Research article

Tourism-type ontology framework for tourism-type classification, naming, and knowledge organization

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A R T I C L E   I N F O

A B S T R A C T

The names of tourism types formed by scholars and practitioners reflect the connotations of various tourism types from different aspects and carry a wealth of tourism knowledge. The documents containing the names and connotations of 232 tourism types were sorted from the Springer *Encyclopedia of Tourism* and 16 major international academic journals. These documents were analyzed using the coding method of grounded theory. A total of 155 naming elements, 22 subcategories, and six categories were extracted. These naming elements, subcategories, and categories constitute the tourism-type ontology, which is the first tourism-type classification framework. Furthermore, the construction of tourism-type ontology enriches the existing research on overall tourism knowledge. The tourism-type ontology can also be used as a preliminary framework for organizing overall tourism knowledge and a foundation for constructing a unified tourism-type naming rule.

1. Introduction

With the improvement in people's living standards, tourism demand has increased rapidly, thus promoting tourism development [1,2]. The World Travel and Tourism Council [3] reported that tourism generated $9.6 trillion and provided 333 million jobs worldwide in 2019, which accounted for 10.3% of global GDP and total jobs. Although the outbreak of COVID-19 had a negative effect on global tourism, its contribution to global GDP remained at 5.3% in 2020 and increased to 6.1% in 2021 [3].

The increasing supply and demand for tourism have led to new tourism types. Recently, tourists' interest has shifted, preferring to experience novelty [4]. Tourist demand is developing toward higher standards, specialization, and personalization. Hence, the tourism market must adjust its supply to accommodate this shift. The new tourism supply and demand have produced many new tourism types, and they determine the nature of tourism market segments [5]. Additionally, environmental changes have also spawned many new tourism types. For example, COVID-19 has increased tourists' demands for staycations and short-distance tourism within the country [6,7] and has also led to non-contact tourism types, such as virtual tourism [8]. Naming emerging tourism types should refer to the naming knowledge of tourism types. However, the naming research in the field of tourism mainly focuses on the naming of tourism sites [9,10], the naming of tourism places [11], and the usage of tourism-type names in different countries [12]. No research has focused on the naming of specific tourism types. Hence, scholars must sort out the naming elements from the names of existing tourism types to guide the naming of newly emerging tourism types.

Numerous tourism types have been formed in theoretical research and practice. When related studies take tourism type as a

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variable, tourism-type classification is typically considered common knowledge without explanation. For example, Cortes-Jimenez [13] classified tourism types into domestic and international tourism and studied the impact of these two types of tourism on economic growth in the Spanish and Italian regions. Meanwhile, Tucki and Pylak [14] classified tourism types into collective and individual tourism and analyzed the role of these two types of tourism in reducing economic inequality in the northeastern region of Poland. Furthermore, the definition and description of specific tourism types, such as geriatric tourism [15], rural tourism [16], and halal tourism [17], were established. However, no research has proposed a framework for classifying overall tourism types. Therefore, a tourism-type classification framework should be constructed to describe the various existing tourism types.

Knowledge management refers to collecting and preserving knowledge through the necessary structures, processes, and methods [18]. It is conducive to transferring the right knowledge to the right people in an operable form at the right time [18]. "An ontology is a formal, explicit specification of a shared conceptualization" [19] (p. 184). Ontology can organize knowledge more effectively to provide users with the required knowledge more precisely [20]. For example, Pai et al. [21] developed an ontology-based knowledge recommendation system, which applied semantic analysis methods to overcome the disadvantages of "fragmented semantic relationships between words," "information overload," and "morphological syntactic differences" in traditional knowledge recommendation systems. Tourism scholars come from different disciplinary fields [22,23], thus leading to the fragmentation of knowledge in the tourism discipline [24]. With tourism development and the expansion of the tourism discipline, research groups with different disciplinary backgrounds have started to dabble in tourism research, which accelerated the development of the tourism discipline and industry [25,26]. However, they did not conduct tourism research under a unified theoretical framework, thus leading to tourism knowledge disorder and fragmentation [24]. Therefore, an ontology to organize the knowledge in the field of tourism must urgently be constructed.

Ontology construction should follow the principles of clarity, coherence, extendibility, minimal encoding bias, and minimal ontological commitment [27]. Ontology construction based on text data is a process that extracts concepts from documents and clarifies their relationship, thereby converting unstructured textual information into hierarchically structured concepts [28]. Tourism-type names convey denotational and connotational contents of tourism [29]. The specific objective of this study is to construct a tourism-type ontology for tourism-type classification, naming, and knowledge organization based on the names and connotations of existing tourism types. The remainder of this paper is structured as follows. Section 2 reviews the relevant literature. Then, Section 3 describes the study design, data sources, and methodology. Next, Section 4 provides the results, followed by a final section that includes the discussion, implications, and conclusion.

2. Literature review

2.1. Definition of ontology

Originally a concept in the philosophy field, ontology is an objective description of the real existence of the real world. In the 1990s, ontology was introduced in the artificial intelligence field [30]. Scholars in artificial intelligence have defined ontologies in different ways [19,27,31,32]. Although ontology has no uniform definition in the academic community, the basic consensus is that ontology includes the following five characteristics: conceptualization, formalization, shareability, clarity, and description of domain knowledge [30]. Referring to the above definition of ontology, this study defines tourism-type ontology as the essential generalization of the names and connotations of existing tourism types. The construction of tourism-type ontology is the process of extracting the elements for naming each tourism type. The naming elements of all tourism types are a part of the tourism-type ontology. The tourism-type ontology can present a comprehensive landscape of the Tribe's tourism knowledge [33].

2.2. Construction method of ontology

Three methods can be used to construct an ontology: manual, semi-automatic, and automatic. Manually extracting themes from the text to construct an ontology has the advantage of high accuracy. However, it is time-consuming, costly, and unable to expand with the growth of the text [34,35]. Some scholars have explored the method of automatic ontology construction to compensate for the shortcomings of manual ontology construction. For example, Fernández-Martínez and Felices-Lago [36] proposed a corpus-based automatic lexical collocate extraction and ontology construction method. Furthermore, Luo et al. [37] proposed an ontology construction method based on lexical granularity and machine learning. Althubaiti et al. [38] developed a method for automatically expanding ontology using machine learning and word embedding. The semi-automatic ontology construction method lies between manual and automatic methods. To construct the tourism-type ontology as a sample for subsequent machine learning accurately, this study uses a manual method for constructing tourism-type ontology.

2.3. Ontology in the tourism field

Research institutions have developed numerous tourism ontologies that have been widely used in the field. For example, the OpenTravel Alliance Specification [39] is used to unify the terminology of related tourism sectors, such as airlines, hotels, car rental companies, railroads, and travel agencies. A multilingual thesaurus on tourism and leisure activities is used for information searches on tourism activities [40]. The Agent Game in Agentcities was developed to simulate the global tourism market [41]. Meanwhile, a coordination ontology for coordinating the data models of different tourism organizations, which realizes information communication without changing the data models of the original organizations, was formulated [42]. An integrated modular ontology, including

tourist type, travel time, and travel location was constructed to satisfy tourists with personalized online services and facilitate them to find alternatives during their travels [43]. Many tourism applications based on ontology have been developed, such as semantic search systems [44,45], tourism recommendation systems [46,47], dynamic packaging systems [48,49], Question Answer (QA) systems [50, 51], and tourism planning service system TripICS [52]. However, as far as we know, the ontology of the existing tourism field is limited to a specific aspect and has not covered comprehensive tourism knowledge. Therefore, based on the names and connotations of existing tourism types, it is necessary to construct a tourism-type ontology that can cover the overall tourism knowledge.

2.4. Tourism classification

Published studies on tourism classification can be broadly classified into three groups. The first group is tourism resource classification, such as the *National Standard for the Classification, Investigation, and Evaluation of Tourism Resources* in China [53], the classification of land reclamation tourism resources [54], and marine tourism resources [55]. The second group is tourism experience classification, such as that based on tourism landscape images [56] and image-text fusion sentiment classification [57,58]. The third group is tourist classification, such as the classification of foreign tourists based on lifestyle [59], senior tourists based on personality traits [60], and olive oil tourists based on the value they place on certain aspects of a destination [61]. In addition, the literature typically takes tourism types as a variable, such as Cortes-Jimenez [13] classified tourism types into domestic and international, and Tucki and Pylak [14] classified tourism types into collective and individual. In this case, the classification of tourism types is generally considered to be common knowledge, without need for an explanation. Currently, systematic studies on the classification of tourism types are not available.

2.5. Tourism naming

The literature on tourism naming focuses mainly on the naming of tourism places and attractions. Scholars presented some significant insights into the naming of tourism places. For example, various names play a crucial role in guiding and shaping tourists' perceptions of the identity of the places they visit [62]. Heritage-site naming is a management tool for protecting and promoting heritage tourism [63]. Tourism-place naming should consider the demands of stakeholders [64]. In the naming of tourism attractions, Chinese scholars conducted systematic studies. For example, Zhang et al. [65] proposed the following principles for naming attractions: (1) naming should be based on facts, (2) naming should consider form and rhythm, (3) naming should focus on market demand, (4) naming should highlight the characteristics of the attraction, and (5) naming should create the atmosphere of the attraction. Fei et al. [66] extracted 15 naming elements, such as resource elements and shape features, from the names of A-class tourist attractions in Hainan International Tourism Island. Moreover, some scholars investigated the naming characteristics and naming elements of specific scenic components, such as pavilions [67], caves [68], and springs [69], in Chinese attractions. Although no systematic study on tourism-type naming exists, research methods for naming element extraction, as a reference for tourism-type naming, are available.

2.6. Tourism knowledge

The overall tourism knowledge generated from the examination of tourism as a holistic object can promote the development of theory construction and practical application [70]. Existing overall tourism knowledge studies can be broadly divided into tourism knowledge generation, tourism knowledge evolution, tourism knowledge framework, and tourism knowledge usage. In terms of the generation of tourism knowledge, Tribe [33] constructed a conceptualized model of tourism phenomena transformed into tourism knowledge through a knowledge force field. Tribe and Liburd [22] further extended Tribe's [33] conceptualized model of tourism knowledge generation to strengthen its explanatory power. Theories and approaches for investigating tourism phenomena originate from multiple disciplines [23,25]. In addition, McKercher [71] argued that tourism research has five obstructive factors affecting tourism knowledge generation, such as "lack of critical thinking" and "becoming method robots."

Concerning the evolution of tourism knowledge, Jafari [70,72] summarized the literature and knowledge on perceptions of tourism as advocacy, cautionary, adaptancy, and knowledge-based platforms from a historical perspective. The four platforms emerged chronologically, with the text and position of the previous platform leading to the formation of the next platform and all four existing today. Meanwhile, Xiao and Smith [73] and Xiao et al. [26] explored the evolution of tourism knowledge using the *Annals of Tourism Research* as the research object.

For the tourism knowledge framework, Leiper [74] proposed a framework for the definition of tourism that includes tourists, the generating region, the transit route, the destination region, and the tourist industry. Wu et al. [75] examined keywords published in the *Annals of Tourism Research*, *Journal of Travel Research*, and *Tourism Management* to construct a framework for the classification of keywords. Park et al. [76] analyzed the keywords in specific tourism research literature from 2002 to 2011 and developed a systematic tourism research classification framework including six categories and 61 sub-categories. Regarding the use of tourism knowledge, Xiao and Smith [77] proposed three sets of propositions for the effective use of tourism knowledge to guide tourism practitioners in its management and use. The effective use of tourism knowledge requires its rational organization. However, research results on the organization of tourism knowledge are limited.

3. Data and methods

3.1. Study design

The grounded theory was first proposed by Glaser and Strauss [78]. It is a research method that encodes unstructured documents and extracts subcategories and categories. Currently, some studies have applied the coding method of grounded theory to ontology construction [79–81]. Referring to these studies, this study applies the coding method of grounded theory to construct the tourism-type ontology. The research process is as follows: documents related to tourism types were collected, then these documents were coded to construct the tourism-type ontology, and the application of tourism-type ontology was explored. The specific research process is shown in Fig. 1.

3.2. Data collection

Part of the data of this study came from the *Encyclopedia of Tourism*, edited by Jafari and Xiao [24] and published by Springer. Routledge published the first edition of the *Encyclopedia of Tourism* compiled by Jafari [82]. To include new research findings within the tourism field after the Routledge *Encyclopedia of Tourism* publication, Jafari and Xiao compiled the Springer *Encyclopedia of Tourism*. The Springer *Encyclopedia of Tourism* includes 1024 headwords created by the Routledge *Encyclopedia of Tourism*, 1988 subject headwords accumulated by *Annals of Tourism Research* since 1973, subject headwords provided by 766 invited authors from 113 countries, and entries collected through the tourism research information network. Therefore, the Springer *Encyclopedia of Tourism* can be considered to cover the relevant tourism knowledge before publication. In this study, a headword is considered tourism types if it has both the following conditions: (1) the headword ends with tourism, travel, or tour, and (2) the description of the headword contains some dimensions of tourism stakeholders, tourism activities, tourism resources, mode of transportation, and tourism
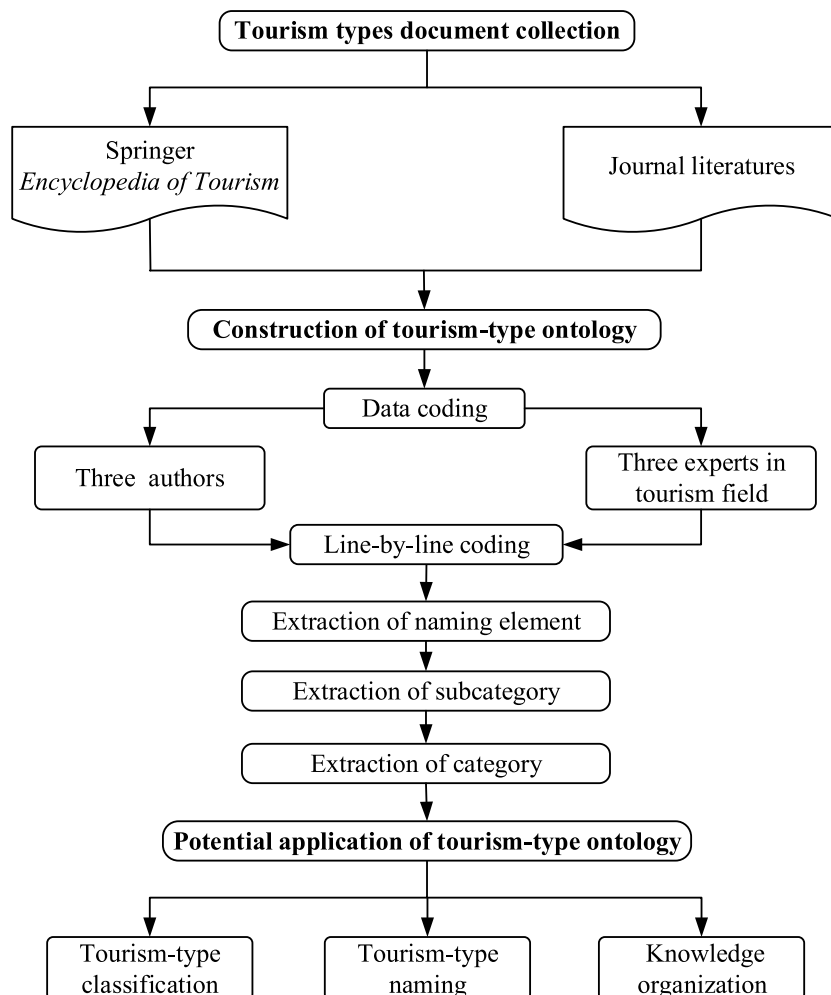

Fig. 1. Flow chart of the study design.

destinations. The names and connotations of 111 tourism types were extracted from the Springer *Encyclopedia of Tourism*, which served as document data for further research.

To supplement the new tourism types after the publication of the Springer *Encyclopedia of Tourism*, another part of the research data came from 16 journals: *Tourism Management, Journal of Travel Research, Annals of Tourism Research, Journal of Sustainable Tourism, Tourism Geographies, Journal of Travel and Tourism Marketing, Current Issues in Tourism, Tourism Management Perspectives, Journal of Hospitality and Tourism Management, Tourism Review, Journal of Hospitality and Tourism Research, Journal of Hospitality and Tourism Technology, Scandinavian Journal of Hospitality and Tourism, International Journal of Tourism Research, Information Technology and Tourism, Tourism Economics*. These journals include all tourism, leisure, and hospitality management subject category journals with SClmago Journal Rank indicator over 1.0 in the SClmago Journal & Country Rank (www.scimagojr.com), and the journals all have "tourism" or "travel" in their titles. Therefore, these journals can be considered to cover the new tourism types comprehensively.

Two literature searches were conducted in the selected 16 journals. Following the strategy of "Title = tourism, Publication Date = 2016–01–01 to 2021–12–31, Document Types = Article," the first literature search was launched on January 15, 2022, and obtained 3525 articles. Articles are considered to contain a specific tourism type if both the following conditions are satisfied: (1) the title or keywords have a headword ending in tourism, travel, or tour, and (2) the abstract is elaborated around the headword and contains some dimensions of tourism stakeholders, tourism activities, tourism resources, mode of transportation, and tourism destinations. Then, these articles are processed according to the following steps: (1) read the titles, abstracts, and keywords of the articles to determine whether the articles contain specific tourism types, (2) read the full text of the articles containing specific tourism types and extract the texts related to the connotation of specific tourism types, and (3) merge the texts by tourism types. The name and connotation texts of 184 tourism types were sorted out. The tourism types extracted from the journal literature were compared with those in the Springer *Encyclopedia of Tourism*, and 113 new tourism types were found. A total of 224 different tourism-type names and their connotations were obtained from the first literature search and Springer *Encyclopedia of Tourism* as document data for constructing the tourism-type ontology. On July 15, 2022, the second literature search was conducted according to the strategy of "Title = tourism, Publication Date = 2022–01–01 to 2022–06–30, Document Types = Article," and 228 new articles were obtained. In the same processing steps as for the first retrieved article, eight new tourism types were extracted from them and used to verify the validity of the tourism-type ontology.

3.3. Coding analysis of data

The coding analysis of data was carried out according to the following steps: text line-by-line coding for naming element extraction, subcategory extraction, and category extraction. The specific process of the data coding is shown in Table 1.

Table 1
Example of data coding.

Coding process	Data codes
Document materials	Type 1. Sustainable tourism: be environmentally, economically and socially responsible for the present and future aa1, while meeting the needs of the community, visitors, or industry …
	Type 2. Antarctic tourism: tourism activities in the Antarctic Circle region aa2 …
	Type 3. Study tour: an out-of-school educational activity that combines research reading study and tourism experiences for students aa3 …
	Type 4. Bicycle tourism: when tourists leave their habitual residence, they mainly use bicycles aa4 to tourism activities …
	Type 5. Medical tourism: tourists leave the region or country to seek medical services aa5 such as cosmetic surgery and surgery …
	Type 6. Ethnic tourism: a tourism form with indigenous culture or national traditional customs aa6 as its main selling point …
	…
Coding labels	aa1 Sustainable and responsible development
	aa2 The Antarctic Circle region
	aa3 Students
	aa4 Bicycles
	aa5 Medical services
	aa6 Ethnic traditional culture
	… (A total of 985 labels)
Subcategories	a1 Sustainable theme (aa1, aa183, aa841 …)
	a2 Geographical scope (aa2, aa350, aa452 …)
	a3 Social role (aa3, aa516, aa621 …)
	a4 Non-public transportation (aa4, aa686, aa787 …)
	a5 Physical experience (aa5, aa224, aa912 …)
	a6 Human attraction (aa6, aa453, aa576 …)
	… (22 subcategories)
Categories	A1 Tourism themes (a1, a7, a9, a16)
	A2 Tourism space-time (a2, a8, a15)
	A3 Tourist characteristics (a3, a10, a17, a18, a19, a20)
	A4 Tourism transportation (a4, a11)
	A5 Tourism experience (a5, a13, a14, a21)
	A6 Tourism attraction (a6, a12, a22)
	(6 categories)

Step 1. Line-by-line coding of the text. This research coded the text sorted in section 3.2 line-by-line to extract words or phrases that can represent the names or connotations of various tourism types.

Step 2. Subcategory extraction. This research collated the codes of step 1 and merged codes with similar meanings to extract subcategories.

Step 3. Category extraction. The intrinsic connections between the subcategories in step 2 were analyzed, and the most related subcategories were clustered to form higher-level categories.

3.4. Validity assurance

This study refers to the method of Sahin et al. [83] to ensure the coding analysis's credibility and the tourism-type ontology's reliability. The first and second authors independently analyzed the document data. Additionally, the two authors regularly met the third author to discuss the subcategories and categories formed by coding. As for the authors' different opinions, three tourism experts were invited to evaluate and synthesize them to reach a final consensus. This study analyzed the documents sorted from the Springer *Encyclopedia of Tourism* and the first literature search and initially constructed the tourism-type ontology. Then, it was used to verify the validity of the tourism-type ontology with the documents of eight new tourism types added in the second literature search. Finally, these documents were coded with the coding method in section 3.3. The extracted categories and subcategories were included in the tourism-type ontology, indicating that the constructed ontology is stable in a short time.

4. Results

Based on the documents obtained from the Springer *Encyclopedia of Tourism* and two journal literature searches, the six categories, 22 subcategories, and 155 naming elements were extracted, as shown in Fig. 2. The number after the subcategory in Fig. 2 indicates the number of naming elements it contains, and the specific naming elements are shown in Tables A.1–A.6 of Appendix A. The following sections describe each category and its subcategories.

4.1. Tourism themes

The extraction process of the tourism themes is shown in Table A.1. Tourism themes can guide the tourism participants to adapt and meet the needs of personal and social development. The tourism themes extracted from the names and connotations of tourism types
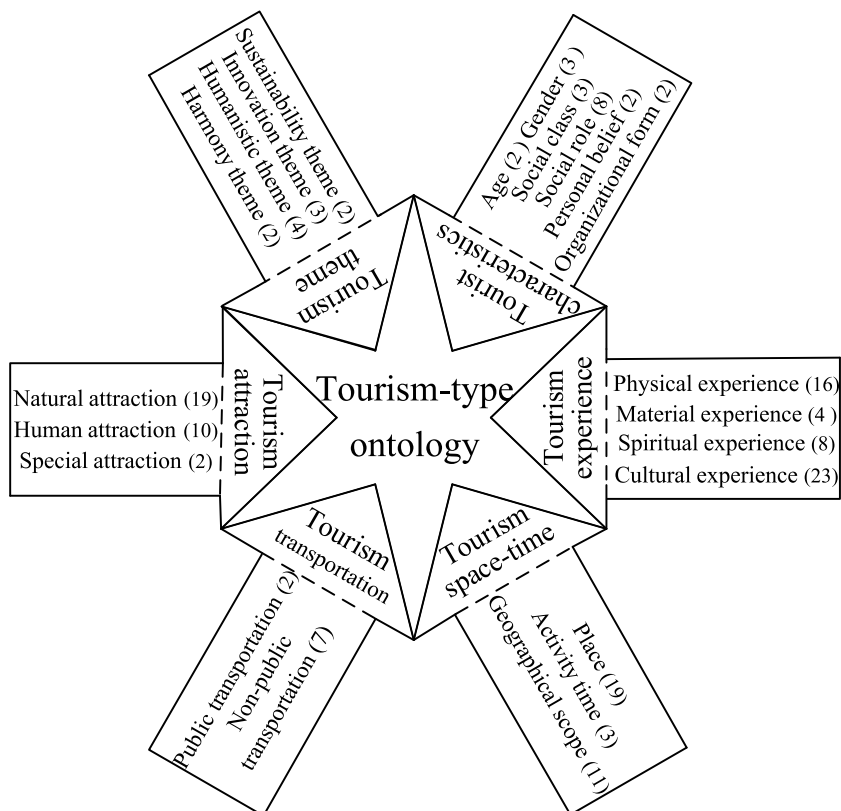

Fig. 2. The composition of the tourism-type ontology framework.

contain four subcategories: sustainability, innovation, humanism, and harmony.

The sustainability theme emphasizes meeting current development needs without undermining future development capacity. "Low-carbon," "ecological," and "green" are representative terms of low-carbon tourism, ecological tourism, and green tourism, all of which have the connotation of sustainability theme.

The innovation theme uses advanced technologies to change the status quo and achieve development goals. Based on the names of tourism types, such as virtual reality tourism, digital tourism, mobile tourism, online tourism, and electronic tourism, their core naming elements are technological innovation terms.

The humanism theme emphasizes that people are the starting point in tourism development and pays attention to the actual situation of tourists. For example, the connotation of community tourism, accessible tourism, slow tourism, digital-free tourism, budget tourism, pro-poor tourism, and responsible tourism all express the concept of satisfying the needs of the relevant participants. Additionally, the adjectives "alternative" and "special" in alternative and special interest tourism are used to modify specialized things or elements, indicating that their main goal is to meet the individual needs of tourists. These tourism types essentially represent the humanism theme.

Harmony is a theme of fairness and reasonableness, which can maintain the balance of various relationships. For example, the core words of justice tourism and peace tourism are "justice" and "peace," which are related intrinsically to the harmony theme.

4.2. Tourism attraction

The extraction process of the tourism attraction is shown in Table A.2. Tourism attraction plays a fundamental role in the tourism system, including natural and human-made elements that can induce tourists to generate tourism motivation. Therefore, the tourism attraction in this study contains three subcategories: natural attraction, human attraction, and special attraction.

Natural attractions are the elements in nature that can attract tourists. For example, reef tourism, mountain tourism, marine tourism, volcano tourism, desert tourism, and island tourism all contain the core naming elements of geological landscapes in natural attraction. Tourism types, such as whale-watching tourism, birdwatching tourism, cherry blossom viewing tourism, wildlife tourism, and forest tourism, mainly take biological landscapes as the core naming elements. Some tourism types also use modifiers such as "watching" and "viewing" as naming elements.

Human attractions are the elements in human society that can attract tourists. Tourism types with human attractions as the core naming elements include military tourism, Olympic tourism, indigenous tourism, ethical tourism, energy tourism, event tourism, heritage tourism, coffee tourism, tea tourism, and olive oil tourism. Additionally, based on the representative words in the names and connotations of the tourism types, it can be seen that the Olympics and events are festival attractions; indigenous, ethnic, and heritage are cultural attractions; energy, coffee, tea, and olive oil represent industrial cultures.

This study defines the attractive elements that people cannot identify or modern science cannot explain, as special attractions. Tourism types with such elements include microclimate tourism and paranormal tourism. Microclimate tourism attracts tourists through small-scale social interactions or natural environment tourism activities [84]. Its connotation contains two attractive elements of nature and society: an ambiguous and indistinguishable attraction. Meanwhile, the paranormal is an event or phenomenon that cannot be explained by natural scientific knowledge, which is a special attraction element.

4.3. Tourist characteristics

The extraction process of the tourist characteristics is shown in Table A.3. Tourist characteristics are composed of basic personal and social characteristics. This category includes six subcategories: social class, social role, organizational form, personal belief, age, and gender.

Social class is the classification of people according to their social and economic status—for example, mass tourism, social tourism, and elite tourism. The main tourists in these tourism types are the ordinary, underprivileged, and elite, representing different social classes.

Social role refers to the people's identity, function, and responsibility in society, such as volunteer tourism, guimi tourism, honeymoon tourism, wedding tourism, business tourism, incentive tourism, national tourism, study tourism, family tourism, babymoon tourism, and VFR tourism. These tourism types involve tourists with different social identities and functions, such as friends, parents, volunteers, family members, employees, businesspersons, students, and newlyweds.

Organizational form refers to the number of tourists participating in tourism activities and their activity forms, such as backpacker tourism, package tourism, and charter tourism. Their core naming elements represent different forms of tourism organization. For example, backpacker tourism emphasizes that tourists usually travel alone, while package and charter tourism provide integrated services for group tourists.

Personal belief refers to a tourist's belief in a certain religion, theory, or political ideal, such as halal tourism, pilgrimage tourism, and communist tourism. The core naming elements of these tourism types are religious and political.

Age is a subcategory based on the age characteristics of tourists, such as senior tourism and youth tourism, "senior" and "youth" are their core words and represent different age groups.

Gender is a subcategory based on the sex characteristics of tourists, such as LGBT (lesbian, gay, bisexual, transgender, and other sexual minority) tourism, romance tourism, maternity tourism, sex tourism, and girlfriend getaway tourism; their core naming elements represent tourists of a certain gender or their tourism activities.

4.4. Tourism space-time

The extraction process of the tourism space-time is shown in Table A.4. Tourism space-time refers to the specific area and period in which tourists perform tourism activities. It includes three subcategories: place, activity time and geographical scope.

Place is the specific location for tourists' activities. The tourism types that use places as the core naming elements are cruise tourism, nightclub tourism, casino tourism, park tourism, protected area tourism, residential tourism, farm tourism, slum tourism, garden tourism, and orphanage tourism. They indicate that tourists perform activities in a small specific space.

Activity time is when tourists conduct activities, generally characterized by day and night, season, or some specific time points. Tourism types with activity time as the core naming elements include winter tourism, night tourism, and transit tourism.

The geographical scope is the territorial area where tourists perform their tourism activities. For example, tourism types related to national borders are international tourism, domestic tourism, outbound tourism, inbound tourism and Asian tourism; tourism types named according to regions representing different levels of demographic, social and economic development are rural tourism and city tourism; tourism types named according to specific administrative divisions include Tibet tourism; tourism types named according to the latitudinal position of the destination include Antarctic tourism, Arctic tourism and polar tourism.

4.5. Tourism experience

The extraction process of the tourism experience is shown in Table A.5. Tourism experience refers to the feelings of tourists affected by the environment, products, services, other tourists, or other factors. This category includes four subcategories: physical experience, material experience, spiritual experience and cultural experience.

Physical experience refers to the physical changes and experiences that tourists feel from the stimulation of the external environment. For example, medical tourism, dental tourism, sports tourism, golf tourism, reproductive tourism, surf tourism, hunting tourism, cosmetic tourism, working-holiday tourism, and equestrian tourism take the physical experience as their core naming elements. They emphasize the physical aspects of the tourist perception through receiving medical services and participating in sports or other activities during the tourism process.

Material experience refers to the experience tourists acquire when they purchase and consume products and goods. The tourism types named based on this subcategory are marijuana tourism, food tourism, wine tourism, shopping tourism, toy tourism, drug tourism, and luxury tourism. Their names and connotations include marijuana, food, wine, toy, luxury products and services, or other products that can help tourists have a material experience.

This study defines spiritual experience as the spiritual satisfaction, relaxation, and solace felt by the tourist during the journey. The tourism types that belong to this subcategory are spiritual tourism, transformational tourism, ancestral tourism, last chance tourism, post-disaster tourism, war tourism, nostalgia tourism, and pleasure tourism. According to the names and connotations of each tourism type, they emphasize the emotional perceptions, emotional belonging, and fulfillment that the tourist desires to obtain through tourism activities, which are based on the tourist's perceptions of the spiritual dimension.

Cultural experience implies that tourists experience different cultures in the cultural connotations of tourism attractions or other elements to meet their cultural needs or gain self-identity. The tourism types named according to cultural experience include creative tourism, archaeological tourism, anime tourism, educational tourism, Hallyu tourism, industrial tourism, film tourism, literary tourism, language tourism, music tourism, scientific tourism, cultural tourism, religious tourism, diaspora tourism, roots tourism and homeland tourism. Based on their names and connotations, the main purpose of tourists is to learn cultural knowledge, feel cultural differences, and meet their own cultural needs. Additionally, tourists in diaspora tourism, roots tourism, and homeland tourism seek self-identity by re-experiencing their motherland or hometown's life and cultural atmosphere.

4.6. Tourism transportation

The extraction process of the tourism transportation is shown in Table A.6. Tourism transportation is the main travel tool and method tourists use in tourism. The research divides it into public transportation and non-public transportation.

Public transportation provides transportation services for the public, and it has strict departure and stop time restrictions. Tourism types named according to public transportation include railway and air travel. They emphasize that tourists use public transportation, such as railways and airplanes, to reach their destinations or conduct tourism activities.

Non-public transportation is a private or leased mode, mainly providing transportation services for minority groups. Tourism types with non-public transportation as the core naming element include bicycle tourism, campervan travel, motor coach tourism, hitch-hiking tourism, hiking tourism, and yachting tourism. This study regards ways of transportation other than public transportation as non-public transportation.

5. Discussion, implications, and conclusion

5.1. Discussion

Classification is an important way to understand ambiguous and complex phenomena and a fundamental approach to scientific research [85]. This study constructs a tourism-type classification framework from the perspective of specific tourism types, thereby providing a new classification perspective for the tourism field. Previous tourism classification studies mainly involved the

classification of tourism resources [53–55], tourism experiences [56–58], and tourists [59–61]. However, this study focuses on the classification of specific tourism types, thereby enriching research on tourism classification. Moreover, in the context of fragmented and disorganized tourism knowledge [24], researchers and practitioners in the tourism field lack an explicit framework for classifying tourism types. Thus, this study provides a unified framework for tourism-type classification, which can deepen stakeholders' understanding of knowledge related to tourism types to promote the exchange of tourism information.

Uniform terminology is one of the attributes of a mature subject field and a necessary basis for its development [86]. The naming elements extracted by this study can be used as a basis for developing naming rules for tourism types. The research methods of this study are consistent with those of existing tourism naming studies [67–69], all of which take existing names as the research object to explore naming elements. However, this study provides a new perspective on tourism naming research by taking specific tourism types as the research object, thereby enriching tourism naming research. Furthermore, the tourism-type classification framework proposed in this study can serve as a basis for naming tourism types and the foundation for the formation of subsequent tourism-type naming rules. The confusion caused by terminological differences can hinder literature search and integration [86], and the naming rules developed based on the tourism-type classification framework proposed in this study can guide the uniform naming of emerging tourism types, thereby facilitating information retrieval and exchange in tourism research and practice.

Knowledge and knowledge management are strategic assets for enhancing the competitive advantage of the industry [87], and tourism knowledge research is crucial for the tourism industry to deal with the uncertainty of the environment. However, tourism knowledge research remains immature [77]. Previous tourism knowledge research focused mainly on tourism knowledge generation [22,23,25,33,71], evolution [26,70,72,73], knowledge frameworks [74–76], and knowledge use [77]. In the organization of tourism knowledge, existing studies aimed at developing application platforms with specific functions from the perspective of tourism practices and constructed local tourism knowledge ontologies [50–52]. The transmission and sharing of tourism knowledge require a unified framework for organizing knowledge. The tourism-type ontology constructed in this study based on specific tourism types can serve as the framework basis for overall tourism knowledge organization.

Additionally, as the framework for the expression of overall tourism knowledge, this study enriches the existing research on the overall tourism knowledge framework in terms of research data, purposes, and results. Representative research on the overall tourism knowledge framework includes Leiper et al.'s [74] tourism framework, Wu et al.'s [75] research subject framework, and Park et al.'s [76] research categorization framework.

In terms of research data, Leiper et al. [74] used the existing relevant literature. Wu et al. [75] took the author-selected keywords of research published in the *Annals of Tourism Research* (1978–2009), *Journal of Travel Research* (2003–2009), and *Tourism Management* (1982–2009). In addition, Park et al. [76] referred to Mill and Morrison's [88] *The Tourism System* and Jafari's [82] *Encyclopedia of Tourism*. This study took the names and connotations of tourism types from Jafari and Xiao's [24] *Encyclopedia of Tourism* and 16 journals (2016–2022). The overall tourism knowledge can be expressed more comprehensively on the basis of different research data.

In terms of the purpose of the research, Leiper et al. [74] defined tourism. Wu et al. [75] revealed the current state of research subjects in three journals. Park et al. [76] constructed a unified framework to describe the subject areas of journal articles. This study constructed a tourism-type ontology for tourism-type classification, naming, and knowledge organization. Different research purposes can motivate researchers to deepen their research to gain a deeper understanding of overall tourism knowledge from different perspectives.

In terms of research results, Leiper et al.'s [74] tourism framework included tourists, three geographical elements (generating region, transit route, and destination region), and a tourist industry (firms, organizations, and facilities that meet the special needs of tourists). Wu et al.'s [75] research subject framework included four categories (geographical areas, subject areas, theories and methods, and knowledge domains), and 200 core keywords; Park et al.'s [76] research categorization framework includes six categories (destination, marketing, demand, travel, geographical areas, and generic terms) and 61 subcategories. Meanwhile, the tourism-type ontology of this study included six categories (tourism themes, tourism attraction, tourist characteristics, tourism space-time, tourism experience, and tourism transportation), 22 subcategories, and 155 naming elements.

In addition, this study has the following limitations. As no rigorous definition of tourism types has been established, this study selected tourism types on the basis of the rough conditions defined by the authors. As such, inaccuracies may have occurred in the identification of tourism types. Second, the data sources for tourism types only included the Springer *Encyclopedia of Tourism* and the 16 selected journals and did not cover other literature, leading to some tourism types that may have been omitted. Finally, although the authors of this study coded the documents independently and consulted fully to determine the final coding results, subjectivity may still exist.

5.2. Implications

The implications of this study are three-fold. First, the tourism-type ontology can be directly used as a framework for the tourism-type classification. The construction of tourism-type ontology adopts a bottom-up approach, extracting the tourism-type naming elements, subcategories, and categories from the texts of the names and connotations of existing tourism types in turn. The tourism-type ontology constructed in this study can be subsequently used as a framework for the top-down classification management of various tourism types. Second, the framework of the organization of overall tourism knowledge can be constructed on the basis of tourism-type ontology. Knowledge organization is the premise of knowledge sharing. At present, knowledge in the tourism field is still disorganized, and organizing this fragmented knowledge requires a common framework. Tourism-type ontology is the abstract expression of all specific tourism-type knowledge. Using the tourism-type ontology as an initial framework and incorporating other representative results on overall tourism knowledge, a complete knowledge organization framework conducive to tourism knowledge storage and

sharing can be constructed.

Lastly, according to the naming elements of tourism types sorted out in the process of constructing tourism-type ontology, the unified naming rules of tourism types can be constructed. Based on the number of subcategories emphasized by the names of tourism types, the naming rules of the tourism types are divided into single-type naming rules and compound-type naming rules. From Tables A.1–A.6, it can be seen that most tourism types with single-type naming rules are presented as "subcategory + tourism". A few of them are in the form of "subcategory + tour," and "subcategory + travel," such as study tour and campervan travel. Additionally, modifiers indicating attributes, properties, and degrees are incorporated into the naming of tourism types in the form of "modifier + subcategory + tourism." For example, "hallmark" in hallmark event tourism symbolizes the property of material, "slavery-based" in slavery-based heritage tourism represents a social nature, and "expedition" in expedition cruise tourism indicates the distance. These modifiers have the function of highlighting the characteristics of tourism types.

When the tourism types emphasize several subcategories in the tourism-type ontology, the compound-type naming rules are adopted. Based on the relationship of subcategories, this research initially classifies the compound naming rules of tourism types into two kinds: multiple subcategories naming rules of the same category and multiple subcategories naming rules of different categories. Then, they are divided into more subdivided naming rules by combining various subcategories to meet the actual needs of tourism-type naming. The common naming rules of compound types are presented as "subcategory + subcategory + tourism." Still, some are presented as "modifier + subcategory + subcategory + tourism." However, some tourism types consist of three or more subcategories, such as the name form of "geographic range + physical experience + vacation/tourism + for + age" [89]. An example of compound naming rules for tourism types is shown in Table A.7.

5.3. Conclusion

This study uses the coding method of grounded theory to analyze the documents of the names and connotations of existing tourism types. A tourism-type ontology including six categories (tourism themes, tourism attraction, tourist characteristics, tourism space-time, tourism experience, and transportation), 22 subcategories, and 155 naming elements was constructed. The construction of a tourism-type ontology enriches the existing research on overall tourism knowledge in terms of research data, purposes, and results. The tourism-type ontology can be directly used as a framework for classifying and managing various tourism types. The tourism-type ontology can also be used as a preliminary overall tourism knowledge organization framework. Furthermore, based on the naming elements of tourism types extracted during the construction of tourism-type ontology, a unified naming rule for tourism types can be constructed.

Author contribution statement

Puwei Zhang: conceived and designed the experiments; contributed reagents, materials, analysis tools or data; wrote the paper.
Jia Wang: contributed reagents, materials, analysis tools or data; analyzed and interpreted the data; wrote the paper.
Rui Li: conceived and designed the experiments; contributed reagents, materials, analysis tools or data.

Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no competing interests.

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Appendix A. The extraction process for each dimension of the tourism-type ontology and the example of compound naming rules for tourism types

Table A.1
The extraction process of tourism themes.

Specific tourism types	Naming elements	Subcategories
Sustainable tourism Sustainable heritage tourism	Sustainability	Sustainability theme

(*continued on next page*)

Table A.1 (*continued*)

Specific tourism types	Naming elements	Subcategories
Sustainable community-based tourism		
Sustainable urban tourism		
Sustainable culinary tourism		
Green tourism	Eco-friendly	
Ecotourism		
Agroecological tourism		
Eco-cultural tourism		
Low-carbon tourism		
Smart Tourism	Communication technology	Innovation theme
Digital tourism		
Mobile tourism		
Virtual reality tourism	Virtual reality technology	
Online tourism	Internet technology	
E-tourism		
Community tourism	Community members' needs	Humanism theme
Community-based rural tourism		
Responsible tourism		
Accessible tourism	Accessibility needs	
Digital-free tourism (DFT)	Freedom from the Internet	
Offline tourism		
Pro-poor tourism	Assist the economically disadvantaged	
Budget tourism		
Peace tourism	Peace	Harmony theme
Justice tourism	Justice	

Table A.2
The extraction process of tourism attraction.

Specific tourism types	Naming elements	Subcategories
Astronomy tourism	Astronomical landscape	Natural attraction
Dark sky tourism		
Nature tourism	Nature	
Nature-based science tourism		
Marine tourism	Marine	
Wildlife tourism	Wildlife	
Mountain tourism	Mountain	
Mountain bike tourism		
Mountain walking tourism		
Island tourism	Island	
Ice-snow tourism	Ice-snow	
Whale-watching tourism	Whale	
Reef tourism	Reef	
Cherry blossom viewing tourism	Cherry blossom	
Glacier tourism	Glacier	
Birdwatching tourism	Birdwatching	
Alpine tourism	Alpine landscape	
Beach tourism	Beach resources	
Sun-and-beach tourism		
Desert tourism	Desert	
Fishing tourism	Fishery resources	
Forest tourism	Forest resources	
Forest-therapy tourism		
Geographical tourism	Geological resources	
Thermal tourism	Geothermal resources	
Spa tourism		
Volcano tourism		
Ethnic tourism	Ethnic culture	Human attraction
Ethnic neighborhood tourism		
Energy tourism	Energy industry culture	
Tea tourism	Tea industry culture	
Coffee tourism	Coffee industry culture	
Olive oil tourism	Olive oil industry culture	
Specific tourism types	Naming elements	Subcategories
Military tourism	Military culture	Human attraction
Olympic tourism	Olympic	
Indigenous tourism	Indigenous culture	
Event tourism	Event	
Sport event tourism		
Hallmark event tourism		

Table A.2 (*continued*)

Specific tourism types	Naming elements	Subcategories
Heritage tourism	Heritage resources	
Communist heritage tourism		
Urban heritage tourism		
Sustainable heritage tourism		
Intangible cultural heritage tourism (ICH)		
Cultural heritage tourism		
Industrial heritage tourism		
Slavery-based heritage tourism		
Microclimate tourism	Indistinguishable elements	Special attraction
Paranormal tourism	Paranormal	

Table A.3

The extraction process of tourist characteristics.

Specific tourism types	Naming elements	Subcategories
Mass tourism	Ordinary people	Social class
Social tourism	Underprivileged	
Elite tourism	Elite	
Study tour	Student	Social role
Babymoon tourism	Expectant parents	
Volunteer tourism	Volunteer	
International volunteer tourism		
VFR(Visiting Friends and Relatives) tourism	Friends or relatives	
Family tourism		
Family adventure tourism		
Guimi tourism		
Honeymoon Tourism	Newlyweds	
Wedding tourism		
Specific tourism types	Naming elements	Subcategories
National tourism	National	Social role
Business tourism	Business people	
Incentive tourism	Company employees	
Backpacker tourism	Individual	Organizational form
Package tour	Group	
Charter tourism		
Halal tourism	Religious believers	Personal belief
Pilgrimage tourism		
Communist heritage tourism	Communist	
Senior tourism	Senior	Age
Youth tourism	Youth	
Sex tourism	Male tourists	Gender
LGBT Tourism	Lesbian, gay, bisexual, transgender and other sexual minority	
Romance tourism	Male tourists	
Maternity tourism		
Girlfriend getaway tourism		

Table A.4

The extraction process of tourism space-time.

Specific tourism types	Naming elements	Subcategories
Cruise tourism	Cruise	Place
Expedition cruise tourism		
Nightclub tourism	Nightclub	
Casino tourism	Casino	
Coastal tourism	Coastal	
Residential tourism	Residential	
Second-home tourism	Second-home	
Off-the-beaten-track tourism	Atypical scenic spot	
Garden tourism	Garden	
Campus tourism	Campus	
Protected area tourism	Protected area	
Farm tourism	Farm	
Camping tourism	Campsites	
Specific tourism types	Naming elements	Subcategories
Slum tourism	Slum	Place
Park tourism	Park	
Wilderness tourism	Wilderness	
Ghetto tourism	Ghetto	
Proximity tourism	Proximity area	

Table A.4 (*continued*)

Specific tourism types	Naming elements	Subcategories
Orphanage tourism	Orphan	
Orphan volunteer tourism		
Outdoor tourism	Outdoor	
Outdoor adventure tourism		
Winter tourism	Winter	Activity time
Night tourism	Night	
Transit tourism	Transit gap	
Antarctic tourism	Latitude and longitude	Geographical scope
Arctic tourism		
Polar tourism		
Asian tourism	Asian	
Space tourism	Space	
Rural tourism	Rural area	
Community-based rural tourism		
Village tourism	Village	
Tibet tourism	Tibet	
Domestic tourism	Domestic	
City tourism	City	
Outbound tourism	National boundary	
Outbound health tourism		
Inbound tourism		
International tourism		
International volunteer tourism		
International convention tourism		
International educational tourism		
International business tourism		
Cross-strait tourism	Cross-strait	
Border tourism	Borderline	

Table A.5

The extraction process of tourism experience.

Specific tourism types	Naming elements	Subcategories
Medical tourism	Medical treatment	Physical experience
Diasporic medical tourism		
Dental tourism		
Cosmetic tourism		
Suicide Tourism	Suicide	
Equestrian tourism	Equestrian	
Nautical tourism	Nautical	
Surf tourism	Surf	
Hunting tourism	Hunting	
Health tourism	Maintain health	
Outbound health tourism		
Wellness tourism		
Healthcare tourism		
Recuperation travel		
Sport tourism	Sport	
Sport event tourism		
Reproductive tourism	Reproductive	
Horse tourism	Horse riding	
Entertainment tourism	Entertainment	
Working-holiday tourism	Working and travel	
Gaming tourism	Gambling and recreation	
Golf tourism	Golf	
Seeing tourism	Seeing	
Ski tourism	Skiing	
Wine tourism	Wine tasting	Material experience
Marijuana tourism	Consume drugs	
Drug tourism		
Food tourism	Tasting food	
Luxury tourism	Purchase luxury products and services	
Shopping Tourism		
Luxury shopping tourism		
Spiritual tourism	Spiritual transformation	Spiritual experience
Transformational tourism		
Last chance tourism	Preserve memories	
Specific tourism types	Naming elements	Subcategories
Toy tourism	Seek mental comfort	Spiritual experience

Table A.5 (*continued*)

Specific tourism types	Naming elements	Subcategories
Slow tourism		
Yoga tourism		
Ancestral Tourism	Ancestral connections	
Second chance tourism	Emotional reproduction	
Post-disaster tourism	Commemorate the past	
War tourism		
Nostalgia tourism		
Nostalgia film tourism		
Pleasure tourism	Pleasure	
Dark tourism	Seeking excitement	
Fright tourism		
Adventure tourism		
Family adventure tourism		
Outdoor adventure tourism		
Homeland tourism	Seeking cultural identity	Cultural experience
Diaspora tourism		
Diasporic medical tourism		
Roots tourism		
Equestrian tourism	Equestrian culture	
Creative tourism	Improving creativity	
Participatory experience tourism		
Archaeological tourism	Archaeological	
Cultural tourism	Learning culture	
Eco-cultural tourism		
Religious tourism	Learning religious culture	
Foraging tourism	Experience food culture	
Culinary Tourism	Experience culinary culture	
Sustainable culinary tourism		
Educational tourism	Learn the knowledge	
International educational tourism		
Language tourism		
Scientific tourism		
Nature-based science tourism		
Specific tourism types	Naming elements	Subcategories
Anime tourism	Enjoy the anime	Cultural experience
Hallyu tourism	Feel Hallyu	
TEFL (Teaching English as a Foreign Language) tourism	English teaching	
Industrial tourism	Experience industrial	
Industrial heritage tourism		
Film tourism	Enjoy the film	
Nostalgia film tourism		
Screen tourism	Relive the screen prototype	
Literary tourism	Re-experience the work	
Music tourism	Enjoy the music	
Agritourism	Experience agricultural culture	
Agroecological tourism		
Grand tour	Enjoy the grand gathering	
Historical tourism	Historical culture	
Art performance tourism	Art performance	
Genealogical tourism	Genealogical culture	
Red tourism	Red culture	

Table A.6
The extraction process of tourism transportation.

Specific tourism types	Naming elements	Subcategories
Railway tourism	Railway	Public transportation
Air travel	Air	
Bicycle tourism	Bicycle	Non-public transportation
Urban bicycle tourism		
Campervan travel	Campervan	
Hitchhiking tourism	Hitchhiking	
Hiking tourism	Walking	
Mountain walking tourism		
Motor coach tourism	Motorcycle	
Yachting tourism	Yachting	
Leisure boat tourism	Boat	

Table A.7

Example of compound naming rules for tourism types.

Subcategories relationships	Naming rules	Examples
Multiple subcategories naming rules of the same category	Spiritual experience + cultural experience + tourism	Nostalgia film tourism
	Sustainability theme + humanism theme + tourism	Sustainable community-based tourism
	Natural attraction + natural attraction + tourism	Sun and beach tourism
	Cultural experience + physical experience + tourism	Diasporic medical tourism
	…	…
Multiple subcategories naming rules of different categories	Physical experience + human attraction + tourism	Sport event tourism
	Natural attraction + physical experience + tourism	Forest-therapy tourism
	Natural attraction + cultural experience + tourism	Nature-based science tourism
	Cultural experience + human attraction + tourism	Cultural heritage tourism, industrial heritage tourism, cultural festival tourism
	Modifier + cultural experience + human attraction + tourism	Intangible cultural heritage tourism
	Human attraction + humanism theme + tourism	Ethnic neighborhood tourism
	Sustainability theme + human attraction + tourism	Sustainable heritage tourism
	Personal belief + human attraction + tourism	Communist heritage tourism
	Social role + spiritual experience + tourism	Family adventure tourism
	Sustainability theme + cultural experience + tourism	Sustainable culinary tourism, agroecological tourism
	Geographical scope + social role + tourism	International volunteer tourism
	Place + social role + tourism	Orphan volunteer tourism
Subcategories relationships	Naming rules	Examples
Multiple subcategories naming rules of different categories	Geographical scope + non-public transportation + tourism	Urban bicycle tourism, scenic drive tourism
	Place + non-public transportation + tourism	Outdoor adventure tourism
	Geographical scope + human attraction + tourism	International convention tourism, urban heritage tourism
	Geographical scope + cultural experience + tourism	International educational tourism
	Sustainability theme + geographical scope + tourism	Sustainable urban tourism
	Humanism theme + geographical scope + tourism	Community-based rural tourism
	Natural attraction + non-public transportation + tourism	Mountain bike tourism
	Geographical scope + physical experience + vacation/ tourism + for + age	Rural summer health leisure vacations for the urban elderly
	…	…

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