

Information integration of data in GIS to enhance the ability to choose hotels according to tourism experience requirements: a study in Thai Nguyen city, Thai Nguyen province, Vietnam

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Abstract: Nowadays, geographic information system has become a powerful tool to help tourists choose a place, type, or method... per the given requirements. In the future, spatial data and other timely travel data will be integrated, updated, and analyzed. This study combined spatial and tourism data to make the attribution a suitable hotel search choice. The hotel's location in Thai Nguyen City, Thai Nguyen Province, Vietnam, is displayed, and the service data of each hotel is used to analyze and query necessary information. The results show that Habana and May Plaza are hotels that meet the requirements of the number of rooms, convenient transportation, and convenience for visitors' experience. In addition, tourism information is always stored, updated, and edited and is also an information channel to help the tourism management of Thai Nguyen Province be better.

Keywords: Geographic information system (GIS), decision making, tourism.

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I. INTRODUCTION

Geographic information system (GIS) is increasingly developing and contributing to tourism development and management industries. Tourism studies with the integration of GIS can be mentioned as sustainable tourism planning [1], tourism management [2], tourist movement patterns [3], tourism marketing application [4], and assessing and finding suitable locations for tourism development [5]. Spatial distribution in tourism was carried out, and many aspects were discussed. Using ArcGIS software, Dickey et al. perform spatial analyses and display ecotourism regions [6]. The spatial distribution function is also represented by the foreign and domestic tourist distribution [7] [8]. Based on data from Montenegro Statistical Office (2017), the spatial inequality between tourist arrivals, foreign and domestic, was measured and compared. According to this report, tourism activity is a stronger trend in the Montenegrin coastal area, and tourist turnover in this region is better than in other parts. Research has also used GIS and integrated tourism elements to analyze and present the change in tourism arrival data. Cimbaljević, M. et al. [9] used geographic statistical methods to analyze tourism's spatial characteristics by measuring geographic distributions and mapping clusters. Balqies Sadoun et al. [10] pay attention to archiving documents and preserving historical sites using art technologies of GIS, RS, and photogrammetry. They showed that tourism and cartography have related, and the website was improved to provide essential information for tourists. The GIS has optimal capabilities in store, analyzing, presenting, planning, making a decision for tourism, and up-to-date information by posting on the web. Bas Boers [11] focuses on tourism planning to integrate sustainability into infrastructure planning via GIS. Some criteria were choices such as visitor experience preferences, carrying capacity, and resources of the region, and then it helps provide insight into the sustainable location and future infrastructure design.

Thai Nguyen province has many potentials for tourism development: Nui Coc Lake, Phuong Hoang cave, safety zone, Thai Nguyen tea hill, convenient location ATK, convenient transportation, 80km from Hanoi capital, from Quang Ninh tourist city 200km, located very close to the provinces rich in historical and cultural traditions such as Lang Son, Bac Giang, Bac Kan Tuyen Quang, Cao Bang. Thai Nguyen province identifies tourism development as the responsibility of the whole political system, creating a favorable environment for businesses and people to develop tourism. However, Thai Nguyen has yet to fully exploit the region's tourism potential, the digital tourism development database has not been paid attention to, and the tourism development policy needs to be more suitable with the available potential. Therefore, building a tourism database to quickly look up, analyze, and give long-term development orientation for the province is an important task.

The study's main objective is to create GIS data to support tourism development using hotel location, tourist location, and historic site features. This information is identified, analyzed, queried, and displayed based on the referenced data. It will also serve as a database for the future digital transformation of the travel industry with information on modes of transportation, assisting in trip planning.

- Find hotels that meet tourism criteria, such as conference rooms, swimming pools, spas, and bars.

The ultimate goal is to find hotels that match specific criteria:

- Locate hotels in Thai Nguyen City by extracting data from Google Earth (GE). The size of each hotel is statistically based on the number of guest rooms in each hotel. Some facilities such as: near the hospital, Automated Teller Machine (ATM), near tourist attractions around the hotel are exposed.

II. MATERIALS AND METHODS

The methodology carried out in this study collected data, entered data, and analyzed data in the GIS framework using ArcGIS software. The collected data was accumulated through surveying and collection in different formats such as GE, hospitality, and geographical data from Thai Nguyen Province. Then these databases were processed, evaluated, analyzed, and displayed. Next step, the database aggregates, compares and visualizes attributes and shapes data. After entering data in software, the missing data and new data were updated, implemented, and carried out; many functions, such as analysis, query, and planning, were serviced for the digital tourism industry.

Some spatial data help display the space and position of an object on the earth's surface, such as the Thai Nguyen province map, Ground control point, and GE image. The GE displays the position of object spatial and hotel location in this study. We find them from GE in Kml format and convert them into an ArcMap software layer. Other attribute data, such as room number and service type of each hotel, are imported into Arcmap software for querying and searching for tourist purposes. A combination of services and utilities of each hotel is stored, displayed, and served for tourism on a digital technology platform. Visitors can quickly look up, recognize and plan their travel.

III. RESULTS AND DISCUSSIONS

3.1. The location map of hospitality in Thai Nguyen City and the capacity of each hotel

Thai Nguyen province identifies three main types of tourism products, including eco-tourism and resort on Nui Coc Lake; agricultural tourism, tea experience, and tea culture; historical tourism on the source of Dinh Hoa' Safety area is linked with the sites, tourist attractions and historical and cultural relics of the provinces in the Viet Bac region. Revenue from accommodation and food services increased from 2010 to 2018, increasing around seven times (Figure 1). The number of guests served by accommodation establishments reached 1.495 thousand arrivals (in 2009), an increase of 6.3% compared to 2018. The number of visitors operated by travel establishments reached 14.5 thousand arrivals, an increase of 11.5%. In 2019, accommodation and catering services of the whole Thai Nguyen province were 3.752 billion VND.

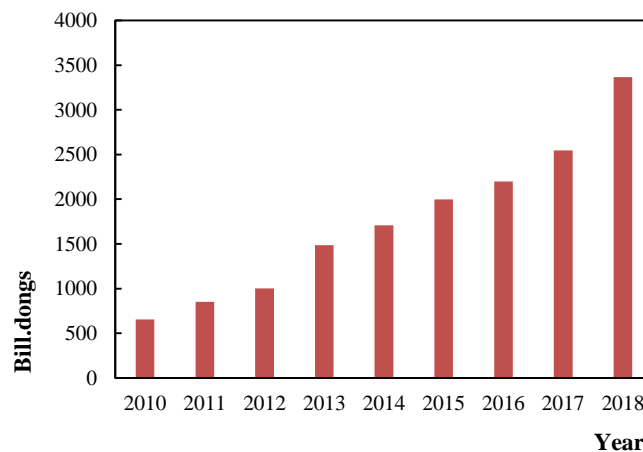


Figure 1. Total revenue accommodation and food services from 2010 to 2018 (bill.dong)

The tourism industry has an essential role in ensuring a good experience for visitors at the beginning of their journey. Experience in accommodation and accommodation is one of the critical tasks. Hotels are a popular form of housing, which significantly interests tourists and visitors. There is a close relationship between the hotel industry and the tourism industry. The available hotels provide accommodation options for visitors and essential accommodation facilities to ensure guests are the most comfortable. In addition to the above facilities, the hotel

also offers a range of other services depending on the size and business purpose of the hotel, such as food service, swimming pool, and golf course, different for each hotel.

Figure 2 shows the location of hotels in Thai Nguyen City. There are 46 hotels in the Thai Nguyen province (data from the Ministry of Foreign Affairs). Hotels have different sizes of rooms, areas, and services. In this study, in Figure 3, we only show hotels with a length of 15 rooms or more. We can be seen that there are 35 hotels displayed; these hotels will have a different number of rooms and services.

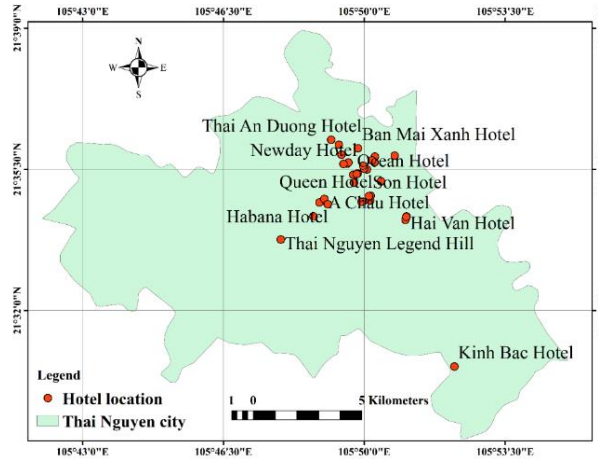


Figure 2. The hotel location in Thai Nguyen city

Figure 3 displays the hotel's scale following the room's number. Based on the number of rooms, we divided become three groups, including 15-40 number room, 41-70 number room, and 71-146 number room. In each group, there are 26 hotels in the 15-40 number room group, seven hotels in the 41-70 number room group, and two hotels in the 71-146 number room group. The group with the most room in Thai Nguyen City are Habana hotel (130 rooms) and May plaza hotel (146 rooms).

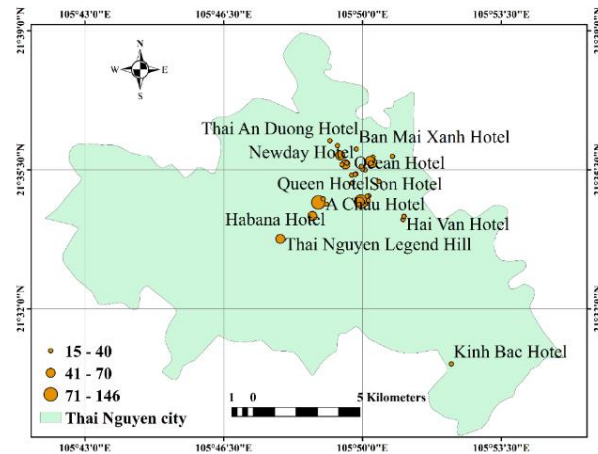


Figure 3. The number room of each hotel in Thai Nguyen city

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3.2 Research and query

Based on data from GE, we collect data on the position of ATM stations, hospitals, supermarkets, and tourist attractions. This information helps tourists locate and find information for research and reference and

improve operational efficiency and experience. Moreover, this information helps to digitize tourism, helping to model the visitor's experience. The distance of these services is quite close to the hotels, making it easy for visitors to move and experience emergencies. In addition to price, the service type is an essential criterion for tourists to choose a hotel. The benefits of hotels in the city are relatively uniform, except for some large hotels that will have accompanying services such as swimming pools, spas, and golf courses.

We exemplify an ideal hotel location with several services: conference room, spa, bar, parking... We query the hotel location with criteria such as over 70 rooms, near the hospital, near the supermarket, and the ATM. The query results show May Plaza hotel and Habana hotel with enormous scale, 130 rooms at Habana hotel and 146 rooms at May Plaza hotel. The outstanding facilities in the service of the two hotels can be mentioned as a bar, Massage/Spa, restaurant, and conference room. However, Habana has a large swimming pool on a crucial intersection connecting to Thai Nguyen City on the highway, near the hospital, near the university, only 300m from the bank transaction office, from the city center 2 km. Habana hotel is 300m from Orthopedic and Rehabilitation Hospital, 800m from A Hospital, and 340m from Viet Tea Supermarket. May Plaza hotel is 800m-2.5km from hospitals. From May Plaza to the eye hospital is only 800m but to Hospital A is 2.2km. Using the same method above, it is easy to query the distance from these two hotels to tourist attractions such as Nui Coc Lake, Phuong Hoang Cave, and the Museum of Cultures of Vietnam's Ethnic Groups. From Habana Hotel, visitors only need to move 14.3 km to Nui Coc Lake, 48.8 km to Phuong Hoang Cave, 3.7 km from the Museum of Vietnamese Ethnic Culture, and 62 km from the Safety of Dinh Hoa area. From May Plaza Hotel to Nui Coc Lake is 17km, to Phuong Hoang Cave is 42.8km, 4.3km from the Museum of Vietnamese Ethnic Culture, and 66km from Dinh Hoa Safe Area. As such, these two hotels are ideally located for groups of tourists to rest, entertain and be convenient.

IV. CONCLUSION

The study investigated the integration ability of GIS in hotel search according to visitor experience requirements. Biological, economic, and field data are integrated, allowing travelers to experience virtual reality and plan their travels accordingly. GIS has robust support in building databases, storing, analyzing, displaying, and querying data. In particular, GIS integrates and analyzes spatial and temporal data, supporting statistics and analysis of tourist destinations, travel time, and decision-making. In the growing digital tourism industry, updating tourism data and data is becoming increasingly crucial for tourists to have authentic experiences, design tourist routes, and choose reasonable trips.

Conflict of interest

There is no conflict to disclose.

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