An empirical study of Thailand cities' color landscapes

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ABSTRACT

Color landscapes are important parts of cultural landscapes. Cities are cradles of human spiritual and material civilizations. As a city changes, its unique cultural context also changes. One of the most significant features of a city is its color landscapes, which help to convey the culture and spirit of a city in a deeply intuitive way. The color landscapes not only shape a city image, highlights a city personality, and transmits cultural information but it is also an important aid in helping people to perceive regional cultural values and experience folk customs. With these concepts in mind, the researchers of this study have selected three typical tourist cities in Thailand as the basis for an empirical study. Three main findings are discussed: (1) Thailand's city color landscapes tend to consist of pure colors with high saturation, and colorful colors have been integrated into Thai people's daily life, which reflect Thailand's different history and culture. (2) The clearer the attributes of the color landscape, the more pertinent they are to the images of the tourist destination. (3) The geographical environment, local religious beliefs, and tourists' expectations are the main motivating factors in choosing the main colors of a city. City color landscapes have become an important part of Thailand's city tourism "industry" and would promote the development of sustainable tourism.

1. Introduction

Cultural landscapes include a broad range of landscape types. City color landscapes as common and important cultural landscapes are not only important in shaping city images for tourists but they are also outcomes of city tourism development. In recent decades, the images and colors of tourism destinations have become primary considerations in the development of regional tourism. All of the world's countries and regions with a developed tourism industry have a distinctive tourism image [1,2]. The research on modern iconography shows that visual information is much more efficient at conveying ideas than other types of information, and that the influence of an aesthetic evaluation of visual information is far stronger than that of other information [3,4]. Color landscapes are an important part of a city tourism image, and color landscapes often provide the easiest way to form a tourist's first impression of a region. The atmosphere expressed by the city culture with the help of a color landscape offsets the indifference engendered by artificial

depictions, promotes an unspoken harmony among individuals, nature, and society, and greatly shapes the beauty of a city [5]. Tourism is related to people's aesthetic activities. With the general improvement of peoples' economic levels, people have had more opportunities to engage in tourism. In this process, cities with bright color landscapes have been stronger attractions for tourists than cities with muted landscapes and, therefore, have generated stronger tourism economies [5,6]. This paper focuses on color landscapes as its starting point and then uses qualitative and quantitative methods to analyze the color landscapes of three Thailand tourism cities with local characteristics. By revealing the reasons for the formation of color landscapes and color composition systems, this research will provide a new perspective on the improvement of the quality of tourism experiences and the landscape environments of tourism cities.

Color landscapes are important in human spiritual life, and therefore they have become effective indicators of the quality of human lives and living environments. Many scholars who have done research on color issues think that the shaping of color landscapes not only improves living environments but also promotes regional economic development [7,8]. In the 1970s, French colorologist Jean-Philippe Lenclos analyzed the visual effects of different architectural colors and landscapes in a large number of field investigations. He concluded that the regional environmental color landscape directly affected residents' and tourists' perceptions of a city [9,10]. Michael Lancaster, a British color planning expert, proposed the concept of the "color landscape" and standardized the control and design of color landscapes from regional and cultural perspectives [11,12]. Eliel Saarinen, an American city planning expert, believed that the colors of a city represent its cultural connotations to a certain extent and determine the images that people form of it [13]. The color landscape has gradually become a hot topic in many fields of research, such as city planning [14–16], psychology [17,18], art [19], anthropology [20,21], and tourism [16,18,22]. It is believed that the colors of a landscape express most succinctly the characteristics of a tourism destination. When a landscape design includes different arrangements and designs of different color intentions, it affects tourists' ideas of the tourism destination's real estate in a short time. It is an important way to cause tourists to make relevant decisions and take part in activities because it reduces the distance between a tourist's view of a scenic spot and the actual physical appearance of the scenic spot. As the most influential factor in the visual depiction of a tourist destination, color landscapes let each tourist form an individual and independent image through the visual recognition system of public tourists.

Color landscapes of tourism cities affect tourists' travel decisions, visual experiences, and physiological stimulations. They are undoubtedly powerful promoters of current regional sights and tourism resource development. Their design, planning, and development have become hot issues for tourism researchers [23–25]. The colors are not only indicators of a city's culture but are also direct manifestations of a city's temperament when shown in international competitions. The quality of the city landscape environment has become the key to attracting tourists and developing a city's economy. Because of its unique colors and cultural landscapes, Thailand has become a tourist attraction for people from around the world. In recent years, Thailand's tourism industry has developed steadily. In 2019, more than 39 million foreign tourists visited Thailand [26]. Thailand's tourism industry will likely increase in status in the future. Therefore, the analysis of Thailand tourism color landscapes is not only a scientific way of recognizing the meaning of the term *tourist destination* but also is important for the development and design of tourism resources for cities.

2. Literature review and research framework

As a comprehensive concept, tourism city color landscapes are the comprehensive perception and impression of city tourists on the tourism cities, and are also the embodiment of city images and characteristics that can be intuitively felt by tourists [27]. As important visual elements, city colors are also of great significance to the visual representation and information transmission of the tourism city images. They play an important role in people's recognition and memory of the city images. Reasonable color landscapes can not only shape the city images and improve the living environments, but also enhance the popularity and attraction of the cities [28]. From the perspective of color geography, the colors of cities are a comprehensive and abstract concept formed by people under many factors such as natural conditions, economic activities, social culture and history in cities, with integrating the human factors and physical geography factors in cities [29]. For the development of city tourism, city color landscapes are an important factor in shaping the images of city tourism, and they are the products of the development of city tourism to a certain stage [30].

Nowadays, color is inextricably linked with tourism because of its importance to images and the universality of its cultural penetration. The color culture is of great significance for tourism resource evaluation, cultural exploration, characteristic theme building, color landscape design, resource integration, route design, and so on [31]. Tourism is an aesthetic activity, and its main appeal comes from the aesthetic quality of tourism resources [32]. The color landscape design of a tourism city has greatly enhanced the cultural atmosphere of a city, expanded the number of tourism resources, and deepened the cultural connotations of tourism resources [5]. For a long time, as points of departure for and destinations for tourists, cities have played a more and more important role in tourism. The city color landscape is a relatively comprehensive picture formed by all of the color elements seen by humans in the city physical environment [33]. The goal of city color landscape design is to make up for the cold ambience of modern cities brought about by high-tech development. The hope is to form a new harmony and unspoken understanding between humans, nature, and culture and to support the continuation of the local cultural context of the city. In many famous tourist cities, city leaders have gradually recognized the quiet value of city color in attracting tourists and have used color to embellish the city and give it a unique color personality. This is seen in the elegant whites of the limestone buildings of Paris, the coffee-colored browns of Amsterdam, and the whites of the Cyclades island group of Greece [34–36]. The successful construction of a city color landscape often brings wonderful intangible assets to a city. In the 1980s, efforts were made in Longyearbyen, Norway, to replace its traditional drab colors with varied bright colors. The scheme of city color planning and construction lasted for 20 years. This effort turned this small, humble Arctic municipality into a famous tourist destination in Norway and drove the development of its city economy and cultural undertakings [37, 38].

There have been many discussions on city color research. At present, researchers mainly focus on architectural color, color planning, color intention, city image, etc [39–41]. In contrast, the analysis of the formation and laws of color landscapes in tourist cities is slightly insufficient. Many studies show that with the development of large-scale tourism, color landscape planning can better activate the tourism market by applying modern color principles to the construction of city image [42–44]. On the other hand, city color construction can fully excavate and reuse the elements of urban tourism resources, make up for the apathy brought to modern cities by artificial depiction, and form a new harmony among people, nature and society [45]. Through the study of city color and tourism landscapes, it is not difficult to find that in the long process of city construction, city colors play a very important role in shaping the city images. The good development of cities is not only reflected in the hard indicators of fast economic development and high urbanization, but also in the good images of cities with bright personality and high recognition. The proper use of colors is like a bright personality label for the city images, which is convenient for people to recognize and remember the city images through their visual senses [46,47].

In fact, color landscapes not only belong to essential factors of tourism industry, but also the most important intangible assets of cities. The external images of cities often need to be displayed through colors. In his analysis of color, Kevin Lynch stated that all people have a local perception of the area and environment in which they live. The deepening of a person's perception will produce an overall perception of the city in which the person lives. Lynch proposed five elements of the image of a city: paths, edges, districts, nodes, and landmarks. Paths are channels along which a person moves; edges are boundaries such as shorelines or walls; districts are large distinct areas of a city; nodes are junctions such as railway stations; and landmarks are prominent structures, such as the Duomo in Florence, Italy. These five elements help build a person's cognitive map of a city space and image [48]. Different observers have different images of the elements, and these images can result in different behaviors. Because the city's city color image is part of its overall city image, color is a feature that is vital to the five elements. Therefore, the symbolic characteristics of roads, boundaries, regions, nodes, and landmarks in the city intention are also applicable to the color landscape intention. Proponents of the geography of color believe that under the common influence of physical geography and human geography, color can be divided into natural color and human color [49]. With the rapid development of cities in recent decades, some materials with natural color have been widely used in city landscape design and city construction after artificial transformation. These are human-made objects such as sculptures that are made from natural materials such as stone or wood. If the color of the natural material does not change during the formation of an object, the color attribute is called semi-natural color. Such objects are constantly being used, partly for their unique, original colors. City color spatial structure is subordinate to city spatial structure, so is the research on city color image.

Considering the diversity of city color landscapes and the complexity of the research on them, we needed a relatively simple format in which we could discuss our research. Therefore, in order to clearly present the intention of the traveling city color landscape, this study will use Lynch's five elements of the city image as the specific components of color landscapes. We will present the color impressions of three typical tourism cities in Thailand from three aspects: natural color environment, artificial color environment, and semi-natural color environment (Fig. 1).

3. Materials and methods

3.1. Geographical locations of the cities studied

Thailand is located in Southeast Asia and is not only one of the most famous tourist attractions in the world but also the gateway and fulcrum of the 21st century Maritime Silk Road and Silk Road Economic Belt [50,51]. Thailand is long and narrow [52]. The northern part is dominated by forests and mountains; the northeastern part is mainly a plateau; and the central part is relatively flat and the main rice-producing area in the country (Fig. 2) [53]. Due to its unique natural conditions, the southern part has a long coastline. Because of the influence of the tropical monsoon climate [54], Thailand has a beautiful natural environment and rich color resources that provide tourists with a gorgeous and colorful visual feast. This makes Thailand's tourism landscape intriguing and varied, with a distinctive and unique color culture. It has become a unique brand for Thailand's tourism resources [55–57].
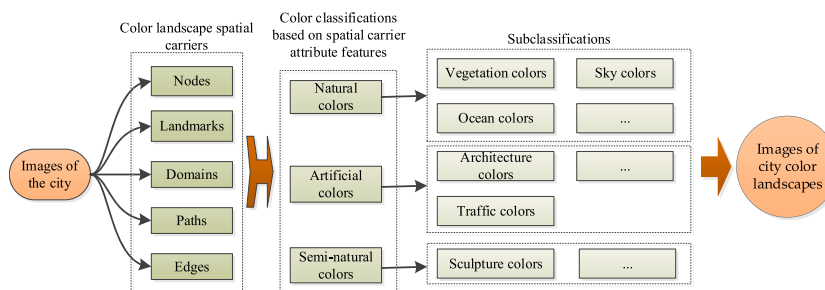
Fig. 1. Composition of city color landscapes. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
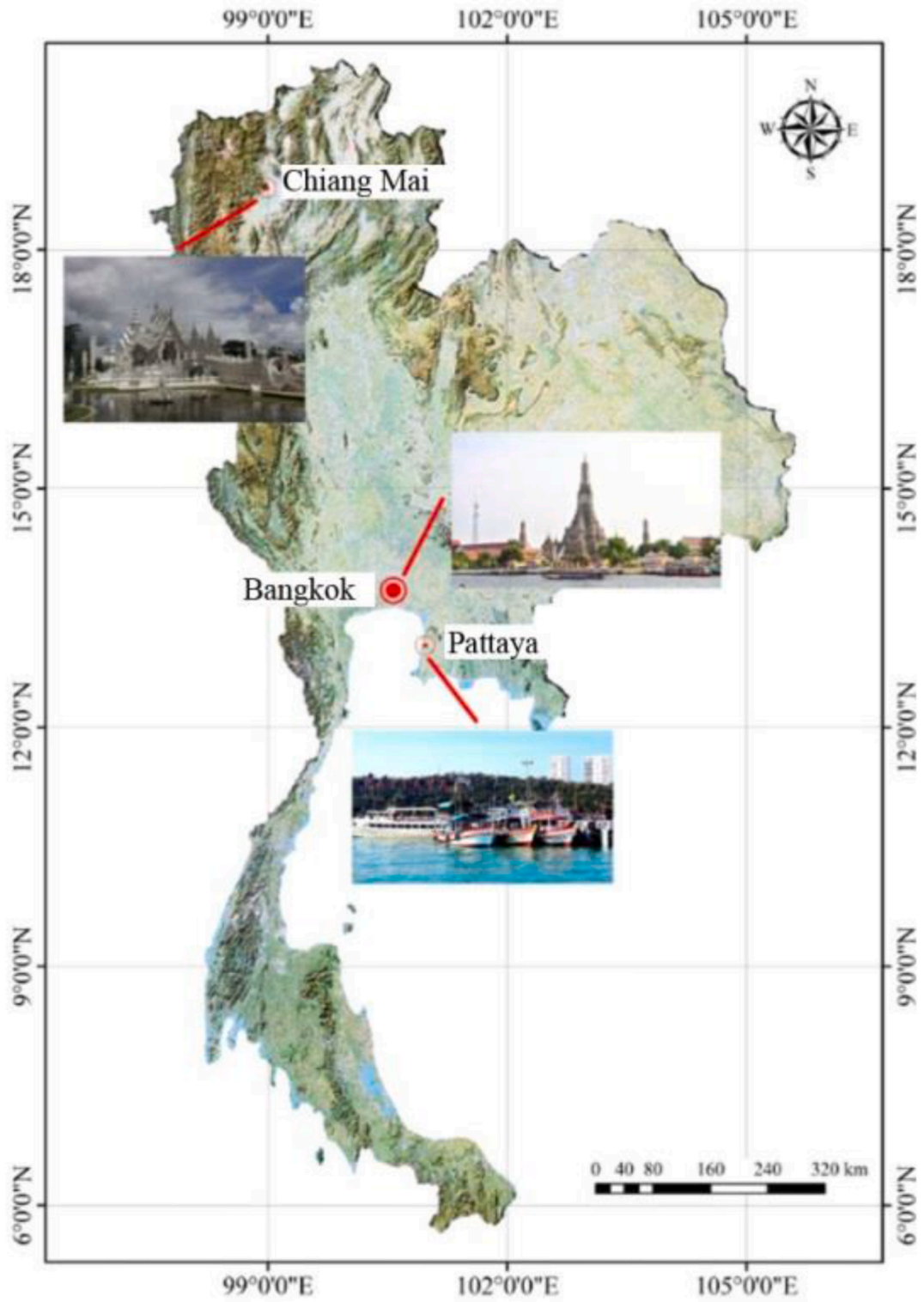
Fig. 2. Locations of Bangkok, Chiang Mai, and Pattaya in Thailand.

3.2. Technical methods

Based on different effects of coastal and inland landscapes on the colors of city landscapes, three typical color tourism cities were selected from north to south in Thailand (Fig. 2): Chiang Mai, the second largest city in Thailand; Bangkok, the capital and largest city; and Pattaya, a coastal city. As tourism cities, these three cities are distributed in the north or south of Thailand, and the tourism popularity of them is relatively high in the past 10 years, which indicates that tourists have a high recognition on these cities. In addition, compared with non-tourism cities, the natural landscapes and cultural landscapes of these three cities are more typical and representative in terms of quantity, type and landscape color. With its focus on color geography, this research investigated color measurements and color photography and made a cross analysis of the color attributes of three cities using a combination of qualitative and quantitative methods. The qualitative analysis was mainly done by reading relevant literature to clarify the foundation of the formation of the city color landscape in Thailand. Quantitative analysis is based on the Chinese architecture color cards. The color cards are formed on the basis of studying the main color systems in the world and doing a lot of color vision experiments. The labeling of its hue, lightness and chroma conforms to international standards, which is scientific and authoritative. First, the current colors were entered in ColorImpact software [58] after a comparison with the same color on the color card and then were analyzed according to hue, saturation, and brightness. Because we were considering the characteristics of many complex color objects in an artificial environment, the main color, complementary color, and color of emphasis were used for analysis.

The colors of the collected photos were quantified and extracted one by one, and the obtained data were stored in a database [59, 60]. It should be noted that due to the subtropical monsoon climate in Thailand, the temperature is relatively constant throughout the year but there is a lot of rain. We needed to ensure the accuracy of the research data and reduce the interference of rain and light on the color collection so we could obtain a relatively clear and accurate chromatogram. Therefore, the photos were taken between 10:00 a. m. and 4:00 p.m. on sunny days of natural and cultural landscapes that would have an important impact on tourists and of city images. The specific technical method used is shown in Fig. 3.

4. Results

4.1. Natural color analysis

Natural colors are unique colors formed in the development of a regional culture. They are not based on the external culture and maintain a material authenticity to the maximum extent possible [61,62]. For example, the sky, clouds, soil, vegetation, fruits, and mountain ranges are important features that have natural colors [59]. In the planning and designing of color landscapes, in order to achieve the preset effect, designers usually use changes in the shapes, areas, and locations of a landscape to affect the overall color coordination [63]. In Thailand, due to a lag in city planning, the natural environment has not changed much, and this has allowed the "authenticity and integrity" of the city natural color landscape to continue (Fig. 4).

By using ColorImpact software to analyze the collected natural landscape colors, the following findings were obtained (Fig. 5):

(1) The main colors of city natural landscapes in Thailand are blue and green. The rich water resources provided by the tropical monsoon climate make vegetation grow vigorously all year round, so that the green color is a relatively stable natural color. The blue color of the sky and water is seen in a large area and is the main color of the city.
(2) In addition to blue and green, the complementary colors of yellow, brown, and red are particularly obvious.

These colors are mostly provided by local species of flowers, which not only embellish the city environment but also increase the diversity of colors. The colors of the sandy beach and bare soil are relatively constant throughout the year. They are not affected much by time or environment and have a good consistency with the colors of the vegetation and water.

By placing the main colors and complementary colors shown in Fig. 5 on a color ring, it can be clearly seen that the natural colors are concentrated between Y (yellow), YR (yellow-red), PB (purple-blue), and B (blue) (Fig. 6). The distribution is quite concentrated, forming a relatively clear color environment tone.
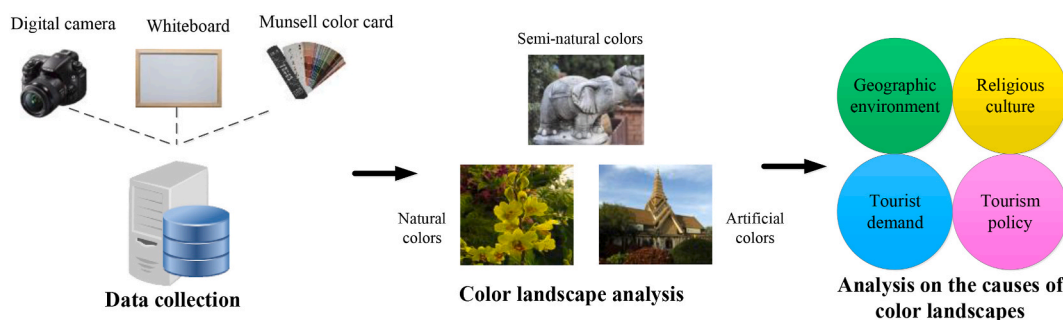

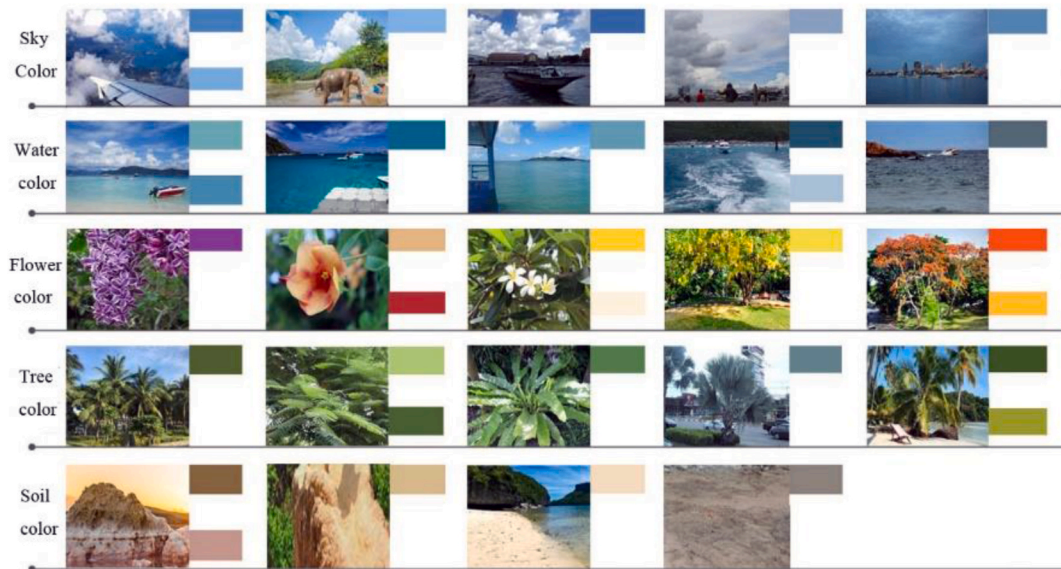**Fig. 3.** Technical method.

Fig. 4. Natural color compositions. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
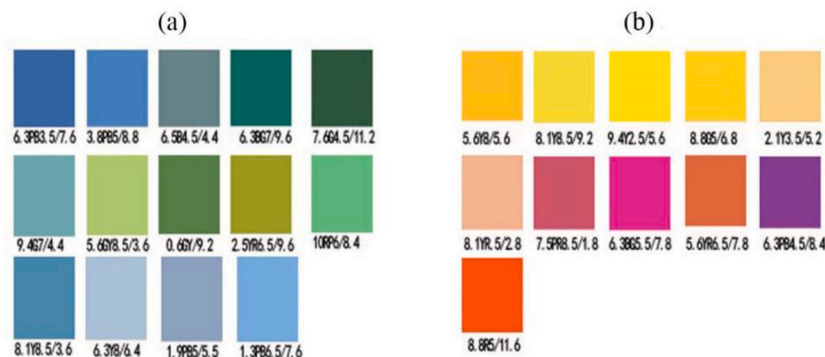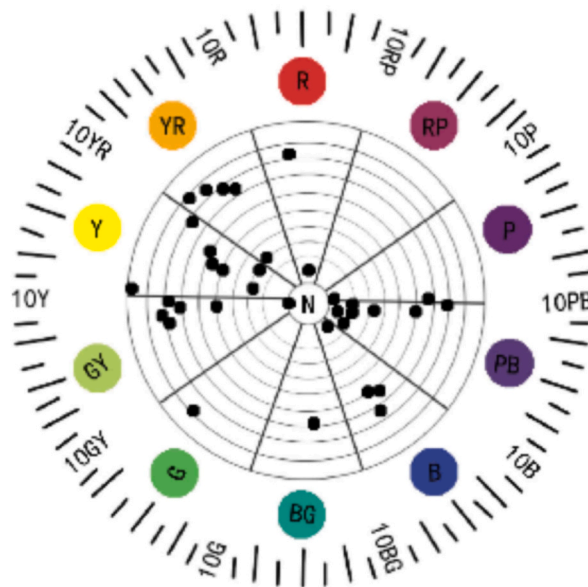

Fig. 5. Main colors and complementary colors. (a) Main colors; (b) Complementary colors. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

4.2. Artificial color analysis

Unlike natural colors, artificial colors are found in human-made paints and dyes. Paints are used for historic buildings, temples, bridges, vehicles, and some works of art and in printed advertisements, and dyes are used for fabrics. Due to the influence of cultures and customs, artificial colors are particularly prominent in the buildings and vehicles of Thailand cities. Ethnic costumes made of dyed fabrics are worn or displayed in only a small number of specific scenic spots, and their influence is not significant. Therefore, this paper focuses on the colors of the architecture and vehicles of transportation that play a leading role in the formation of the city color landscape in Thailand. As static color landscapes, architectural colors remain constant and influence the overall color landscape. The architecture of Thailand cities can be divided into classical architecture, which is mainly seen in temples, palaces, and traditional dwellings reflecting national traditional customs, and modern architecture, which is seen in buildings influenced by modern civilization. The colors used for these structures mostly affect the color landscape of a city in terms of the shape of an area. In contrast, the traffic colors form a mobile landscape. They can be thought of as dots that move and carry their colors with them. They have a strong degree of recognition. The current traffic colors are bright and varied; this is different from the past, when only one or a few colors were used for vehicles in most areas. The patterns formed by vehicles are often ignored.

4.2.1. Architectural colors

Classical architecture is the essence of the Thailand tourism culture and is rich in color matching. Classical buildings in every corner of a city contrast strongly with the surrounding environment. The Grand Palace [57], located in the center of Bangkok, is the largest

Fig. 6. Distribution of natural color tones on a color ring. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

existing, golden axle wood palace in the world. Its exterior wall is white, which represents purity and dignity. The main color of the palace is golden yellow, which shows a royal status. The roof is a classic three-roof structure of Thailand style, decorated with blue-purple and orange-red glazed tiles. The edge of the roof is made of yellow-green tiles, and the cornices are tall crests. Both solemn and lively in effect, the Grand Palace represents the high standard of Thailand classical architecture of a certain period.

The colors of classical architecture in the ancient city of Chiang Mai are more romantic. The White Temple (Fig. 7a) was built in 1998 by the famous Thailand painter and architect Chalermchai Kositpipat for King Rama IX of Thailand. It is overwhelmingly white. A large number of transparent glass plates are embedded in the white walls and sculptures to symbolize heaven. In sunlight, the temple is bright and clear. It has a strong visual impact on tourists, putting them into a peaceful mood and letting them experience the power of religious gods. Another interesting building is the Golden Toilet (Fig. 7b) inside the White Temple, which is different from other public toilets. Its color decoration and overall design have turned an old public facility into an organic part of a scenic area. It is in a single golden yellow building in the midst of a group of white buildings but does not seem jarring. Through the transformation of color and the design of form, the integration of a primary and a secondary landscape is achieved, which not only changes the traditional image cognition of a toilet in a scenic area but also realizes the coexistence of functionality and ornamentation of the facility.

The traditional dwellings in Pattaya are more "gentle and modest" in color and form. The main form is the stilted building. The whole building is made of wood. The roof is covered with black tiles. The interior color of the wood is mainly brown or primary-teak color. The buildings have good ventilation and heat dissipation and are embodiments of adaptation to a tropical natural environment. In the late 1980s, with the acceleration of city construction in Thailand, traditional buildings were gradually replaced by simple modern buildings. The use of wood materials was greatly reduced, and the shape was more transparent. The exterior walls were mostly painted and the architectural color was more vivid (Fig. 8).

ColorImpact software was used to analyze the architectural colors shown in Fig. 8 and to compare the most common temple color and residential color. It can be said that the colors used in classical architecture, of which religious temples are the core, have played a

Fig. 7. White temple and golden toilet in chiang mai. (a) White temple; (b) golden toilet. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
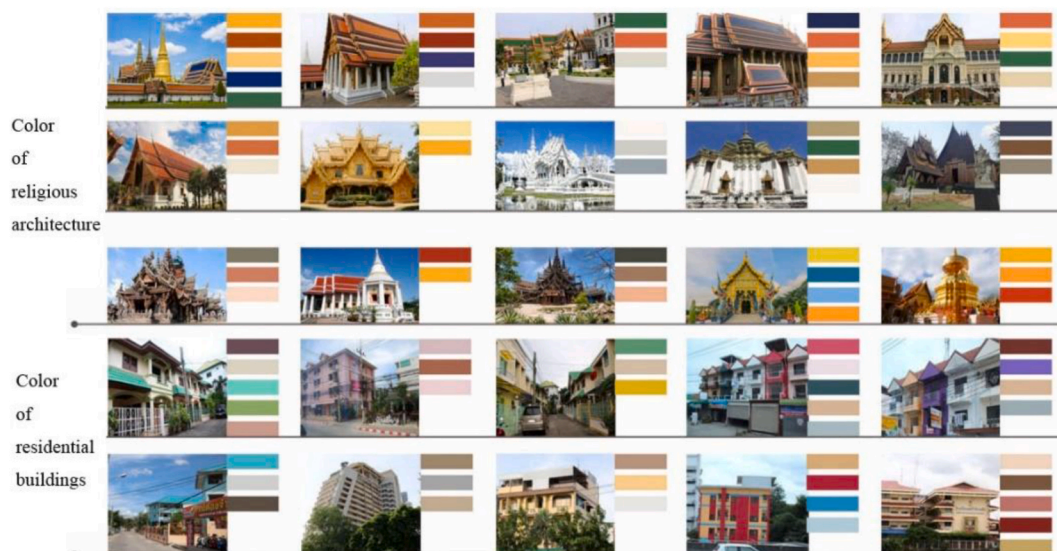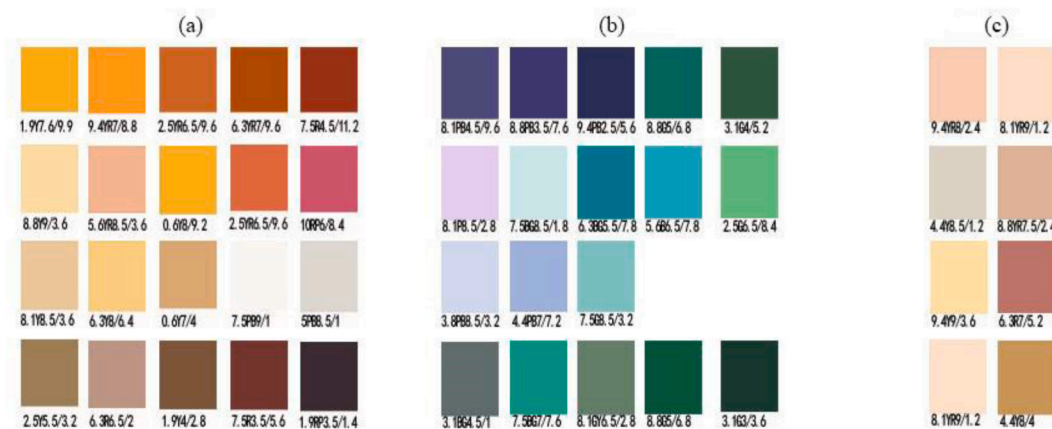
Fig. 8. Building color composition. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

guiding role in the formation of colors of the whole city. Yellow, red, green, and white are widely used in temples, and these colors have become the first choices of architectural color for residences. The architectural colors are divided into three types: main color, complementary color, and color of emphasis (Fig. 9). The concepts of dominant color and complementary color have been mentioned above. In building color analysis, we added the color of emphasis, which is the color that is most prominent relative to other colors. Through the comparative analysis of building colors, it can be seen that Thailand buildings generally take warm yellow as the main tone and have the roof and wall as the color carriers. Complementary colors include purple, green, and blue-gray, which often appear on the porch roof and balcony wall. Colors of emphasis, as part of city architectural colors, are widely used in modern architecture. It is not difficult to find that colors of emphasis have a certain likeness to the main colors after comparing the two types of colors. This paper illustrates the influence of classical architectural colors on a culture and the inheritance and improvement of modern architecture on a color culture.

If one places a color above the color ring and compares it with the previous study of natural colors, architectural colors are seen to have a relatively concentrated feature (Fig. 10). The main color and color of emphasis are mainly of high brightness, in this case, YR (yellow and red). There are two main areas of complementary color, BG (blue-green) and PB (purple-blue).

4.2.2. Traffic colors

The Thailand government's management of traffic colors is not limited to a single tone. Taxis, motorcycles, and buses are very bright in color, and as they shuttle through the streets of a city they form a flowing color landscape (Fig. 11). The colors are mainly

Fig. 9. Building color tones. (a) Main colors; (b) Complementary colors; (c) Accent colors. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
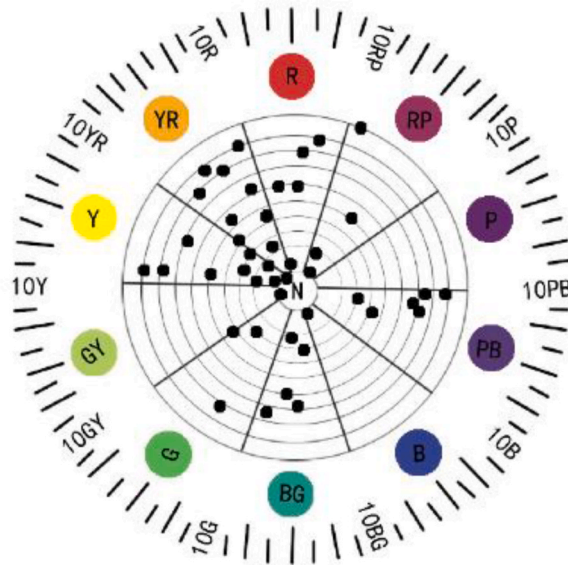
Fig. 10. Distribution of building color tones. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
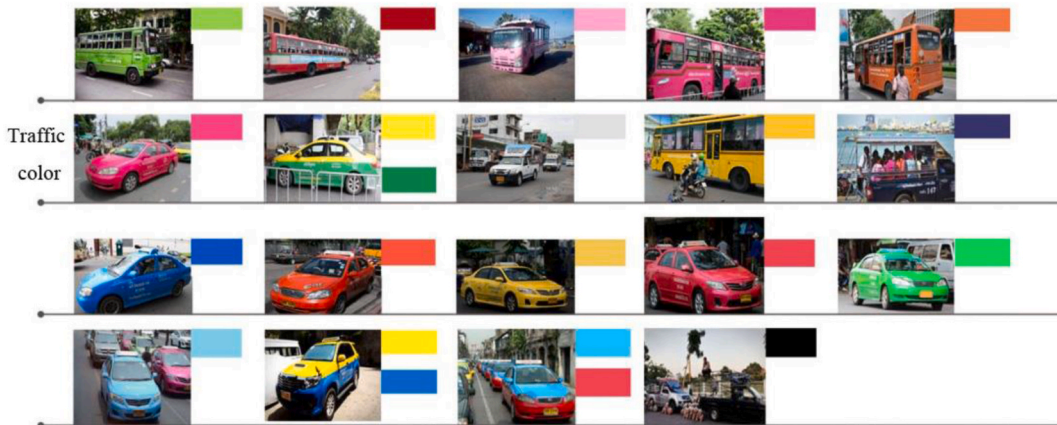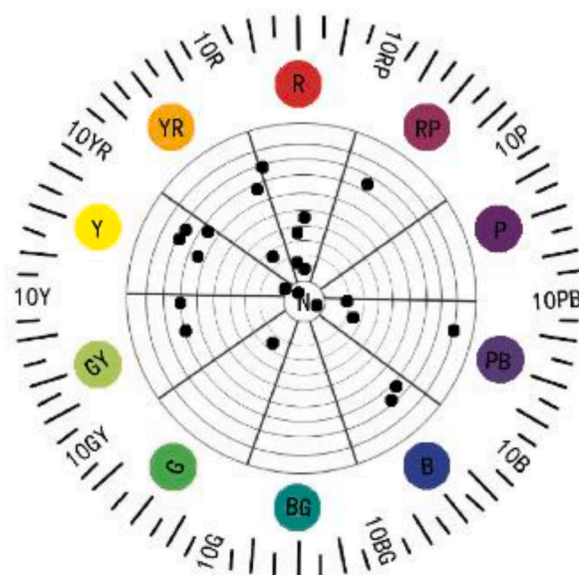

Fig. 11. Traffic color composition. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

yellow, red, green, and blue and are of high purity and brightness. Most of the colors used have a strong integrity. Therefore, we do not distinguish dominant colors and complementary colors in the study of traffic colors.

It can be seen from Fig. 11 that the bold use of color changes the usual images of the dull traffic colors to various bright colors and increases the variability of the city color landscape. By looking at the color ring (Fig. 12), it can be seen that the traffic colors are mainly GY (green-yellow), Y (yellow), YR (yellow-red), and R (red).

4.3. Semi-natural color analysis

Semi-natural colors are colors of objects made from natural materials by humans. Therefore, they are also the colors of nature in objects that have been worked into decorative or artistic but unnatural forms. After artificial design and processing, their physical properties are not easy to change. They are often presented in the form of sketches in the application of city landscapes. In Thailand, these objects are made of stone (Fig. 13a), jade (Fig. 13b), wood (Fig. 13c), and other regional materials. Most of the colors of these objects are gray and muted. The objects are often used as decorative accents that provide a visual connection between structures surrounding them, such as old and new buildings.

Fig. 12. Distribution of traffic colors. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)
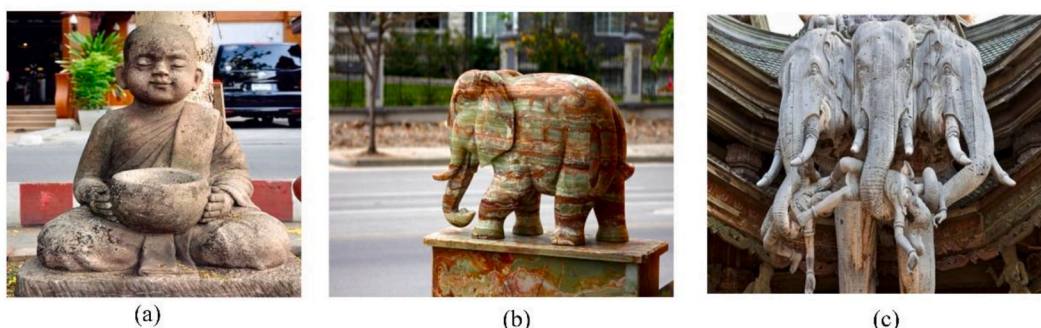
Fig. 13. Semi-natural colors. (a) Stone carving; (b) Jade carving; (c) Wood carving. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

4.4. Summary and analysis of city color landscapes in Thailand

Colors of nature and artificial colors play leading roles in the color landscapes of cities. The main colors of nature are blue and green, and the colors that complement them are yellow, brown, and red. Combining the two types of colors increases the diversity and beauty of the color landscape. Most artificial colors are used for architectural structures. In Thailand, warm yellow is the main architectural color, and purple, green, and blue-gray are yellow's complementary colors. By using the color ring, we can see that the colors of nature and architectural artificial colors have a certain degree of exchange between the main tones and auxiliary tones. That is, the main tones of the colors of nature become the complementary colors of architectural artificial colors, and the complementary colors of the colors of nature become the main tones of architectural artificial colors. In this way, the color landscapes of Thailand's tourism cities are based on blue and green, the colors of nature. Warm multichromatic colors and colors with high brightness and strong contrast can give tourists a bright, positive, and relaxed feeling. The color landscape can provide tourists with clear, strong, dazzling characteristics, which can play a prominent role in the image of a tourism destination. Color landscapes of city vehicles use diverse artificial colors. The cold and warm colors are used not as main colors and complementary colors but as an overall axis of color distribution that is basically consistent with the axis of colors of nature and artificial colors used for buildings. The traffic colors are much influenced by the local nature and culture, and they are a flowing expression of a color culture. In contrast, the semi-natural colors are flat. Even though the area they occupy is small, they can play a role in optimizing the transition between the colors of nature and artificial colors.

Because of their unique images and permeability, color landscapes are aspects of the whole range of tourism resource evaluations, landscape designs, route developments, and tourist experience evaluations, which have a direct impact on the decisions tourists' make

about travel. Although the three cities in the study area are different, the colors of nature, artificial colors, and semi-natural colors of them are the same. The colors of nature are almost not affected by the regional environment, and the whole are relatively bright. Influenced by the mainstream culture of Thailand, the artificial colors of Thailand cities have a high degree of purity and saturation, and this determines the overall color image of the cities. In contrast, most of the semi-natural colors are complementary to the landscape and the influence of landscape colors is weak. Therefore, understanding the use of city artificial colors is the key to understanding the quality of tourism resources and the attraction of city tourism.

5. Discussion

Color landscapes of tourist destinations are dependent on the landscape resources of the destination. Through the color matching and expression of different hues, purities, and lightness, color landscapes can produce different degrees of physiological stimulation for tourists, directly affect tourists' perceptions and judgments of a tourist destination, and make tourists form the overall color intention of the tourist destination. Through an analysis of a city's colors, we can see that the colors of nature and artificial colors of the color landscape in the tourism cities of Thailand are on the northwest-southeast axis of the color ring. The contrast of the main colors and complementary colors is obvious. Such combinations in a color landscape are determined by many factors.

5.1. Special geographical environments as foundations for the use of the colors of nature in Thailand

First of all, the geographical environments are the main factors affecting the formation of city color landscapes. For the overall characteristics of city color in Thailand, geographical environments play a decisive role in the formation of city color tone, lightness and chromaticity [64,65]. The terrain, soil, vegetation, water resources and other elements contained in the geographical environments provide material support for human city construction [66,67], and the use of localized materials makes the regional colors of the cities more obvious. Different natural and geographical environments create different regional colors. People often choose city colors according to regional climate, humidity, temperature, lighting and other conditions [54,68]. These color cultures caused by the geographical environments are further reflected in the architecture, clothing, transportation and other city landscapes of Thailand through continuous infiltration.

5.2. Religious culture and beliefs in creating the uniqueness of Thailand's tourism landscapes

Compared with the geographical environments, the influence of religious beliefs on the color landscapes of Thai cities is more typical and guiding, which is also where the color characteristics of Thai cities lie [69,70]. Because different religions have different beliefs with different color worship, such as Buddhism's worship for yellow and white, and Taoism's worship for black [71]. Therefore, when a country or region has a large range of religious beliefs, these colors generated by religious worship would be reflected in the color landscapes of cities. According to the survey, more than 95% of the Thai people believe in Buddhism, and Buddhist culture has wide penetration and influence in all social strata [72,73]. This kind of color worship generated by religious belief has formed distinct characteristics in the color landscpaes of Thai cities.

5.3. Counter promotion of tourists' demand motivation to the formation of color intention in Thailand

Existing studies show that color is an important manifestation of tourism destination image. Compared with abstract concepts, colors as visual symbols have strong visual expression. The cities with bright color landscapes are convenient for tourists to recognize and remember the city images through visual senses, so as to stimulate people's impression of the city images [29]. In recent years, more and more cities attract tourists through the construction of color landscapes, and tourists' personal preferences and expectations for a certain city often directly or indirectly affect the colors of the city. As a big tourism country in the world, in order to externalize the city's value connotation into the city image, the government has enlarged the colors that attract tourists in the process of city construction, which can be seen in the choice of colors of buildings, advertisements, transportation, etc [74,75].

5.4. Active and open tourism policies in the promotion of landscape intention

As one of the important economic pillar industries in Thailand, tourism has been supported by national policies since the formation of the industry and during its development, expansion, and upgrading. The Thailand government attracts tourists from all over the world by reducing taxes and organizing various tourism festivals and celebrations [76,77]. A large number of tourists have stimulated the transformation of scenic spot landscapes from extensive to refined, including the structural restoration of historic buildings, the renewal of colors, and the integration of regional customs in the color matching and arrangement of vegetation, which makes Thailand characteristics clearer. Thailand's tourism industry has been greatly developed, and the number of tourists visiting Thailand has reached a record high. In 2017, Bangkok was continuously rated as "the world's largest tourism destination city" [78]. In order to meet the wishes of tourists from all over the world, the National Tourism Administration of Thailand uses a variety of natural landscapes and historical and cultural attractions to launch a variety of tourism activities. There is a connection between the growth in tourism and the improvement of tourist attractions [79,80]. In this process, colors as the core of landscapes have been further strengthened.

5.5. Semi-free color architecture system of Thailand's tourist cities

Through the analysis of Thailand' tourism color landscape resources, we find that the formation of Thailand's city color landscape is a semi-free state color landscape system promoted by various forces (Fig. 14). Respect for the natural environment has caused the government to become aware of the needs of citizens and tourists to varying degrees. Among them, the geographical environment, religious beliefs, and tourists' expectations are the main driving forces leading to developments in the color landscapes. They determine tourists' color landscape intentions for tourist destinations. The government's policies, both rigid and flexible, have adjusted the city color landscape in Thailand, and this guarantees the sustainable development of the color environment. Through the formulation of clear color use requirements, the residents' awareness of maintaining the color environment has been strengthened, and the overall color landscape of a city can be effectively improved in a certain period of time. In contrast, objects with a semi-natural color can offset the strong stimulation resulting from the high saturation of main tones and their corresponding complementary colors. A strong inclusiveness alleviates the visual fatigue of tourists and increases their interest in the city landscapes.

6. Conclusions

From the color survey of three cities in Thailand, we can know that the color landscapes of Thai cities tend to be pure colors with high saturation. These colors are mostly the refraction of local religion, culture and geographical environments. The use of colors to market tourism destinations is conducive to inheriting local culture, highlighting local characteristics, enhancing the tourism attraction of destinations, and thus promoting tourists to form more positive cognitive images of tourism destinations. Then, understanding the formation and characteristics of the color culture of tourism destinations is not only conducive to marketers to design color images that are more in line with tourists' psychological expectations, but also to reasonably add color elements to the positioning, marketing, publicity and planning of tourism destinations, which can attract different tourist groups and improve tourism experience. In the context of the continuous transformation of tourism from a regional culture to an industry that provides economic benefits, Thailand makes full use of its rich and colorful city landscapes to show the national culture and regional characteristics of various cities. This attracts tourists from all over the world, and it not only promotes economic growth but also drives the development of related industries.

With the acceleration of urbanization, research on color landscapes is gradually becoming a hot topic of city construction, cultural promotion, and tourism development in different regions. Color landscape planning and design in different countries and regions has become an important way to address dilemmas of color and achieve color harmony. In-depth studies of the color development environment, formation process, functional characteristics, cultural connotations, and causes in different types of cities can enhance the theoretical and practical research of city color landscape planning and is also of guiding significance to cities undergoing transformation and development. Unlike the semi-free style color landscape system in Thailand, color landscape planning in many cities is regulated by government policies and is quite rigid, and most color landscape planning is not legally compulsory. It is common to break through the phenomenon of planning. Therefore, it is the key to ensure the color order to determine the legal status of color planning. The tenets of the geography of color propose that it is necessary to meet the actual needs of color landscape design and cultivate professional talent in color research and design.

The development of the city color landscapes is a gradual process of multi-agent coordination through the city economy and local culture. Therefore, the relationship between government planning and decision making and public participation should be
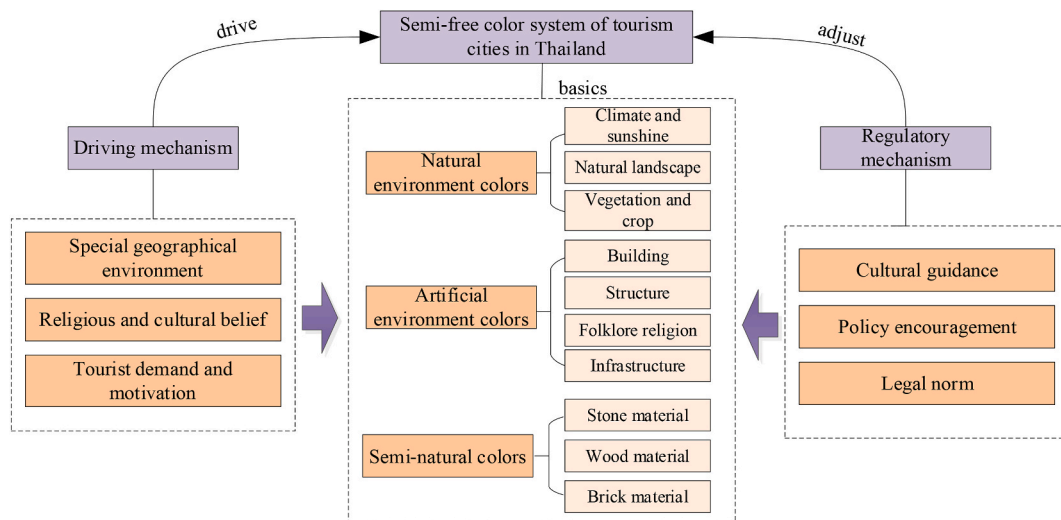
Fig. 14. Semi-free color system framework of tourism cities in Thailand. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

strengthened. Some city leaders view color planning as difficult to implement and tedious. This needs to be changed. Flexible regulations among government leaders (design leading), the public (design awareness), and the enterprise (design implementation) is the basis of landscape planning and design. Residents' desires should be reflected in color planning, and the complete implementation of the design can be ensured at the same time. It is also very important to enhance cultural confidence. The Thailand people's love for their own culture is reflected in all aspects of the color landscape culture. Many countries and regions also have excellent historical and cultural archives. If they can make proper use of them in their landscape designs and integrate their regional traditional cultures, histories, and knowledge into them, it will help to form a distinctive color landscape culture. Finally, in the color landscape configuration, we should make clear the temperature of the color and respect the laws of nature. Unlike Thailand, where the temperature is almost constant throughout the year, some countries have four distinct seasons and an array of rich natural colors in spring, summer, autumn, and winter. Some practices, such as "Southern flowers are planted in the north, and four seasons bloom; southern trees are planted in the north, and four seasons are evergreen" artificially weaken the climate and regularity of the landscape to some extent, resulting in the illusion of regional landscape assimilation [81,82]. Therefore, in specific designs we should operate flexibly, treat regional differences rationally, and cultivate personalized local color landscapes.

It is worth noting that although this study focuses on the color landscapes of three Thai tourism cities and systematically analyzes the color landscape composition and characteristics, the coverage is still not comprehensive. For example, the analysis of the background factors affecting the city landscape colors is still insufficient, and the comprehensive investigation and analysis of city advertising, signs and furniture are lacking. The next step of research would be to carry out in-depth analysis and research on the color landscapes of tourism cities in a more comprehensive way, so as to further analyze the tourists' cognitive laws on the color landscapes in tourist destinations.

Author contributions

Chunliu Gao: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Javed Iqbal: Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Data availability statement

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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