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Geographic information systems and big data analytics: optimizing digital adoption to develop tourism in Buton Islands, Indonesia

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Abstract

This research aims to optimize tourism potential in the Buton Islands, Indonesia, using Geographic Information Systems (GIS) and Big Data Analytics. The study addresses the low tourism potential in the region and constraints in tourism development, such as lack of information and data. Qualitative methods include document analysis, literature studies, and focus group discussions. Quantitative methods involve surveying respondents about the use of GIS and Big Data Analytics in tourism development. Data was collected from government documents, online news, and direct observation of tourist sites. The results emphasize the importance of IT and GIS in developing the tourism sector in the Buton Islands, particularly in Baubau City and South Buton Regency. GIS is crucial for identifying and managing tourism potential, while Big Data Analytics helps optimize development by analyzing visitation trends, tourist preferences, and consumer behavior patterns. The integration of these technologies can improve tourist experience and efficiency of tourism-related public services. By integrating GIS, Big Data Analytics, and Information Technology, local government and stakeholders can collaborate to create a superior tourism experience, support local economic growth, and ensure the sustainability of the natural and cultural environment in the Buton Islands.

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Introduction

Geographic Information Systems (GIS) and big data analytics are essential in optimizing digital adoption for tourism development (Sakas et al., 2022; Tang, 2023). Using geographic information, big data can strategically plan and control land use to develop and allocate resources for tourism areas such as Sichuan Province (Su, 2023). Using web analytics and big data in tourism development can improve customer visibility and experience. In the era of COVID-19, revenue management, marketing strategies, and innovative and sustainable development of the travel experience must be developed (L. Wu et al., 2023).

Using information technology (IT) in government can potentially improve the effectiveness and efficiency of public services (Lawelai et al., 2023; Sarwar et al., 2023), including in the development of the tourism sector (Pencarelli, 2020; Werthner et al., 2015). GIS and big data analytics are recent developments in government information technology that can be applied to tourism development (Tsou, 2015). By integrating GIS and big data analytics in tourism development, the government can utilize data and

information to identify tourism potential that needs to be developed and determine the right development strategy (Miah et al., 2017), and make more precise and strategic decisions in developing tourism in an area.

GIS technology has had a significant impact on tourism development by providing valuable spatial analysis tools in tourist destinations such as Parma, Spain (Ruiz-Pérez et al., 2023). It also controls pedestrian flows and identifies cultural heritage sites near railroad systems, thus facilitating sustainable tourism routes between cities such as Turin and Milan (Rolando & Scandiffio, 2022). GIS also helps assess visitor preferences and helps travelers decide on planning and marketing strategies (Li et al., 2021). GIS also plays an important role in tourism, potential assessment, geological mapping, and supporting integrated management frameworks for natural areas such as Rottnest Island in Western Australia (Supak et al., 2015).

GIS has had a significant impact on tourism development in various regions (Brown & Weber, 2013). Through integrating spatial data such as topography, climate, vegetation, and infrastructure, GIS helps identify potential tourism areas and develop appropriate strategies (Han et al., 2023). In addition, GIS also helps analyze tourism patterns, plan infrastructure development, and estimate environmental impacts (Nunna & Banerjee, 2022). By combining these data, governments can design sustainable and competitive tourism strategies, including environmentally friendly attractions, effective promotion, and responsible destination management. GIS is thus a valuable tool for planning the future of tourism in the Buton Islands.

Meanwhile, big data analytics can process tourism data and provide new insights into tourism trends, visitor behavior, and preferences (Miah et al., 2017). Thus, the government and tourism actors can be more informed (Burbano et al., 2022; Heimtun & Haug, 2022; Zou & Yu, 2022), and strategic decisions in developing tourism in the Buton Islands (Lawelai et al., 2021). In addition, the use of information technology can also increase government transparency and accountability in tourism development. The government can utilize electronic platforms to publish information related to tourism development (Abdul Aziz et al., 2023), such as plans, budgets, and financial reports. Government information technology use is expected to help improve tourism development in the Buton Islands. New findings and results in this study of government information technology can be applied to tourism development in other regions in Indonesia.

The problem behind this research is the low tourism potential in the Buton Islands, which the government has not maximally utilized (Sadat et al., 2023). Tourism actors (Salma et al., In addition, there are still obstacles to developing tourism in the Buton Islands, such as the lack of information related to tourism potential, lack of data and information about visitors, and lack of access to information for tourists who want to visit the Buton Islands. Therefore, this research aims to optimize digital potential using Geographic Information Systems and Big Data Analytics to develop tourism in the Buton Islands. Thus, it is expected to increase tourism potential in the Buton Islands and encourage regional economic growth.

The urgency of this research lies in the importance of developing the tourism sector in the Buton Islands as a regional economic potential that is still not maximally utilized. Information technology, especially GIS and Big Data Analytics, is crucial in optimizing tourism potential in today's digital era. This can help collect and analyze data and information related to tourism potential, visitors, and access to tourist information. Thus, tourism development in the Buton Islands can be carried out more

effectively and efficiently to increase regional economic growth and the welfare of the local community (Khairul et al., 2022).

This study aims to create an information system to optimize the tourism potential of the Buton Islands using GIS and big data analysis. This system provides accurate, effective, and efficient information for tourism development. The problem-solving approach includes spatial analysis in decision-making to increase digital potential in tourism development. This research is expected to improve the quality and quantity of tourists, strengthen Indonesia's tourism competitiveness, and improve stakeholder decision-making. Using information technology and big data strengthens innovation and improves efficiency and productivity in the tourism industry.

Research Methods

This study focuses on the Buton Islands region, including Baubau City and South Buton Regency, an essential economic, social, and cultural region in Southeast Sulawesi, Indonesia. Baubau City is a historical city founded in 2001 with a land and sea area of 295,072 square kilometers and a population of 166,150 people. Established in 2014, South Buton Regency has a land and sea area of 509.92 square kilometers and a population density of 99,580 people, significantly contributing to the region's economic growth. Understanding the potential and dynamism of the region can help develop effective strategies to increase tourism attractiveness, strengthen the local economy, and improve community well-being.

This study uses several steps to achieve the research objective. In the first phase, geographic data collection will include surveys and focus groups (FGDs) to understand the tourism situation in Baubau City and South Buton Regency and develop geography-based information. In addition, this study will also collect tourism data such as the number of tourist visits, tourists' perceptions, and demographic data of tourists. This research method allows tourism destinations and facilities to be identified and mapped (Rosselló et al., 2021). The provision of tourism information requires the participation of stakeholders through FGDs in tourism decision-making. (Avci & Özgen, 2022).

Secondly, in the data analysis stage, researchers used Brand24 to identify patterns, trends, and a deep understanding of big data that can be used for decision-making related to tourism development. Brand 24 is an easy-to-use tool for analyzing discussions and mentions of brands and phrases across various media platforms. It provides sentiment analysis, influencer analysis, and automated PDF reports to help users identify influencers, increase brand awareness, and improve marketing strategies. Web analytics and big data are revolutionizing tourism, enabling destinations to attract more visitors and enhance competitiveness (Tang, 2023). These technologies help predict tourist behavior patterns, optimize destination management, improve decision-making processes, attract quality tourists, and increase tourist revenue (License & Han, 2023).

In the last stage, this research visualizes GIS for Tourism in the Buton Islands, which explains the distribution of tourist destinations in the two research locations. This research also visualizes the trend of mentioning "Wisatabuton" on social media. Utilization of information technology to improve the effectiveness and efficiency of public services in tourism development that displays data on trends in the number of tourists in Baubau City and South Buton Regency.

Results and Discussion
A GIS for Tourism in the Buton Islands

Tourism GIS is very important in the world of tourism (Wei, 2012) Especially in Buton Islands, Baubau City, and South Buton Regency. The system uses geospatial technology and geographic data integration to identify and manage tourism potential in the region (Ambecha et al., 2020). The system provides detailed information about tourist destinations, including location, accessibility, facilities, and unique attractions (Hoang et al., 2018), thus allowing travelers to plan their trips more efficiently.

Tourism GIS also serves as a tool for local governments and tourism destination managers, providing valuable data on visitor patterns, visitation rates, and environmental impact (Zhang et al., 2020) This data helps plan visit management strategies, establish destination capacity, and design conservation measures to preserve nature and culture (Hewlett & Brown, 2018).

The Buton Islands Tourism GIS can potentially benefit the tourism industry, visitors, and local communities. GIS enables personalized travel experiences, increasing visitor satisfaction and expanding the range of passengers visiting the islands. Mobile apps and interactive websites can provide comprehensive information on tourist attractions, visitor reviews, photography, and content sharing, thereby enriching the traveler experience and fostering deeper connections with the locations and local communities.

However, the Buton Islands Tourism GIS also has significant implications for local economic development and the preservation of the unique nature and culture of the region. This technology can enhance local economic sustainability, promote sustainable tourism, and improve tourist accessibility. Therefore, there is an urgent need for the study and development of a Buton Islands Tourism GIS. The Buton Islands can enhance the visitor experience, drive local economic growth, and conserve environmental resources by utilizing advanced technological strategies. Emphasizing this study's importance can inspire stakeholders to invest resources in this technological advancement to accelerate the growth of the tourism business in the Buton Islands.

The city of Baubau, located in Southeast Sulawesi, Indonesia, is a popular tourist destination famous for its historical and religious tourism (Astiana, 2019; Gufran & Nastia, 2022). The Buton Sultanate Fort, a 2,740-meter-long limestone structure, is the largest in the world and was recognized by the Indonesian Record Museum and Guinness Book Record in 2006. Built-in the 16th century by the third Sultan of Buton, La Sangaji, the fort played an important role in the history and defense of the Buton Sultanate for more than four centuries. The Baadia Fort, built by Sultan Muhammad Idrus Kaimuddin I, was a defensive base from pirate attacks.

In addition to its historical value, Baubau City offers a religious experience with the Great Mosque of Wolio, the oldest mosque in Southeast Sulawesi, and the Cuban Mosque, the tomb of the Sultan of Buton XXIX. The Malige Palace, a heritage wooden building, reflects the tradition of Butonese wooden architecture. Museum Keraton Buton, also known as Museum Budaya Wolio, exhibits a collection of relics of the 38th Buton Sultanate.

The traditional ritual of Batu Poaro, part of Buton's cultural heritage, is a fascinating experience for tourists seeking a spiritual and historical experience. The ritual pays homage to Sheikh Abdul Wahid, a key figure in the Islamization of the Buton Kingdom. The ritual not only honors historical figures but also reflects the local people's strong beliefs and cultural roots. The ritual is a direct experience of the

symbolism and traditions passed down from generation to generation, offering visitors a unique and exciting experience.
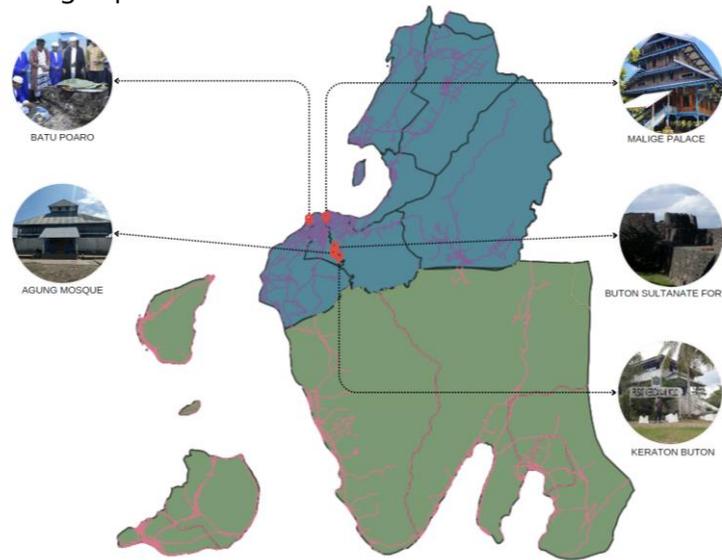
Figure 1. Distribution of historical tourist destinations of Buton Sultanate
Source: data processing using GRASS GIS

Baubau City and South Buton Regency are also paradises for beach lovers and have various natural attractions. Lakeba Beach in Sulaa Village, Baubau City, offers stunning ocean views and activities such as snorkeling, fishing, jogging, and camping. Families often visit this beach on weekends because of its safe waves and playground. Nirwana Beach in Sula Village, Baubau City, offers a soothing sunset view at dusk and is perfect for tourists looking for white sand and blue seawater.
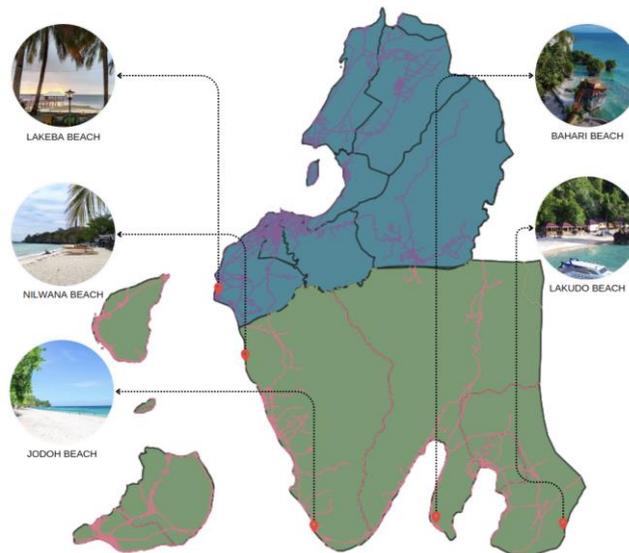
Figure 2. Distribution of beach destinations
Source: data processing using GRASS GIS

Jodoh Beach in Bola Village, South Buton Regency, is a popular spot for selfies and pre-wedding photo shoots, with facilities such as food stalls, gazebos, and toilets. Pantai Bahari, also known as Ratu Empat, in South Buton Regency, offers natural wonders with clean coastlines, coral formations, and clear seawater. This beach was once a filming location for a television station, so it gives a romantic impression. Lakadao Beach in South Buton Regency is a hidden paradise with cliffs, rocks, and stunning photo spots. Activities that can be done on this beach include snorkeling, swimming, fishing, and diving, and there is a large camping area for a comfortable,

relaxing experience. These beaches are perfect for tourists who want to explore the natural charm of the Buton Islands in Southeast Sulawesi, Indonesia.

Buton Islands, especially in Baubau City and South Buton Regency, is a natural tourist destination in Southeast Sulawesi, Indonesia. Kogawuna Waterfall in Lakolaguu Village, Baubau City, is a popular tourist destination, offering a beautiful natural backdrop for photography and opportunities for freshwater fishing. Kanari Waterfall in Kaisabu Baru Village, Baubau City, is a popular tourist attraction because of the 500-meter-long ring road that connects the two sub-districts.
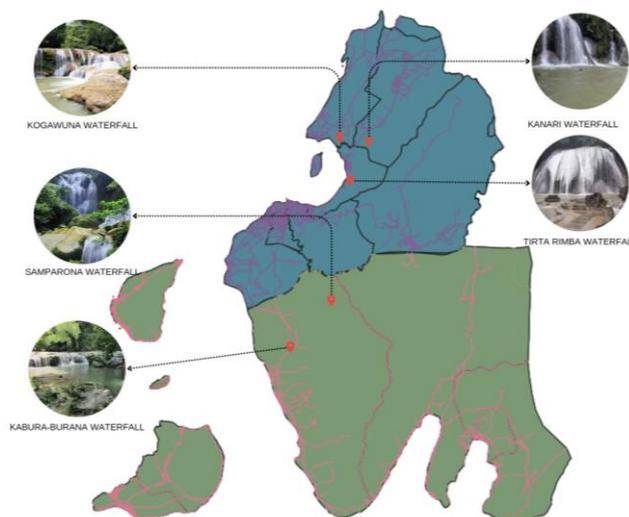
Figure 3. Distribution of waterfall destinations
Source: data processing using GRASS GIS

Tirta Rimba Waterfall in Baubau City offers tranquility, with its water flowing gently into natural pools, making it an ideal escape from the daily routine. Kabura-burana Waterfall in South Lawela Village, South Buton Regency, offers beautiful natural scenery, cool breeze from protected forests, and clear water, which local people commonly use. Labusa Waterfall in South Buton Regency, with a height of 30 meters and a cave in the middle, blends beautifully with the surrounding green forest and has a small swimming pool at the bottom. Samparona Waterfall in South Buton Regency offers a hill climbing adventure to reach a 45-meter waterfall hidden in the Samparona Protected Forest area. This waterfall adds to the charm of Buton Islands as a stunning natural tourist destination.

Kotamara area in Baubau City, Southeast Sulawesi, offers an unforgettable relaxing experience with the stunning backdrop of Baubau City Bay. Visitors can enjoy the beautiful sunset while hunting for culinary snacks at the stalls along the way. This area also offers sports facilities such as running tracks, soccer fields, basketball courts, children's playgrounds, and relaxing places.

Kamali Beach in Baubau City offers stunning views of the beach and bustling boats, with a special attraction in the form of a dragon head statue near the Mayor's Office. Visitors can relax in the park along the coastline and explore souvenir and snack vendors. Wantiro Hill in Baubau City offers an enchanting atmosphere with unspoiled sea panoramas, with Waramusio Beach below. Wantiro is a popular hangout for sunset lovers and sea view enthusiasts. Batu Sori Tourism is a popular destination in Baubau City, famous for its long bridge over the sea and giant ship-shaped rocks. Located in Palabusa Village, Lea-lea District, visitors can enjoy the bridge's beauty, multipurpose stage, gazebo, and Batu Sori photo spot, which displays spectacular views of the beach from a height.
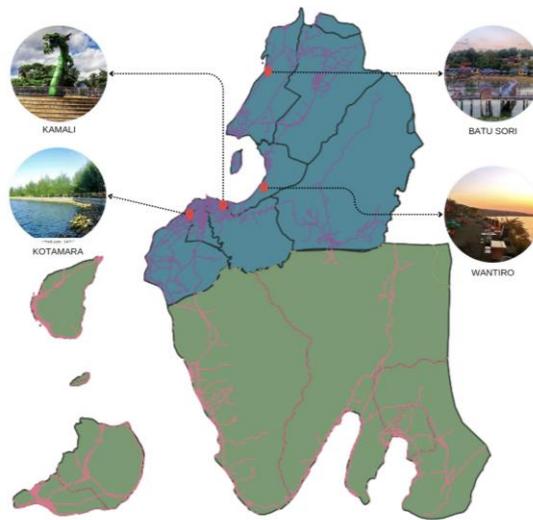
Figure 4. Distribution of beachside culinary destinations
Source: data processing using GRASS GIS

Baubau City and South Buton Regency, Southeast Sulawesi, are famous natural tourist destinations with attractions such as Lakasa Cave, Lanto Cave, Moko Cave, and Mokobeau Cave. Lakasa Cave, a stunning cave with sharp stalactites and stalagmites, offers visitors a refreshing pool with beneficial minerals and a stunning view of white crystals. Lanto Cave, a popular tourist attraction, requires diving skills and is unsuitable for beginners due to its dim interior and damp floor. Moko Cave, located in South Buton, is a charming destination with a shallow depth of 50 meters and ancient artifacts such as Chinese jars, ceramics, and human skulls. Visitors can observe these artifacts through freediving, but the roughness of the surrounding rocks makes them unsuitable for beginners. Mokobeau Cave, a natural cave 100 meters long and 50 meters wide, is a must-visit for tourists, offering an unforgettable travel experience due to its aesthetic appeal. Travelers can explore the cave for free, with the best time being late afternoon to evening.
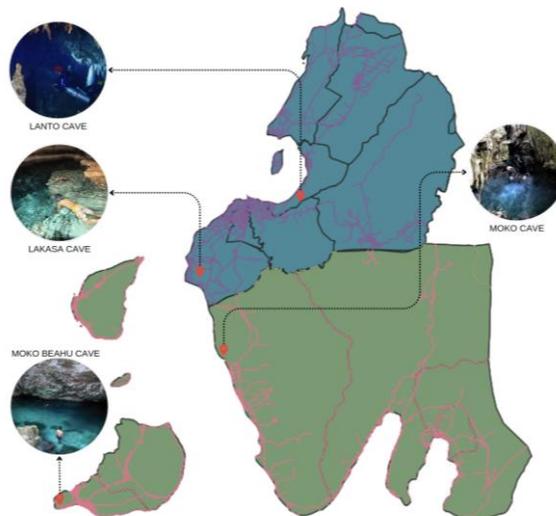
Figure 5. Distribution of cave tourism destinations
Source: data processing using GRASS GIS

GIS tourism in Buton Islands, especially in Baubau City and South Buton Regency, is important in managing and promoting tourist destinations. The system integrates information about geographic locations, addresses, and descriptions of tourist attractions so that visitors can easily access and understand each destination. The system provides interactive maps and detailed information about these attractions,

which can be accessed through a mobile app or website. Users can see the geographic location, routes, and facilities at each tourist spot, and the system can also provide efficient travel route recommendations based on visitor preferences.

Tourism GIS also helps authorities and managers of tourist attractions regulate visitors' flow, monitor the environment's carrying capacity, and take necessary conservation measures (Ćulibrk et al., 2021). The system can integrate visitor numbers, travel patterns, and environmental impact data for further analysis. The system can also be used to plan targeted promotional campaigns based on the popularity and appeal of each tourist attraction.

This research shows that GIS for Tourism in the Buton Islands is valuable for managing and marketing tourism potential. GIS provides accurate and up-to-date information, enhances the visitor experience, expands the positive impact of tourism on the local economy, and preserves the environment. This study highlights the importance of identifying and promoting each destination's distinctive wealth in the tourism concept, emphasizing environmental preservation and cultural heritage in line with the principles of sustainable tourism development.

GIS is a major focus of the research, highlighting the importance of technology in managing tourist destinations. The concept of destination management involves the use of information technology to monitor and manage tourist flows, as well as to enhance the tourist experience (Grundner & Neuhofer, 2021; Huerta-Álvarez et al., 2020; J. Wu & Yang, 2023). An in-depth analysis can delve into how GIS can assist in effective and strategic decision-making in destination management—tourism infrastructure such as museums, beaches, and natural caves. In the literature, tourism infrastructure development is important to improve accessibility and visitor convenience (Dalimunthe et al., 2020; Herrera et al., 2018). Analysis may include comparisons between the success of existing infrastructure and international standards or theories relating to tourism infrastructure development.

In addition, it is important to highlight the role of local communities in tourism development. The concept of sustainable tourism development emphasizes the importance of local community involvement and empowerment (Khalid et al., 2019; Wondirad & Ewnetu, 2019). The analysis may include strategies that have been implemented or recommended to ensure that local communities can equally feel the benefits of tourism. Likewise, tourism marketing strategies are an important factor in the success of tourism destinations. The analysis can link the use of GIS to effective digital marketing and tourism promotion efforts and explore the potential for cooperation with private parties or regional/national tourism organizations.

Utilization of Big Data Analytics in Increasing Tourism in Buton Islands

Big data analytics has significantly impacted the development of the tourism sector (Ardito et al., 2019), such as in the Buton Islands. By analyzing data from online reservation platforms, social media, and geolocation sensors, stakeholders can gain insights into visiting trends, traveler preferences, and consumer behavior patterns (Buhalis et al., 2019). This information helps travelers understand their' accommodation needs, preferences, and preferences so they can tailor their offerings. Big data also helps identify trends in long and short-term visits, enabling them to plan effective marketing strategies and measure the impact of tourism initiatives.

Big data has improved operational efficiency in the tourism sector, enabling stakeholders to make more informed resource allocation decisions (Liu et al., 2023), leading to optimized tourism service arrangements and better travel routes (Pencarelli,

2020). Regular evaluations of initiatives and programs can identify areas that need improvement or adjustment, resulting in significant improvements in operational efficiency.

Integrating big data analytics with tourism destination management systems has revolutionized the development (Cillo et al., 2021), of personalized tour packages for tourists in the Buton Islands. This integration allows for faster response to trends and changes in traveler preferences, so tour packages can be more responsive to changing market needs. In addition, this integration allows for deeper personalization in providing additional services, offering more precise advice, and improving the traveler experience.

	VOLUME OF MENTIONS	SOCIAL MEDIA REACH	NON SOCIAL MEDIA REACH	POSITIVE	NEGATIVE
	4	17 K	0	3	0
	+2 (+100%)	-3556 (-17%)	0 (0%)	+3 (+100%)	0 (0%)

4 MENTIONS	4 SOCIAL MEDIA MENTIONS	0 NON-SOCIAL MENTIONS	17 414 SOCIAL MEDIA REACH
0 NON SOCIAL MEDIA REACH	992 INTERACTIONS	4 USER GENERATED CONTENT	953 LIKES
3 100% POSITIVE MENTIONS	0 0% NEGATIVE MENTIONS	$ 1760 AVE	1 MENTIONS FROM TWITTER
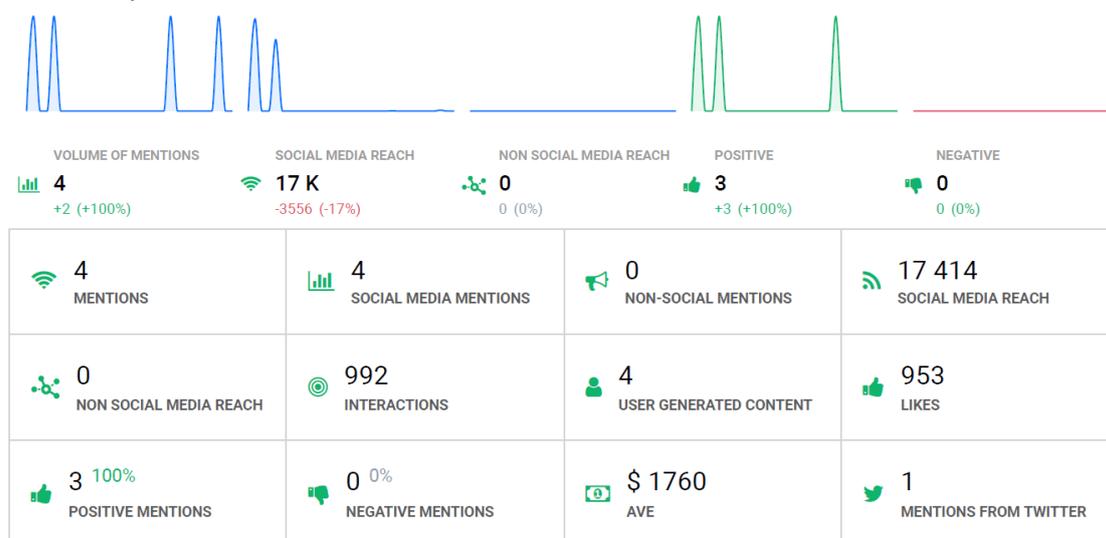
Figure 6. The trend of mentioning Buton Tourism on Social Media
Source: data processing using Brand24

In 30 days (24 Jul 2023 - 23 Aug 2023), there have been four mentions of tourism destinations in the Buton Islands, but the fact that all of them come from social media shows that there is potential that has not been fully tapped. In today's digital age, leveraging Big Data Analytics can be a powerful tool to improve tourism promotion. While reaching 17,414 people is an appreciable achievement, the potential reach can be much greater with a more targeted analytics strategy.

While there have been nearly a thousand interactions with content, whether these interactions result in conversions to physical visits or purchases is worth considering. Ultimately, the tourism campaign aims to encourage tourists to actually visit the location and experience the beauty of Buton firsthand. Therefore, it is important to measure the impact of this interaction on the end goal.

While there are four pieces of content generated by other users, this can be a positive indicator that there is enthusiasm from the community or travelers toward the destination. However, further strategies can be developed to encourage more user-generated content. Although there are 953 likes, it may be necessary to explore how to create more engaging content that attracts more people's attention. This can involve various elements, such as compelling visuals or a compelling story.

The mentions of Buton Islands on social media, particularly Twitter, have significant value potential. These mentions suggest that people who talk about Buton have influence and can be targeted through promotional strategies. Twitter's potential as a channel for expanding reach and promoting tourism in the Buton Islands can be leveraged with the right content strategy. However, there is still room for improvement and optimization, such as leveraging Big Data Analytics, increasing user engagement,

and optimizing the use of specific social media platforms to boost tourism promotion in Buton Islands.

This research emphasizes the importance of using big data analysis to improve tourism marketing strategies. This aligns with modern marketing strategies that focus on understanding consumer behavior, industry trends, and customer needs (Rosário & Raimundo, 2021; Sheth, 2021). Big data analysis helps in developing more focused and successful initiatives. The study highlights the importance of conversion metrics in travel marketing, which analyzes how well a campaign motivates users to take action.

The study also emphasizes the importance of creating engaging content to increase user engagement and attract more viewers. This is in line with the concept of content-based marketing, which emphasizes providing valuable and relevant information to the intended audience (Ho et al., 2020; Hollebeek & Macky, 2019). Social media, especially Twitter, is very important for promoting travel because social media helps companies interact with consumers, build brands, and expand the reach of promotional content.

The results of this research emphasize the importance of working with users to improve community engagement and content creation strategies. This research suggests the use of big data analytics to improve destination promotion strategies. Through user engagement in content development and user experience, users can create more relevant and engaging content. Other social media and review sites can also provide useful content. Through big data analytics, users can optimize these strategies by providing valuable data on user preferences and trends, improving content quality and effectiveness, and promoting destination awareness. Thus, this approach can make the tourism industry more efficient and effective in promoting destinations.

Traveler Trends in Buton Islands

Tourist trends in the tourism industry are evolving due to factors like the COVID-19 pandemic, focusing on health tourism, sustainable tourism, and virtual tourism (Narmadha & Anuradha, 2021). The industry adapts to new trends by focusing on nature-based destinations, ecotourism, and safety measures (Haukeland et al., 2023). Technologies like multi-buying platforms and high-performance computing tools enhance travel agencies' role in the industry (Collier & North, 2013). Understanding travelers' behavior and preferences is crucial for a sustainable tourism industry, emphasizing the importance of technology in the industry.

Based on various studies, social media platforms significantly influence travel trends in island destinations, influencing destination choice, visitor behavior, and interest levels, shaping preferences, and inspiring travel plans (Siegel et al., 2023). In addition, through digital marketing strategies and online promotions, social media marketing effectively increases tourist visits to islands such as Pari Island (Adzra Muthi'ah Hafizhah et al., 2022). In Indonesia, social media marketing significantly influences tourists' perceptions, satisfaction, and loyalty towards new island destinations such as Lebak Regency, Indonesia, highlighting its role in introducing and popularizing the destination (Indrajaya, 2022).

From 2018 to 2022, there will be interesting dynamics in the tourism industry in the Buton Islands. The city of Baubau experienced marked fluctuations in the number of tourist arrivals. Between 2018 and 2019, there was a significant decline. However, things changed quickly. In 2020, there was a sharp spike in the number of visitors, which then continued to increase until 2022. On the other hand, South Buton Regency experienced

encouraging growth from 2018 to 2019. However, in 2020, despite the decline, visitor numbers were still above 2018 levels. Then, there was another increase in 2021 and 2022. This dramatic change in visitor numbers can be influenced by various external factors. Tourism promotion, economic conditions, and even the impact of unexpected factors such as the COVID-19 pandemic can all play an important role in the dynamics of the tourism industry.

Baubau City has proven to have great potential that must be utilized further. The rapid surge from 2020 to 2022 shows that the city has an appeal capable of attracting visitors. Strengthen tourism infrastructure and expand promotion to optimize tourism potential. On the other hand, South Buton Regency shows a higher level of stability in the number of tourist arrivals. Despite the fluctuations, visitor numbers have been relatively stable from year to year. This indicates that the district has attractions that can maintain tourist interest.

Visible trends suggest that there is potential to identify key factors influencing fluctuations in traveler numbers. A deep understanding of these factors can provide a solid basis for planning tourism promotion and development strategies in both regions, especially in Baubau City and South Buton Regency. With proper analysis, the government and relevant parties can design more effective strategies to improve the tourism industry in the Buton Islands.
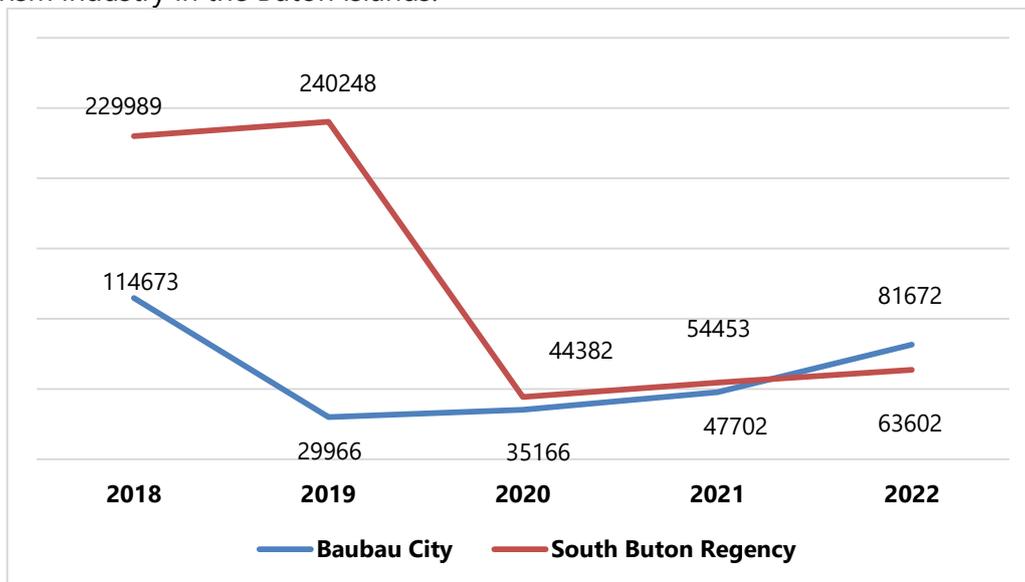
Figure 7. Trend of Tourists in Baubau City and South Buton Regency
Source: Data processing from Southeast Sulawesi Central Bureau of Statistics, 2023

The number of tourists in Baubau City and South Buton Regency fluctuated significantly over the past five years, with a significant decline in 2019, indicating the need to apply information technology to understand and cope with these changes. Sophisticated analytics and data processing systems can help local governments gain insight into factors that affect traveler numbers, such as seasonality, or external factors, such as events or economic conditions.

The competitive advantage of tourism businesses is significantly influenced by dynamic capabilities such as human resources, organizational learning, and digital marketing (Gintciak et al., 2022). The tourism industry, which is a multi-industry complex, offers significant growth and development potential to address economic challenges in the region (Nguyen et al., 2023). Leadership styles significantly influence group dynamics in organizations, including the tourism sector, by providing clear direction that can motivate team performance (Oprescu, 2023). Tourism significantly

impacts individuals, communities, and sustainable development, shaping social identities and influencing various aspects of life (Ntalakos et al., 2023). The evolution and resilience of the tourism industry is influenced by a variety of complex factors, especially in the face of challenges such as the COVID-19 pandemic.

Tourism infrastructure development is essential to improve regional competitiveness and attract tourists (Petrova et al., 2018). Planning strategies, digital marketing, and accessibility are key factors in attracting tourists (Gupta, 2019). Through a focus on infrastructure development such as accommodation, transportation, and entertainment facilities, as well as effective marketing strategies, destinations can improve their competitiveness, attract more visitors, and drive socio-economic development through tourism activities. Through this approach, it will ultimately improve the overall tourism experience.

The results of this study emphasize that tourism economic theory has significant implications for the development of the tourism industry (Danish & Wang, 2018; Zhao, 2021). The theory emphasizes the importance of considering economic variables in influencing visitor numbers and understanding the impact of global and local economic circumstances on visitor demand. Investments in information technology, such as social media platforms and government websites, have significant implications for improving tourism marketing and maximizing the use of information technology to expand target audiences and increase visitor engagement.

In practice, tourism industry professionals should prioritize developing more efficient advertising techniques and improving services for visitors, such as allocating resources for information technology, improving tourism infrastructure, and developing proficiency in digital marketing. Stakeholder collaboration is essential in designing and implementing tourism development initiatives to ensure that the interests of all stakeholders are considered. By considering these implications, tourism practitioners can plan and implement sustainable tourism development strategies, while researchers and academics can gain a deeper understanding of the factors that influence the dynamics of the tourism industry.

Conclusion

This research highlights the importance of integrating big data analysis from GIS and IT to improve sustainable tourism development in Buton Islands, particularly in Baubau City and South Buton Regency. The findings of this study show that GIS helps identify and manage tourism potential by providing detailed information about unique locations, accessibility, amenities, and attractions. Big data analytics optimize tourism development by analyzing online platforms, visitor trends, and consumer behavior patterns. IT integration automates public services, providing accurate information about attractions, accommodations, events, and various tourist facilities. The results of this study emphasize the importance of cooperation between local governments and stakeholders in using information technology to develop the tourism sector.

The theoretical implications of this research are significant, as it provides a foundation for developing new concepts in digital-based tourism and provides insights into the interaction between information technology, environmental sustainability, and tourism development. Practical implications can be implemented by local governments and stakeholders in the Buton Islands, enabling effective strategies and policies to manage tourism destinations, improve public services, and promote tourist attractions. However, limitations of this study include the specific context of the Buton Islands and limitations of data and resources. Therefore, future research needs to explore the

impact of information technology on the tourist experience, sustainable management of tourism destinations, and adaptation to environmental and social change.

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