Developing Coastal Eco-tourism in Developing Countries through Big Data

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Abstract

Accuracy of information and timeliness are essential in tourism management. This study explores the role of big data in supporting coastal ecotourism performance, which in this mixed mode study involves two expert discussion groups. We derived the themes for discussion and analysis from relevant literature. A total of 485 questionnaires were distributed and analysed using SAS Contextual Analysis 15.1. the results show that Big Data has the potential to benefit both tourists and stakeholders by providing quick and accurate access to information. However, the management, storage, and retrieval of big data pose challenges due to its vast and continuously expanding volume. Dealing with such massive amounts of data can be arduous. Big data can be used by both government and tour operators to manage and develop coastal ecotourism activities with minimal environmental impact. Tourists can access trend data on coastal tourism. This includes both general and ecotourism' -based information to plan visits and businesses that meet market demand. This study identifies the factors that contribute to creating value from big data and explores their impact on positive service encounter in marketing intelligence within business ecosystems.

Keywords: Coastal ecotourism, Big data, Accuracy, Trend data.

1. Introduction

The significance of ecotourism in promoting social management and empowerment in developing countries is noteworthy. Community-based ecotourism can have a substantial social impact on these groups. Coastal development involves the utilization of water areas and natural resources for the benefit of coastal communities. Therefore, it is crucial to manage both the coastal resources and the people who inhabit the area for the economic development of coastal communities. Coastal areas provide natural resources, life support services, and amenities. They also receive waste from land-based activities such as trade, fishing, and industry. Furthermore, they have the potential to offer marine and fisheries

resources and facilitate trade between regions, islands, and continents.

The use of big data is developing alongside technology and increasingly complex business needs. It has the potential to provide valuable insights and enable better decision-making in the business world. Big data is important in the digital age as it provides an empirical basis for supporting management information systems and public decisions that affect many people. This is possible because big data can reveal behaviour patterns.

The utilization of Big Data (BD) in social media (SM) is becoming more frequent in the tourism industry, leading to greater dissemination of information (Dou et al., 2023; Inanc-Demir & Kozak, 2019). SM marketing is a common strategy for increasing branding because of the ease with which information can be exchanged between users (Inanc-Demir & Kozak, 2019; Xiang & Fesenmaier, 2017).

Indonesia has seen a significant increase in internet users, with 175.4 million as of January 2020, a 17% rise from the previous year. Additionally, as per the analysis presented in (ADB & WTO, 2021; Ikhsan, 2020). it is expected that the adoption rate in Indonesia will attain 64% by January 2020.

The impact of technology and ecotourism on human existence in the era of globalization is evident. Its influence is evident in the ubiquitous use of social media in daily life, including travel and commonplace activities. As an online platform, social media enables individuals to express themselves, to interact, collaborate, disseminate knowledge and forge social connections. Technological and ecotourism advancements in social media have made communication more convenient and accessible (Cheah et al., 2022; Hase & Schäfer, 2022). The objective of this investigation is utilizing of Big Data in enhancing Coastal Ecotourism in Senggigi Beach.

2. Methodology

This study was conducted in the Senggigi Islands from December 2023 to November 2024. The research included interviews and discussions with various stakeholder groups (Table 2). To ensure a consistent representation of stakeholders, respondents were selected using stratified random sampling (Datar, 2017; Panacek & Thompson, 2007). The study used semi-structured questionnaires. Two discussions were held in BD (Belias et al., 2021) and one in CE to describe the common attitudes and expectations of each stakeholder group (Ames et al., 2019; Tomlinson & Kamber, 2021).

Table 1. The Group Respondent BD & CE

Stakeholder groups	Number of Respondents
Senggigi Travel agents	50
Members of Department of Tourism and Creative Economy	40
Public car/motorcycles drivers	45
Taxi drivers	40
Senggigi local community members	50
Senggigi tour guide	45
Task Force members for the Acceleration of Handling COVID-19	45
Tourists	50
Handicraft artisans	50
Local food seller	50
Members of local government	20
Total	485

The participants discussed a number of indicators to assess the prospects of existing and expected BD and the restoration of CE.

To complement the interviews, this study organised two group discussions (Nyumba et al., 2018). Each group consist of 225 respondents for each group. The participants in the first group discussed existing and expected BD (Belias et al., 2021). While those in the second group discussed the establishment of the Senggigi CE (de Grosbois & Fennell, 2021; Henes Aprilia et al., 2023; PohPoh, 2001). However, the atmosphere of the meetings was informal to allow free discussion of the opportunities and challenges.

The data collected were tabulated and analysed using content analysis (Collins et al., 2018; Lucero et al., 2018) by using SAS Contextual Analysis 15.1. (Technology, 2021). Content was extracted based on respondents' ratings of the above statements. The inter-rater agreement was quantified as the kappa coefficient (Hengky, 2018; Swangjang & Kornpiphat, 2021; Tien et al., 2021). The value of kappa varies between 0 and 1. A value greater than 0.6 indicates a high level of agreement (Chambon et al., 2018; Kraemer, 2015). All analyses and calculations were performed using SAS/STAT software (Neuendorf, 2020; SAS Institute, 2016).

3. Results

The data in Table 2 show that BD supports SCE with the main objective of gaining access to data. This is crucial for improving BD's information performance. The secondary priority is to gather diverse data to enhance the tourist and operator information's usability. The data in Table 2 shows that BD supports SCE with the main objective of gaining access to data, which is crucial for improving BD's information performance. Stakeholders need accurate and reliable data to support SCE activities (K=0.6622).

Table 2. Big Data Supporting e-transaction -Coastal Ecotourism- Senggigi

Big Data - Senggigi Coastal Ecotourism.	Value	% Freq
Volume: large number and volume of data	30	0,2013
Velocity: ability to access data quickly	26	0,1745
Variety: load different types of files	27	0,1812
Value, generate valuable information	31	0,2081
Veracity: trustworthiness refers to how accurate	35	0,2349
Kappa Value = K = 0,662222		

Data accuracy is a priority for tourists in determining their tourist destination, considering that this is very valuable information for them in determining or determining their choices. With BD, they can easily access the data they need. This really helps tourists in deciding when to travel, both transportation and accommodation options which they will choose in their transactions.

Table 3. Senggigi Coastal Ecotourism (SCE)

Senggigi Coastal Ecotourism.	Value	% Freq
Develop sustainable practices	24	0,1752
Safe intensities of natural resource use	27	0,1971
Optimise ecotourism management	30	0,2190
Natural potential of CE	31	0,2263
Community empowerment for economic development	25	0,1825
Kappa Value = K = 0,608889		

SCE's analysis shows that Senggigi Beach satisfies the prerequisites for coastal ecotourism (refer to Table 3). However, the effectiveness of the beach can be enriched via community empowerment and sustainable economic utilization according to SCE's development programme. This will do good to conserving its natural resources. The existence of these three factors can extend coastal management, thereby amplifying Senggigi Beach's allure as a centre for coastal ecotourism.

4. Discussion

Generally, there are three types of sources for BD exhaust data: sensors (such as Internet of Things, CCTV, Google Maps, and satellite imagery), digital content data (such as social media platforms like Facebook, Twitter, or Instagram, blogs, Google Trends, online travel agencies, and online reviews), and BD exhaust data (such as bank transaction data and telephone call records). Tour operators and hoteliers can access and comprehend tourists' profiles, consumption patterns, tourism habits, needs, and demands. This enables them to offer tourism products suitable for specific tourist segments through social media and other online platforms. It can help operators address negative issues promptly, provide information

about the sentiment of a tourism product, and increase engagement from tourists and influencers. The use of BD with online tracking agencies such as Traveloka, Booking.com, Agoda, and Tripadvisor poses several challenges in Indonesia. These include a shortage of data scientists, inadequate BD infrastructure, privacy and ethical concerns, and the necessity for partnerships between government, society, and business.

Given the ease of access to BD, there are at least some challenges related to ethics and privacy. Both data of tourists that are easily accessible and come from several travel applications via social media. This can be overcome by limiting access to this information that can protect the privacy of tourists.

There are at least three main uses of big data in tourism:

Firstly, increasing the number of tourists and hotel occupancy. Having access to data from coastal cultural-nature tourism activities, flight schedules, and other relevant information by BD reduces tourists' disappointment when they choose a tourist attraction.

Secondly, there are at least three topics: increasing visitation rates and room occupancy, reducing failure and dissatisfaction of tourists in choosing tourist attractions, and understanding the profile, consumption, and tourism habits, needs, and demands of tourists. Tourist profiles can be obtained by using information from social media, Google Trends, online reviews, telephone data, and banking transactions (both digital and conventional). These profiles can then be used as a source of marketing information for tourism products that cater to specific market segments, increasing their value.

Finally, virality of tourist spots, hotels, and restaurants. Sentiment analysis is used to process BD related to tourism by analysing online reviews. This analysis can help to quickly address negative issues and provide insight into product sentiment, increasing engagement from tourists, travellers and influencers.

Nevertheless, BD and Business Intelligence (BI) are closely linked concepts. BD analytics can be used to support the implementation of Business Intelligence Systems in the e-tourism sector. This can be achieved in several areas:

The aviation industry possesses a vast amount of data that can be analysed to benefit tourism. Flight schedules are frequently tailored to cater to the interests of tourists visiting specific destinations. By analysing historical data, it is possible to estimate the number of visitors to certain tourist locations or tour packages in the following year. Marketing strategies, such as offering significant discounts at certain times of the year, can also be implemented.

Hotels utilise information technology to enhance operational efficiency, manage inventory, and maximise profitability. The Property Management System (PMS) facilitates internal management and distribution via electronic media. It coordinates reception and other organising reservations hotel. Business Intelligence is a downstream system that provides information to support strategic decision-making in the hotel industry. For instance, it can offer suggestions for room rates.

E-Tour Operators can utilise business intelligence to enrol tour operators, establish timetables,

and allocate business territories. Travellers frequently buy packages that comprise of - lodging organised by a tour operator, holiday travel, direct selection of airlines and hotels. They have developed a comprehensive online that integrated Google Maps. This innovative use of technology provides added value to their clients.

4.1 Sustainable Coastal Ecotourism (SCE)

Coral reef plantations ought to be preserved in the coastal regions of SCE to promote sustainable practices in the tourism industry. To garner tourist interest, ecotourism destinations, including Senggigi and other locations in West Lombok, should contemplate the inclusion of coral reef plantations. Seaview Aruna Resort in Senggigi, Batu Layar, West Lombok had established a significant 750 coral reefs with tremendous success.

Flooding presents a recurring problem in numerous localities of this region, which leads to disruptions within the tourism sector. The West Lombok district administration urges relevant parties operating in the West Nusa Tenggara (WNT) River Basin and WNT Road Basin to implement preventive measures to address this issue. The Director of Public Works and Physical Planning stressed the importance of working with stakeholders and the local community to clear waterways throughout West Lombok as a temporary method to counteract flooding. The information was provided by BD.

One of the communities taking care of the environment, the Lombok Ocean Care (LOC) community, is cleaning up plastic waste, also in terms of community empowerment for economic development. They have brought together dozens of people, both locals and foreign tourists. They swim to the middle of the sea to pick up the rubbish. They use nets to look for the rubbish that is floating in the sea. Some of them dive into the sea to pick up the rubbish. In carrying out this plastic waste clean-up, the group worked with the Lombok Waste Bank Association, buying clean waste and taking part in the action to socialise the sorting and processing of waste. In one week's, they had a collection of 200 kilograms of waste. There is an awareness that there is still a lot of plastic waste in the sea and this is a problem. They not only collect the waste but also process it into eco-bricks. Their mission is to spread the word about the dangers of plastic waste and the Zero Waste Programme. So that people can learn how to process waste, waste management is carried out by his group and the community once a week by doing it together. The community wants to change the paradigm of the community that waste can be turned into handicrafts and make money.

Meanwhile, to complement the ecotourism activities on this beach, food is served in restaurants near the beach, usually not far from processed seafood. At the Olah-olah restaurant, tourists can order grilled seafood sudamala or another choice of grilled fish fillet and chicken stuffing. There are also Indonesian specialities such as chicken Taliwang, Indonesian curry, seafood tofu, mixed rice Sudamala and processed Mangsit.

In terms of optimising ecotourism management, SCE is known as one of Lombok's most popular natural tourist attractions. It offers views of Mount Agung in Bali. The main SCE destination promoted by the government to overcome the problem of inter-island connectivity with other transport is not optimal. What needs to be considered is how to link these modes of

transport. For example, it only takes 25 minutes to get from Lombok airport to the Mandalika Special Economic Zone (MSEZ). Tourists can go out and enjoy other tourist destinations. The WNT's position as a maritime axis route is very competitive. It ensures the smooth distribution of people and goods between regions. For this reason, capacity service on the WNT transport network in order to create a multi-purpose transport system for the efficient and competitive movement of goods and people.

4.2 Practical Implication

Ecotourists' ability to access data quickly can be improved. This can support social communication with the form of loading different types of files from the SCE, especially in supporting community empowerment for economic development. Local communities can easily know and understand the main needs of tourists' consideration.

Another implication of this study is that the results can be used to identify general tourism patterns, especially for coastal ecotourism. This is certainly very helpful for stakeholders in formulating policies in similar tourism destinations in developing countries.

4.3 Limitation and Future Research

Limited time and funds are the limitations of this study, all of which can be the material for further study both in terms of BD and CE. However, this study does not specifically differentiate between the assessment or response from local and foreign tourists. They have different assessments based on culture and needs. Further research could investigate various factors of the supply-side constraints on business actors in maximising the performance of big data to meet the needs of foreign and local tourists.

5. Conclusions

Study results shows that SCE still not maximising utilized BD in coastal ecotourism (CE) social communication activities. This can be improved in the future to support information and database for environmental management and community empowerment in support of SCE. One of the benefits of improving CE performance is to increase the economic contribution of the community on the Senggigi coast. They also need training to implement and sustain sustainable development programmes based on coastal community empowerment to maximise SCE management. The training will cover two areas. The first is training in the use of BD. The second is training to improve SCE performance. Both types of training are very helpful for local government programmes as well as the Director General of Tourism and stakeholders' efforts to improve the performance of the coastal environment and the interest of eco-tourists visiting Senggigi Beach.

Respondents consider the trustworthiness and accuracy of SCE data to be the most important factors of BD accessibility. On the other hand, they still feel that there is a lack of quick data access to SCE information on social media. This study recommends that BD stakeholders improve the accessibility of BD data in Senggigi Beach. This will increase the demand for tourists to visit the beach.

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