

Mapping the Potential of Tourism Villages Using Geographical Information System in Bintan Regency, Riau Islands, Indonesia

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Abstract. Tourist villages are typically formed to provide at least three major benefits to the local community, namely economic, social, and environmental benefits. Pengudang and Busung villages have the potential to be used as tourist destinations, but this potential has not been fully realized. Pengudang and Busung Villages have been unable to provide economic benefits to the surrounding community due to a lack of utilization and development of natural resources. So far, the hub of tourist activity in Bintan Regency has only been Sebung Lagoi Village and its environs. Despite the fact that there are many villages in Bintan Regency with interesting development potential. As a result, a strategy must be developed so that Pengudang Village and Busung Village, in addition to Sebung Lagoi Village, can be developed as alternative tourist destinations. The use of geographic information systems can aid in the mapping of potential tourist villages. The goal of this study is to use a geographic information system to identify and map the tourism potential in Pengudang and Busung villages. This study employed a spatial analysis based on attractiveness and supporting facilities. According to the results of spatial data processing and field surveys, Pengudang Village has five tourism potentials, while Busung Village has four.

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1 Introduction

Tourism has an important role in increasing people's income and is one of Indonesia's leading industries. Because of the various tribes, customs, and cultures that other countries lack, Indonesia has great tourism potential, making it a unique attraction. A tourist village is a program for developing and utilizing objects with village appeal. Natural tourism, cultural tourism, historical tourism, traditional tourism, and handicraft tourism are all supported by attractions, lodging, and other facilities in tourist villages. The goal of tourism village development is to create a people's economy and independent villages. Tourist villages are expected to increase the trend and motivation for tourism trips that return to nature, interact with local communities, and are interested in learning about local culture and uniqueness, thereby encouraging rural tourism [1].

Bintan Regency has relatively good destination development, and tourism actors have a high level of awareness. Tourism activities in Bintan Regency, in particular, are still not evenly distributed across all regions or districts. The majority of tourist activities are currently concentrated in Sebong Lagoi Village. Meanwhile, Pengudang and Busung villages have not been developed to their full potential. Pegudang Village and Busung Village are villages in Bintan Regency that are distinct in their own right. The seagrass ecosystem, mangrove ecosystem, and coral reef ecosystem all exist in Pengudang Village. Trash house tours, traditional clothing, sunken shipwrecks, opium houses, and seafood festivals are also available. Meanwhile, unique tourist attractions in Busung Village include the blue lake, mangrove tourism, and Teluk Diraja Beach. This tourist attraction has existed in the past, but it has not developed well due to a number of obstacles, including a lack of home stays (lodging) and public facilities such as transportation and lodging.

Bintan Regency's destination development is relatively good, but tourism activities are still not evenly distributed in every region or village. Tourism development is clearly stated in Tourism Law No. 10 of 2009 to encourage equal distribution of business opportunities and gain benefits, as well as being able to face the challenges of changing life at the local, national, and global levels. Regulation of the Minister of Tourism of the Republic of Indonesia No. 29 of 2015 also states that the development of rural-based tourism (village tourism) is expected to drive tourism economic activity in rural areas, with the hope of preventing community urbanization from villages to cities. To address the issues raised above, it is necessary to map the tourism potential in Pengudang and Busung Villages, particularly in the areas of nature, history, and culture. Cultural mapping is ideal for determining potential in greater depth [2].

To effectively map tourist attractions, fast and accurate mapping techniques are required. Satellite remote sensing data and GIS (Geographic Information Systems) are critical for mapping and monitoring natural resources on the earth's surface. Geographic Information Systems (GIS) can be used to map tourist areas by utilizing remote sensing data. A Geographic Information System (GIS) is a type of software that can be used to input data, store it, manipulate it, and display it.

The output is geographic information about objects on the earth's surface that have the potential to be used as tourism, residential, or transmigration areas [3][4]. As a result, there is a need for tourist area mapping and good management in efforts to develop tourist attractions. As a result, it is critical to chart the evolution of Pengudang and Busung Village's attractiveness. This is consistent with the Indonesian government's policy, which is currently focusing on developing small islands as conservation areas in collaboration with the tourism industry [5]. This activity aims to provide tourists with the best information possible so that the development of tourist objects and attractions can boost economic growth.

2 Research methods

2.1 Time and Place

The field survey was conducted in Pengudang Village and Busung Village for four months, from September to December 2023. From November to December 2023, data was processed and analyzed. Fig 1 depicts the research locations of Pengudang Village and Busung Village.

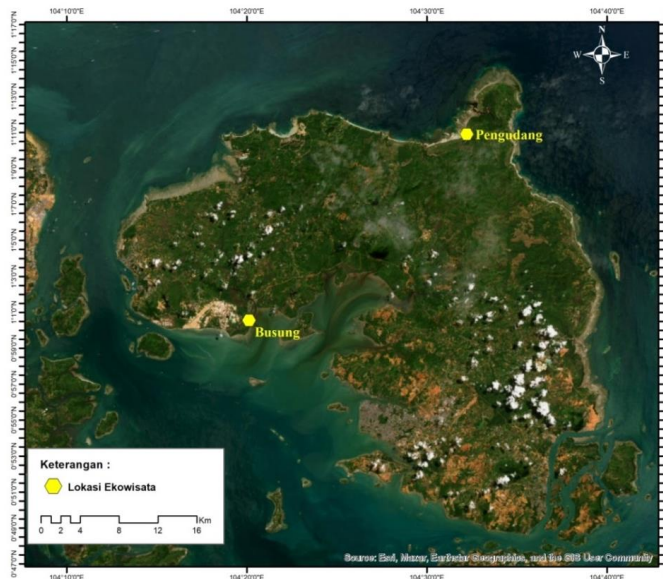


Fig 1. Map of research locations

2.2 Tools and Materials

A set of computers, Arcgis software, Microsoft Word software, Microsoft Excel, GPS, camera, and writing equipment were used in this study. The Indonesian Earth Map (RBI) at a scale of 1:25,000 in 2021 Geospatial Information Agency (BIG), Village Boundary Map at a scale of 1:25,000 Geospatial Information Agency (BIG), SHP of rivers, lakes, and roads at a scale of 1:25,000 Geospatial Information Agency (BIG), and data DEM (Digital Elevation Model) were used in this research.

2.3 Methods and Procedures

2.3.1 Data Collection

The mapping procedure is divided into three stages of activity. Several methods are used in the activity stages to collect data and references, which can later be used to strengthen and simplify the research results.

- a. Observation : Observation is a data collection method that involves observing and recording. The observer's job is to watch the object being studied and record everything they see. Direct observations were made in Pengudang and Busung villages in Bintan Regency, Riau Islands Province.
- b. Data collection : Data was collected using primary and secondary sources, and the data was analyzed spatially. Primary data is information gathered directly in the field via field surveys, interviews, and documentation. Secondary data is information obtained from government agencies and the results of online data collection in the form of satellite images overlaid with relevant literature.

Table 1. Data yang dibutuhkan

No	Data yang dibutuhkan	Sumber
1.	Regional profile	Pengudang dan Busung villages
2.	Potential Opportunities and Investments	Interview / FGD with stakeholders
3.	Potential Obstacles	Interview / FGD with stakeholders

Interviews are the process of gathering information based on research objectives via a question and answer format, in which questions are posed by the interviewer and answers are provided by those being interviewed. The first type of interview is a Focus Group Discussion (FGD) with village stakeholders such as village/lurah heads, local RT(Rukun Tetangga) / RW (Rukun Warga) heads, PKK (Pemberdayaan Kesejahteraan Keluarga) women, village

consultative bodies, BUMDES, ecotourism community groups, POKDARWIS (Kelompok Sadar Wisata), heads of youth organizations, UMKM (Usaha Mikro, Kecil dan Menengah), business actors, and other ecotourism services.

- c. Review of the literature : A literature study is a method of gathering data from libraries, websites, previous research, books, notes, and reports on the activities undertaken. This study's literature consists of scientific writings about natural tourism, related maps, and geographic information systems.

2.3.2 Data Analysis

Spatial analysis is used to classify the unique distribution of the space-forming elements that will be discussed by describing the object under study in the form of point, line, and plane elements. This process investigates how the potential at activity locations is spatially mapped into tourist areas.

- a. Tagging : The process of adding geographic tagging to an object is known as tagging. This procedure makes it easier to track and locate information about a specific location. Every tourist attraction in Busung Village and Pengudang Village is tagged for this activity.
- b. Digitization : Digitization is the process of converting analog data to digital format. In GIS, digitization is the process by which previously raster-only objects such as roads, houses, rice fields, rivers, and others are converted into vector objects (polygons, lines, and points). Digitization is used in this activity to create tourist locations, regional borders, road construction, and other objects deemed necessary.
- c. Inventory : This activity involves recording and compiling the attractions and tourist components of each area, adjusting them to the indicator components of natural tourist areas, and then entering them as map attribute data.
- d. Tourism potential mapping : This is the stage in which the tourist attractions at the activity location are mapped. Mapping was done with the ArcGIS application using data from interviews and field surveys. As a result, a natural tourist attraction displaying the spatial distribution of tourist attraction locations is created. Then, create a tourist map by describing the condition of the tourist attraction and including its geographical coordinates.
- e. Validation of data : At this point, the obtained data is re-validated by comparing the inventory data on the map to the actual conditions in the field. This is done to obtain accurate results that are in accordance with the conditions in each village.

3 Results and Discussion

3.1 Research result

Pengudang Village and Busung Village in Bintan Regency have significant tourism potential, particularly natural tourism combined with strong local customs. Nature Tourism, Island Exploration Tourism, Cultural Tourism, Beach Tourism, and Historical Tourism are all available in Pengudang and Busung Villages. Pengudang and Busung villages are well-known for their beautiful natural attractions. Divers, snorkelers, and swimmers can enjoy a variety of activities in Pengudang Village's shallow waters, which still have healthy seagrass and coral reef ecosystems. Busung Village, on the other hand, has desert tourism, a blue lake, and historical tourism in the form of eating the hero Hang Nadim.

3.1.1 Pengudang Village

Pengudang Village's superior potential is in fisheries, which can stabilize the community's economy and increase per capita income. The fisheries sector employs up to 26% of the population and is supported by village areas that directly border the sea. Aside from that, Pengudang Village has a sizable mangrove ecosystem. Pengudang Village's mangrove forest area is one of the potential tourist destinations.

Because Pengudang Village has a variety of tourist destinations, its tourism potential is well known to the general public, particularly in the Tanjungpinang and Bintan areas. The Bintan Regency general spatial plan for 2005-2025 designates Bintan Regency as a tourist area, one of which is Pengudang Village. Pengudang Village has the following tourism potential:

- a. Island The exploration : Island exploration is a tourist activity for Pengudang Village mangrove tours. Visitors will be taken to see the location of the shipwreck, which is a relic of the royal dynasty, the beautiful Junjung rock, and the underwater beauty in the waters of Pengudang Village by snorkeling and diving while enjoying the charm of the beauty of the mangrove forest in Pengudang Village.
- b. Batumpang Beach (Seafood Festival) : The Seafood Festival is an annual event held at the end of each year, usually in November or December. This activity promotes Malay culture while also highlighting the culinary potential of seafood such as shrimp crackers, sotong crackers, fish crackers, and dodol, a syrup made from mangroves that is processed by the local community. This activity also includes traditional games and one-of-a-kind exhibitions at Batumpang Beach.

- c. Shipwreck Tourism : Shipwreck history tourism is a tour of the remains of sunken Chinese dynasty ships. Following further investigation on the ship, many remains of items such as bowls, jars, glasses, plates, coins, money, and others that were estimated to be hundreds of years old were discovered.
- d. Batu Junjung : Batu Junjung is a must-see tourist attraction in Pengudang Village. The location is behind the hill at the end of Batumpang Beach. You can travel to Batu Junjung by boat or on foot, but the road is steep and uphill. If you want to go camping, there is a designated area.
- e. Roka Resort : Roka Resort is one of the Pengudang Village resorts. If you want to stay and tour Pengudang Village, this resort has a swimming pool, beach, restaurant, and several other amenities.
- f. Mangrove Educational Tourism : Pengudang Village has developed into a popular marine tourism destination in Bintan Regency. Routine activities such as mangrove planting tours are carried out. Mangrove educational tourism is a tourism activity that teaches tourists about natural sustainability and community culture in order to become an attraction in the preservation of life and the mangrove ecosystem. Mangrove education activities in Pengudang Village include everything from sharing mangrove knowledge to planting mangrove seedlings.

3.1.2 Busung Village

Busung Village is one of the villages in Bintan Regency's Seri Kuala Lobam District. Busung Village is one of the villages with material, labor, community self-help, and tourist attractions. The area of Busung Village is 1,913 Ha, with the northern border being Kuala Sempang Village, the southern and western parts bordering the sea, and the eastern part bordering Teluk Lobam Village. Busung Village has a population of 1,530 418 people divided into 418 families. Busung Village offers a wide range of tourist attractions. Cultural tourism, island hopping tourism, beach tourism, historical tourism, and natural tourism are all options. The natural tourist attraction of the Telaga Biru Desert is the most striking. Busung Village has the following tourism potential :

- a. Blue Lake and Desert : There is a desert formed naturally with white sand in this location. A number of statues in the shape of horses and camels were purposefully erected as tourist photo ops. Telaga Biru Bintan was formerly a sand mining area. The mine is no longer in operation, and the unused sand material scattered around the site gives it the appearance of a desert, while the former sand pits have filled with rainwater, forming a lake. The Telaga Biru Bintan Desert has many interesting places to photograph or simply enjoy the scenery. Telaga Biru (Blue Lake) is so named because the water is clear and Tosca blue.
- b. Tour Mangroves : The mangrove tour is a type of community-based tourism. Tourists can tour/explore the mangroves using a speed boat to see the natural beauty along the river, which is managed directly by the community.
- c. Culture of Mass Circumcision : Carrying out mass circumcision activities is a typical Busung Village culture. This is an annual event held to commemorate the Prophet's birthday, as well as a parade to commemorate the Prophet's birthday and a plain flour event. This activity is steeped in Malay culture and traditional Malay culinary delights like egg trees, flags, and traditional Malay decorations.
- d. Hang Nadim grave : Admiral Hang Nadim has a remarkable heroic story that has been passed down from generation to generation. Admiral Hang Nadim, nicknamed Lang-lang Laut, served the Kingdom of Malacca. This nickname was given to him because his job was to patrol the Malacca Kingdom's strait area. The grave of the Malay hero Admiral Hang Nadim is located in Busung Village, where a pilgrimage is held every 27th of Sha'ban led by the Bintan Traditional Leader.

3.2 Discussion

After observing and exploring tourist attractions in Pengudang Village and Busung Village, Bintan Regency, the tourist destinations are outlined in the form of a tourist map, as shown in Figures 2 and 3. When visiting, tourists generally consider the completeness of the facilities. Tourist facilities and services improve visitor [6]. As a result, tourism mapping in Pengudang and Busung Villages includes not only existing tourist attractions but also interpretations of tourist routes and tourism supporting aspects such as restaurants, home stays, places where handicrafts are produced, and culinary production typical of local communities.

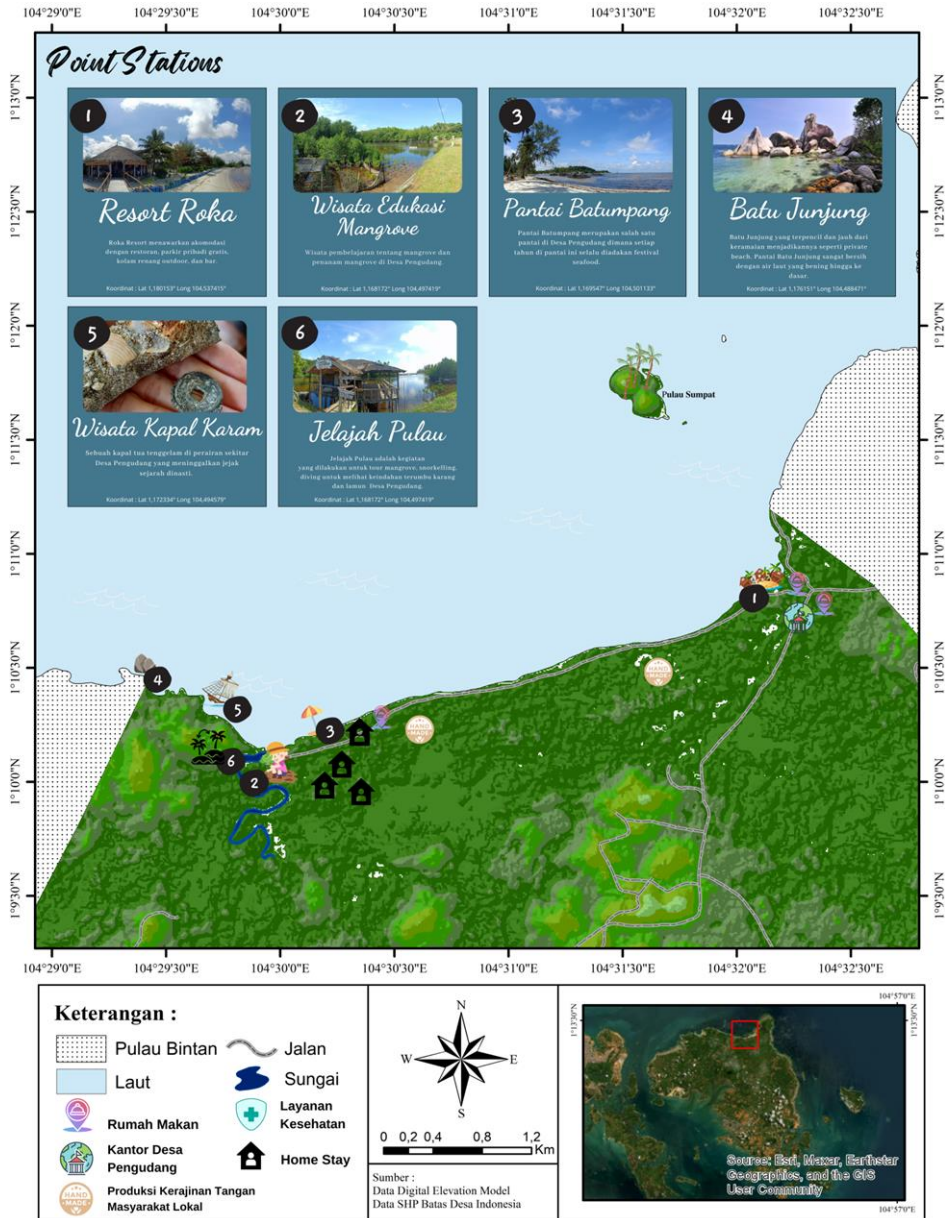


Fig 2. Tourist Map of Pengudang Village

The results of this research's tourism potential map include coordinate points, supporting facilities, and photos of tourist attractions, as well as explanations about each tourist attraction. This differs from previous research [7] [8], which only mapped coordinate points and supporting facilities on the map display. The mapping of tourism potential in this study was not done concurrently with the preparation of tour packages, as was done in previous research [2]. The preparation of tour packages is hoped to make it easier for tourists to enjoy the tour because the activities have been scheduled, making it more practical [9].

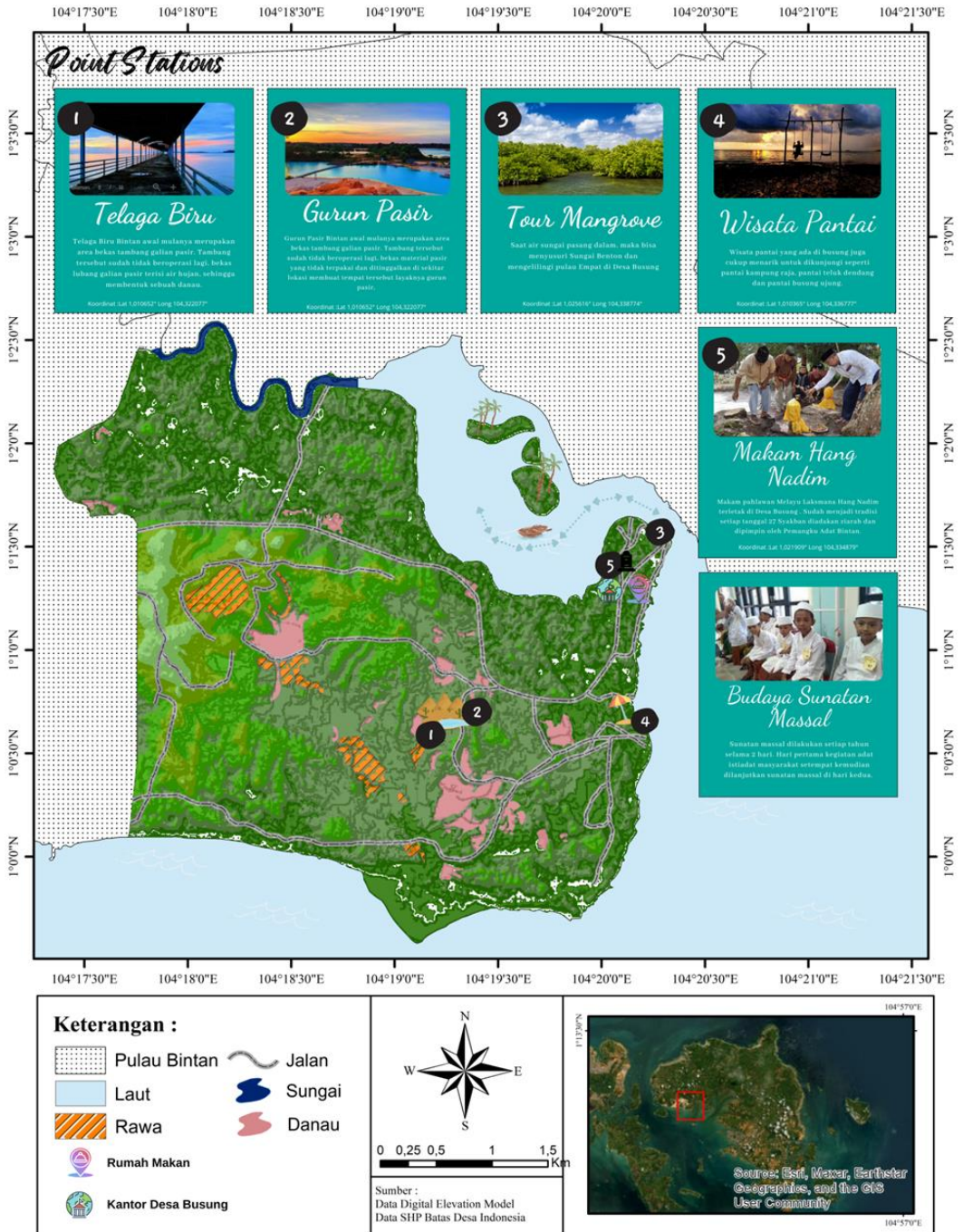


Fig 3. Tourist Map of Busung Village

Tourist villages not only have distinctive products, but also a variety of attractions, strong customs, and unspoiled natural tourism. Tourist attractions, according to [9], have a positive and significant influence on tourists' decisions to visit tourist attractions. The more appealing the tourist attractions displayed, the more tourists will choose to visit those locations. Each village has its own mangrove forest with various mangrove tour options. Mangrove tours in Pengudang

Village can be combined with other activities such as snorkeling and diving to see seagrass and coral reefs. Meanwhile, in Busung Village, a mangrove tour is conducted at high tide around four islands, each with its own distinct character.

Because of the unique differences in tourist attractions, tourists have a wide range of destinations and decisions to make. Tourists have shown an interest in rural areas because of their potential for natural and cultural scenery, as well as various handicrafts. Rural tourism has distinct characteristics, such as an unspoiled natural environment, clean and cool air, beautiful views, the presence of various types of animals and plants, as well as rural residents and their culture, which provide tourists with unique experiences that they cannot obtain in cities [10]. Rural areas have many attractions and strengths that attract both domestic and international tourists [11].

Tourist attraction mapping is carried out in general by mapping natural tourism, culture, local attractions, typical and unique products offered to tourists in each village in Bintan Regency. With the village's characteristics, this can be followed up on to provide many benefits for the relevant village area [12]. This tourist village mapping was done in the hope of providing benefits such as job opportunities, development for local UMKM, and increased income for the surrounding community.

4 Conclusion

Because Bintan Island is surrounded by water, the potential for beaches and natural resources is particularly appealing. Pengudang and Busung villages have the potential to be used as tourist destinations, but this potential has not been fully realized. It is hoped that this tourist village mapping will make it easier for tourists to enjoy tourism in Pengudang Village and Busung Village. The tourism potential map in Pengudang and Busung Villages includes information about tourist attractions such as tourist attraction locations, home stays, restaurants, health services, government offices, and souvenir shops. Pengudang has five tourism potentials: Island Exploration, Batumpang Beach, Sinking Ship Tourism, Baju Junjung, and Mangrove Educational Tourism, whereas Busung Village has four: Blue Lake and Desert, Mangrove Tour, Mass Circumcision Culture, and Hang Nadim Tomb. The tourism potential mapping project, it is hoped, will make it easier for tourists to visit.

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