Management of coastal resources in Mandalika in an era of disruptive innovation waves

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Abstract. The development of maritime tourism in Central Lombok is still dependent on Bali tourism. The natural beauty and socio-cultural values of the coastal communities in Mandalika differ from Bali, and has the potential of being developed into an attractive centre for tourists. One of the disruptive innovations in coastal areas in Mandalika is the increase in online travel centres which provides cheap and easy traveling packages. However, this system only prioritizes economic aspects, and fails to take into account the ecological sustainability aspects. This research, therefore, aims to identify the types and meanings of maritime culture in the form of rituals and traditions of coastal communities which is developed to increase and estimate Mandalika’s economy. Data collection was carried out using in-depth interviews and questionnaires, with the descriptive analysis of multiplier effects used for analysis. The results showed that the rituals and traditions such as the Bau Nyale tradition, Madak Mare, and the Ruwah Segara developed in Central Lombok are packaged into maritime culture-based tourism centre. This also requires the support of all stakeholders and the readiness of the local community. The type of business which grows in the presence of marine tourism includes hotel businesses, cafes, restaurants, and souvenir shops, while the direct, indirect, and continued economic impacts are estimated to be around IDR 8 M per year. This tends to have a multiplier effect on employment and economic growth in Central Lombok.

1. Introduction
Mandalika Special Economic Zone is one area in Central Lombok, West Nusa Tenggara which is currently being developed for tourism an area of 1,036 hectares and faces the Indian Ocean for marine tourism potency. The potential of natural tourism are Kuta Beach, Mawun Beach, Tanjung Ann Beach, and Bilelando Beach, etc. The data of the potential of tourist visits in Kuta Beach showed a significant increase over the past five years from 40,000 to 257,400 person [1]. On the other hands there is the potential for cultural tourism, such as madak mare, ruwah segara, and bau nyale. Changes in the tourism paradigm from something to buy to something to do and to see and something experience are opportunities for culture ecotourism [2].

Tourism is the most commonly understood as the provision of services for people traveling to and staying outside their usual environment for less than one consecutive year for leisure or for business
purposes. The operational definition of tourism for structural industry statistics is ambiguous. If one defines tourism from the consumer’s point of view, all products and services consumed by tourists could be taken into account; this would be the widest possible definition. Ecotourism from its genesis and founding theories has set out to conserve and preserve the environment through sustainable operations that include surrounding communities in efforts to reduce their poverty levels [3]. The concept of ecotourism as a tourist activity is a form of tourism developed in a natural environment that includes tourism elements and rural culture. Ecotourism is seen as important because it can provide sustainable development as opposed to the negative impacts of uncontrolled development of mass tourism areas on the environment and local communities [4].

The importance of innovation was long underestimated in service activities, including tourism. The major turning point came with the rise of the internet in the 1990s and its rapidly evolving impact on the tourism industry. It soon became clear that the new information and communication technologies would enable innovation in many ways, with significant (and even disruptive) impacts on the sector’s value network. Tourism is probably one of the sectors where the internet has had the most significant impacts: it leads to disintermediation in some markets and re-intermediation in others, increases dramatically the market transparency, changes the way in which service providers market their offer and enables entirely new business models. Unsurprisingly, therefore, some of the main innovation trends in tourism discussed in the following sections are internet-enabled developments (online booking, dynamic packaging, online rating platforms, digital mobile services). However, there are other important innovations which are not strictly internet-related, such as the rise of the no-frills airlines (although it could be argued that the possibility of online booking has been a crucial success factor for this industry, and thus again being internet-enabled) [5]. An important business model innovation in the sector which requires information technology (but is not necessarily internet-driven) are yield management systems. In the following, these trends which the authors consider as the currently most important innovations in the sector are briefly introduced and assessed in terms of their disruptive impact [6].

The development of tourism activities needs to pay particular attention, firstly, to the quality of the environment through measures aimed at its conservation and development [7]. Sustainability and the economic consequences of creating marine protected areas need to be addressed in a multispecies and multi-activity context [8]; furthermore, tourism and recreation could contribute significantly to the wellbeing of society. When the concept of sustainable development arose in relation to tourism in the 1990s, sustainable development was seen as more closely related to the carrying capacity (CC) than anything else, because the idea of sustainability implies a limit and because both concepts share the same difficulties as far as the formulation of the ideas, practices, utility and diversity of types [9]. The carrying capacity of tourist areas is defined as the maximum number of people who can visit a tourist destination without causing physical, economic, or socio-cultural environment damage or an unacceptable decline in the quality of tourist satisfaction [10,12].

The increasingly disruptive impact complex ecological pressure of coastal areas in the form of pollution, biodiversity degradation and physical degradation of coastal habitats. Maritime culture has not yet been developed into a creative economic component supporting marine tourism. Lack of community preparedness and active participation. The unavailability of information on the value of the multiplier effect resulting from cultural-based marine tourism. The aims of the study are: (1) Analyzing the carrying capacity of the Mandalika Economic Zone for the development of marine tourism; (2) Analyze the readiness of coastal communities in the development of marine tourism; (3) Analyze the value of the multiplier effect of marine tourism activities; and (4) Formulate strategy of coastal resource management for the development of marine tourism.
2. Research methods

2.1. Time and location
The study was conducted in March to August 2019 in coastal areas of Central Lombok Regency, there are: Kuta Beach, Mawun Beach, Tanjung Ann Beach, and Bilelando Beach. Data collection was carried out by interviews using questionnaires, in-depth interview, and observation in the field. Respondents consisted of local people, labor of tourism, adat community, adat leader, and visitors to beach tourism in the coastal area of Central Lombok.

![Administrative map of Central Lombok Regency as research location](image)

Figure 1. Administrative map of Central Lombok Regency as research location [1]

2.2. Data analysis
The research methods used are qualitative and quantitative. The data obtained were analyzed descriptively. The first and third objectives use data analysis carrying capacity and multiplier effects, with mathematical equations, as follows:

2.2.1. Carrying capacity analysis.
One way that can be used to determine the carrying capacity of a region is by referring to the carrying capacity analysis formulated by [13]. The approach of calculating the carrying capacity of tourism to determine the capacity of an area for maximum tourist visits based on physical, biological, and management conditions through Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC), and effective carrying capacity. TCC is divided into the following levels:

\[
PCC = \frac{A}{(Au \times Rf)}
\]  

(1)

PCC: Physical Carrying Capacity; A: wide of tourism area; Au: area required by each tourist; Rf: Rotation factor (number of visits per day).

\[
RCC = PCC \times (Cf1, Cf' 2, Cf' 3, ... Cf'n)
\]  

(2)

RCC: Real Carrying Capacity; PCC: Physical Carrying Capacity; Cf1.Cfn: Correction factor; Factor of Cf x : 1 - Lmx / Tmx; Cf x : Correction factor of variable x; Lm: Limit the magnitude of variable x; Tmx : Total numbers of variables x.
Management Capacity (MC) shows the current condition of tourism management in each tourism area and is estimated based on available infrastructure, facilities and facilities, based on respondents’ perceptions.

\[ ECC = RCC \times MC \]  \hspace{1cm} (3)

2.2.2. Multiplier effect
Measurement of the local economic impact of tourism activities through two types of multiplier effects, namely [14]:
- Keynesian Income Multiplier (KIM) is a change in the unit of tourist spending giving changes to the level of income of local people. written in formula:

\[ KIM = \frac{D + N + U}{E} \]  \hspace{1cm} (4)

- Income Multiplier Ratio is a multiplier effect that illustrates how much impact on the local economy. This multiplier has included both continued and indirect impacts. Income Multiplier Ratio Type I, written in formula:

\[ IMR_I = \frac{D + N}{D} \]  \hspace{1cm} (5)

- Ratio Income Multiplier Type II, written in formula:

\[ IMR_II = \frac{D + N + U}{D} \]  \hspace{1cm} (6)

D: Local income received directly from E (IDR); N: Local income received indirectly from E (IDR); E: Additional tourist expenditure (IDR); U: Local income received further from E (IDR).

The multiplier effect has the following criteria, (a) If the multiplier coefficient value is less or equal to zero \((\leq 0)\), then the tourist area has not been able to provide an economic impact on tourist activities; (b) If the multiplier coefficient value is between zero and one \((0 \leq x \leq 1)\), then the region tourism provides a low economic impact value; (c) If the multiplier coefficient value is more or equal to one \((\geq 1)\), then the tourist area is able to provide an economic impact on tour activities.

3. Result and discussions
3.1. Potential of nature and culture tourism
Central Lombok Regency is one of the tourist destinations in Indonesia with a diversity of unique natural and cultural potentials and its uniqueness and locality, where the two elements can be combined in its development. The tourist attraction consists of natural and socio-cultural and artificial attractions. The natural attractions in Central Lombok Regency are quite numerous and varied from the northern tip to the south, also the socio-cultural tourist attraction and the artificial tourist attraction which is quite a lot and varies starting from the uniqueness of the socio-cultural traditions of the people, the arts, historical relics and craft. The tourist attractions are scattered in almost every village and sub-district in Central Lombok, especially in southern Central Lombok such as: Kuta-Lombok, Sade (Rambitan), Mawun, Selong Belanak, Tanjung A'an, Gerupuk and so on.

In 2014, the government approved the development of the Mandalika Special Economic Zone proposed by PT. Indonesia Tourism Development Corporation (ITDC). Mandalika focuses on the development of agro and ecotourism industry activities on an area of 1,035.67 hectares located in Kuta Village, Pujut District, Central Lombok Regency, West Nusa Tenggara Province. and a supplement for the Mandalika KEK. This area has an area of 27,101.93 Ha which is divided into 2 (two) areas,
namely the Core 2 Area and the Buffer Area with an area of 3,762.82 Ha and 23,339.11 Ha, respectively (table 1). This area is located in the south of Central Lombok Regency and faces the Indian Ocean. This condition presents its own challenges for the management of this area.

The potential of marine tourism and creative economic activity in the community is the result of the development of cultural products and the wisdom of the local community. As part of cultural products and local marine wisdom, marine tourism and creative economic activities can become domestic identities and characteristics in the community in an area. Among the many cultures of local people in Indonesia, the culture and wisdom of the people of Central Lombok is one that has the potential to be packaged and developed into a marine tourism product based on local wisdom. Maritime cultural activities such as the bau nyale, madak madek mare, and ruwah segare are among the cultures and local wisdom that developed in Central Lombok (Table 2).

Table 1. The total area of the Central Lombok Regency strategic area around the Mandalika

| No. | Area | Sub-district       | Wide (Ha) | (%) |
|-----|------|--------------------|-----------|-----|
| 1.  | Core | Pujut              | 3.761,1   | 100,0 |
| 2.  |      | Praya Barat        | 4.751,3   | 20,4 |
| 3.  | Buffer| Praya Barat Daya  | 1.216,3   | 5,2  |
| 4.  |      | Praya Timur        | 1.946,3   | 8,4  |
| 5.  |      | Pujut              | 15.303,2  | 65,8 |

Table 2. Maritime cultural performance of the community of Central Lombok

| Type of culture | Mean | Message | Strengths | Weaknesses |
|-----------------|------|---------|-----------|------------|
| Bau Nyale       | Mandalika | Princess as the central figure of Sasak society | • Polite political symbol | • Bau Nyale is one of the world's cultural heritage |
|                 |       |         | • Peace symbol | • Bau Nyale festival becomes a national event |
|                 |       |         | • Alignments to the interests of many people | • There are creative products that can be combined with nyale exoticism |
|                 |       |         |             | • Unscheduled sea worm emergence, depend on sasak calendar |
|                 |       |         |             | • Many activities in the Bau Nyale festival are not related to nyale (sea worm) |
| Madak Mare      | Expression of the relationship between the mountains and the sea | | • Sea as a medical treatment facility | • Madak Mare is a unique tradition and has a selling value |
|                 |       | • Continuing tradition | • The beach as a venue for hospitality | • Only done at Kuta beach |
|                 |       | • Perception: showing poverty, ignorance and slums | | • The local community received the Madak Mare well |
| Ruwah Segara    | Expression of the relationship between | • A form of gratitude | • Monumental, conducted every 5 years | |
|                 |       | • Acculturation of Bajo and Sasak | • It is an acculturation | |
Table 2. Maritime cultural performance of the community of Central Lombok

| Type of culture | Mean | Message                                      | Strengths | Weaknesses |
|-----------------|------|----------------------------------------------|-----------|------------|
| fishing communities and microcosm elements | culture of Bajo and Sasak | Sasak society is a tolerant society | Other supporting cultures; history, philosophy, storytelling, traditional clothing, dances, and others |

Bau Nyale is one of the routine ceremonial activities of the Sasak tribal community which is carried out by hunting sea worms. Bau Nyale takes place on every 20th of the 10th month of the Sasak calendar, which is around February to March. Bau Nyale is carried out in the Seger Beach area, Kuta, Central Lombok. The Bau Nyale tradition originates from the legend of Princess Mandalika who came from the Tonjang Beru kingdom, a central figure of the Sasak indigenous people. The Bau Nyale tradition has a very high cultural value, and has a strong philosophy among the people. Political symbols of courtesy, peace and partiality towards the interests of many people are among the many philosophies of the legendary Princess Mandalika. Bau Nyale is now one of the world's cultural heritage and has become a national tourism activity, although it has not been packaged effectively and optimally. One obstacle in packaging the Bau Nyale tradition as a national festival activity is the difficulty in setting the time for this ceremony.

Madak Madek Mare is a maritime culture that is formed from the expression of the maritime community's relationship to the mountains and the sea. Like every culture and local wisdom in the world, Medak Mare has a unique and high selling value, and can certainly be packaged as a cultural attraction that can attract tourists. The tradition carried out by the Sasak tribe, especially in Pujut Sub-district, lasted for three consecutive days three times in one year of the Sasak calendar or around August, September and October. Uniquely, the tradition of Madak Madek Mare is done on the beach, by setting up long tents made of tarpaulin and woven palm leaves for overnight. During the night on the beach, one of the activities carried out was Madak Empaq or catching fish using poisonous roots for fish tied to a piece of wood.

Roah Segare is a form of gratitude which is a form of cultural acculturation of the Sasak and Bajo indigenous peoples. This tradition is one form of expression of the relationship of indigenous fishing communities with microscopic elements. Segah Roah or Sea Ruwatan is done once a year, which is every month Muharram calendar of the Islamic calendar. The tradition of Roah Segare begins with the ritual of reciting mantras and continues with a malarari offering consisting of various produce to the sea, as a form of gratitude for the fishing community to the sea and hope for abundant marine products in the future. In practice, there are several customary provisions including customary prohibitions to go fishing for fishing for three days after the Roah Segare ritual is performed.

3.2. Carrying capacity
The area of the Mandalika Special Economic Zone (A) is 10,356,700 m², with an open space that can be enjoyed and needed by tourists by 50 m². The value of the effective carrying capacity of the KEK Mandalika is associated with the management capacity of the management based on calculations showing the number 41,867 visitors/day or 1,256,021 visitors/month with 80.1% management.
calculation of the ECC obtained a value of 36 visits / day with a management capacity of 56% which shows that management managers have limitations in handling tourists in large groups [15].

Carrying capacity of Marine Tourism in Central Lombok included: PCC (Physical Carrying Capacity) is 207.134 visitors per day; Real Carrying Capacity is 33.536 visitors per day, and Effective Carrying Capacity is 41.867 visitors per day. Overall this value is still above the average number of actual tourists based on vehicle parking tickets in 2018-2019 as many as 819 visitors / day according the data of Indonesia Tourism Development Corporation. Based on the value of effective carrying capacity, which is a value that has taken into account environmental biophysical conditions and management capacity, the future development of the Mandalika can be directed towards mass tourism which can still be optimized by paying attention to the preservation and sustainability of existing natural resources and optimizing the capacity of officer manager. According to [16], management capacity can be indicated from several variables such as the legal basis, policies and regulations, equipment, personnel, financing, infrastructure and facilities, so that in increasing the capacity of management officers in serving visitors need to be supported by capacity management is based on these variables. Based on field observations, it shows that the management authority of the Mandalika at ITDC has not yet developed a good communication between the management and the local community, while the facilities and infrastructure have been well developed.

3.3. Coastal community readiness

Maritime tourism is a familiar thing with the people of Central Lombok. The dynamics of the development of The Mandalika as a tourist center that has been going on since the era of President Soeharto have shaped people's perceptions of the development of the Central Lombok tourism sector, both regarding the opportunities of local communities in developing the tourism sector, recognition of their existence as the original owners of the tourism development area, as well as the impact it causes. However, the hope of community involvement in the development of the community sector is very visible. One of the opportunities is the development of a creative economy based on marine culture in increasing the added value of marine tourism. The theory of reason action, a person's intention is a function of two basic determinants, namely personal matters and social influence. Based on this, Ajnen formulated theory of planned behavior. In theory, it is said that a person's intention to perform a behavior is determined by three things, namely attitude toward behavior, subjective norms, and perceived behavioral control [17, 18].

In general, the public is interested in creative economic ventures, especially the younger generation but has various limitations. Variables related to community readiness in creative economic activities based on marine tourism include: (a) community attitude (interested in becoming an entrepreneur in the creative economy sector and tourism. Interested in becoming employees in the creative economy sector and tourism); (b) subjective norms (creative economy can be accepted as long as it obeys the norms of Sasak society, there are still many families who do not support the creative economy business, because of the parents who want their children to become employees, friends are very supportive, but lacking skills); (c) personal encouragement (factors that limit people's interest in developing the creative economy; limitations of mastery of digital technology, limitations foreign language skills, tend to feel inferior compared to female workers, lack of extensive network due to social limitations, feeling that you have no talent for the creative industry).
3.4. Multiplier effect

The socio-economic characteristics of tourists are seen from their age, last education, type of work, income per month, origin of the area, how tourists arrive, and number of groups. Based on age, tourists who come to the Mandalika are aged 15-58 years, with an average age of domestic tourists aged 27 years and foreign tourists aged 29 years. This happens because tourists who come are dominated by students, both on weekdays and holidays. Based on the origin of tourists who come to Mandalika as much as 93% of domestic tourists come from outside Nusa Tenggara Barat Province, such as: Pare-Pare, Makassar, Jakarta, Banten, Yogyakarta, East Java, and from within NTB such as: Bima, Sumbawa, West Lombok, East Lombok, Mataram City, and Central Lombok, while 7% are foreign tourists from Australia, Malaysia, Singapore, UK, and Ukraine. Based on work, 30% are students, 6% are civil servants, 1% are military / police, 18% are private employees, and 45% are entrepreneurs. Based on the average tourist income per month for domestic tourists is IDR 4,857,700 per month and foreign tourists is IDR 24,553,400 per month. Based on the arrival of tourists to the Mandalika as much as 45% of tourists with groups or groups, as many as 44% of other tourists with family and the remaining 11% themselves. Based on the number of groups of 72% tourists who come in groups bring groups of 1-5 people, 16% bring groups of 6-10 people, as many as 12% bring groups of> 10 people.

The total expenditure of Mandalika tourists in conducting marine tourism activities in the Mandalika comes from 48.57% of transportation (airplane tickets, train tickets, bus tickets, fuel), 26.28% comes from lodging / accommodation, 9.07% comes of consumption, 1.84% comes from the cost of tourism in the region (surfboard rental, buoy rental, snorkeling / diving equipment rental, tire rental, banana boat rental), 0.48% tour service fee (guide), 0.09% entrance ticket to the Mandalika location, and 13.67% of other fees.

The impact of tourism can be seen from the magnitude of the multiplier (turn over or multiplier effect) which can be seen from the value of the coefficient of multiplier as a result of the influence of the amount of tourist spending at tourist sites). Measurement of the economic impact of tourism activities in Mandalika Lombok is carried out with a multiplier effect analysis. The analysis was carried out to estimate the direct impacts, indirect impacts and further impacts of tourism activities in Mandalika Lombok. According to [19], an analysis was carried out for each group of tourism activity actors such as local business groups providing goods and services supporting tourism activities, including local business units that provide goods and services for tourism activities as well as local workers who play a role in providing the needs of goods and support services for tourism activities. Based on [20], measuring the economic impact on local communities can be done using two types of multipliers including the Keynesian Local Income Multiplier Effect which can indicate the estimated amount of visitor spending that affects the increase in local community income and the Income Multiplier Ratio that can indicate an estimate of the magnitude of the direct impact felt by visitor spending on the local economy.

Marine tourism in Central Lombok has a large economic impact on the local community. Economic impacts arising from tourism activities are direct impacts, indirect impacts, and continued impacts measured by the value of the multiplier effect, where the results of this study obtained a multiplier effect of 1.26 for the Keynesian Income Multiplier, 1.08 for the Multiplier Income Ratio Type I, and 1.17 for Multiplier Income Ratio Type II. This economic impact is slightly lower than other ecotourism activities such as Whale Shark Ecotourism in Gorontalo [21] and marine tourism in the Thousand Islands [22], as well as marine tourism on Tidung Island [23]. Economic impacts such as marine tourism in other areas such as Aceh in research [24] also show the value of RIM and KIM> 1, which means that marine tourism activities have an economic impact on the local community. Whale shark ecotourism in Gorontalo achieved a type II Income Multiplier effect ratio of 1.97. This is because whale shark ecotourism has been around for a long time and is more developed than marine tourism in Mandalika.
3.5. **Strategy of coastal resource management for the development of marine tourism**

To improve sustainable management of Mandalika in the tourism sector to minimize disruptive needed the strategy are: (1) Determination of alternative policies pursued by multi stakeholders, namely the government, the community, and the private sector to advance the field of marine tourism; (2) Form community groups that manage ecotourism-based creative products and conduct digital marketing and foreign language training; (3) In travel packages promotions also the Tourism Office emphasizes aspects of Branding, Advertising and Selling. To strengthen destination promotion, the Tourism Office conducts publications and promotions through Paid Media (local and national print and electronic media), owned media (websites), social media (Twitter, Facebook and Instagram); (4) Security of investing for investors; (5) Diversification of cultural-based marine tourism creative products.

4. **Conclusion**

Mandalika Economic Zone has cultural potential needs to be packed with the natural potential of marine tourism into a new destination package. The analysis of tourist offers approached with the carrying capacity of the region, it is known that the number of tourists visiting Mandalika is still below the carrying capacity. The carrying capacity for marine tourism in the Mandalika was estimated at 41,867 people/day. Currently, tourist arrivals in this region are above 51% of the estimated carrying capacity. Tourism activities have an economic impact on local people with the multiplier coefficient greater than or equal to one. Strategy of Mandalika resources management, namely investment security, zoning, quality of human resources, and economic activities, in order to become sustainable marine tourism.

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