastructure can be adaptively repurposed for creative applications, such as the restoration of old structures into Creative Hubs, co-working, or co-living spaces. This approach aligns with the concept of adaptive reuse, as proposed in previous research on historic urban regeneration and creative economy development.

Moreover, the housing stock data reflect the potential of local wisdom and community activities, such as Likay, Nang Dong-Ling Lom performances, Chinese paper folding, and traditional markets. These can be integrated into tourism routes and creative activities to provide tourists with cultural and creative experiences. Previous studies have shown that integrating local arts and culture with tourism activities can enhance value creation and strengthen community engage-

ment. The synthesis of spatial data and local knowledge underscores the necessity of community participation and sustainable resource management to maintain a balance between conservation and economic development. Research on creative cities and urban regeneration highlights that strong community networks and effective local resource management play a crucial role in the success of historic urban regeneration and the development of the creative economy.

Therefore, smart tourism development in the four communities should focus on spatial connectivity, the adaptive reuse of historic buildings, the promotion of local wisdom, and the creation of creative tourism routes that align with the unique potential of each area, aiming to provide distinctive and sustainable experiences.

### Discussion and Policy Recommendation

The application of GIS in analyzing housing stock across the four historic communities within Phitsanulok municipality demonstrates its potential as a tool for managing creative tourism spaces. GIS enables the iden-



tification of abandoned buildings and vacant areas (Low Demand – High Vacancy), which are suitable for development into Creative Hubs, co-working spaces, co-living spaces, and art studios, as well as for identifying spatial opportunities aligned with new forms of tourism development. The adaptive reuse of existing structures and the creation of creative public spaces can stimulate the circular economy and enhance social value, a finding consistent with observations in the historic districts of Phitsanulok (Foster and Saleh, 2021, p. 4).

However, Alsayel, de Jong and Fransen (2022, p.7) cautions that focusing on adaptive reuse without considering social context and community access rights may lead to displacement and the emergence of a “creative-class city” rather than inclusive benefits for local communities. Therefore, the practical application of GIS analysis must balance creative development with community rights protection to avoid potential inequalities. Furthermore, the Smart Zoning and Creative City concepts proposed by Sonn and Park (2023, p. 395) emphasize integrating spatial data with community participation to promote urban sustainability. This is supported by Eldamaty and Nagi (2025, p. 404), who found that mixed-use development and adaptive reuse can enhance economic diversity and attract creative tourists. Nonetheless, O'Connor (2020, p. 15) argues that creative development driven solely by governmental or private actors risks commodifying cultural capital, potentially undermining local identity.

From a management perspective, this study emphasizes the importance of collabora-

tive governance and public–private partnerships (PPP), aligning with Mendoza and Talavera (2025, p. 6), who argue that participatory models can help overcome constraints related to land tenure and budgeting. Conversely, Perkins, Khoo and Arcodia (2022, p. 306) highlight challenges such as power imbalances and divergent agendas among stakeholders, which may undermine the effectiveness of collaboration if negotiation processes and trust-building are not adequately implemented.

In terms of communication and digital engagement, Sonn and Park (2023, p. 395) argue that social media and storytelling can foster relationships with tourists and enhance community branding. However, Frenzel, Giddy and Frisch (2022, p. 924) caution that digital engagement may marginalize the voices of groups with limited access to technology, potentially affecting the equity of tourism development.

Based on the synthesis of study findings, the development of historic Phitsanulok as a creative tourism destination should adopt an integrated approach incorporating mixed-use development, adaptive reuse, smart zoning, and collaborative governance. While GIS serves as a precise decision-support tool, processes must be designed to prevent displacement and cultural commodification. Moreover, inclusive engagement mechanisms should encompass both digitally connected and marginalized groups to ensure development is sustainable, equitable, and capable of generating shared value for all stakeholders.

### Policy Recommendation

Based on the study findings and relevant literature, the development of Phitsanulok's historic communities as creative tourism destinations can be translated into the following policy recommendations:

1) **Integrated GIS Database Development:** The municipality should establish an integrated GIS database encompassing physical assets (e.g., abandoned buildings, vacant lots, and infrastructure) and socio-economic data to support continuous development potential analysis.

2) **Flexible Adaptive Reuse Policy:** Incentive measures, such as tax reductions or low-interest loans, should be established to encourage entrepreneurs to renovate historic buildings for creative activities, while a regulatory framework is necessary to prevent community displacement.

3) **Development of Creative Public Spaces:** Policies should support the development of public spaces, such as Creative Plazas or Pocket Parks, with designs that emphasize flexible use and accessibility for both the community and tourists.

4) **Integrated Creative Tourism Route:** Developing a tourism route that connects all four communities, using distinct yet complementary themes, can strengthen the city's brand and distribute economic benefits. The route design should integrate activities like co-working spaces, pop-up markets, and creative retail.

5) **Collaborative Governance:** A joint working mechanism should be established involving the municipality, private sector, temple

groups, and the community to collaboratively design and implement development plans. This approach not only aligns with the recommendations of Bramwell and Lane (2011, p. 412) but also addresses power-related challenges.

6) **Digital Engagement and Marketing:** The municipality should develop online platforms to publicize tourism activities and solicit public feedback, while also promoting storytelling and social media to create shared experiences.

These policy directions should be implemented in an integrated manner, balancing economic value enhancement with the protection of cultural and social values, which is central to the sustainable development of historic cities as creative tourism destinations.

### Future Research Recommendations

1) Future studies should conduct longitudinal analyses to examine the long-term socio-economic impacts of adaptive reuse on community income, resilience, and tourism patterns, thereby providing empirical evidence to support sustainable tourism development.

2) Research could conduct comparative analyses across multiple historic towns to identify best practices in creative tourism, adaptive reuse, and mixed-use spatial development. This would provide transferable models and policy guidance for destination managers and urban planners seeking to enhance destination competitiveness.

3) Future research should evaluate both tangible and intangible outcomes, such as economic benefits, social capital, and preservation of local identity, ensuring creative



tourism initiatives generate sustainable and inclusive value for all stakeholders involved in the tourism ecosystem.

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