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Industry 4.0 and the future challenges for the local community to manage eco-tourism (a case study of the participatory eco-tourism management in Menipo Island, West Timor, Indonesia)

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Abstract. Rapid development over the past two decades has brought us to the industrial revolution 4.0 era, where mastering information technology is an absolute thing for people to run their business. This situation is undoubtedly a challenge for the eco-tourism industry that involved local communities as well. This article aims to describe the current situations of the participatory eco-tourism management conducted by the local community and their strategies in dealing with the industrial era 4.0. The study was conducted in 2018 towards local people of Enoraen Village, Amarasi Timur District, Kupang Regency, East Nusa Tenggara Province, as the actors of eco-tourism management. The data and information in this paper are obtained using a quantitative method through the structured interview using questionnaires (n=100) and qualitative methods by collecting scientific writings published in journals and proceedings. This article concludes that there is a gap between the ability of local communities to access knowledge about information technology with massive demands for the use of this technology. We suggest that the development of information technology infrastructure and internet networks must reach remote villages. Furthermore, communities need assistance from any parties in order to be able to use these accesses to support eco-tourism management in Menipo.

1. Introduction

Today's human civilization has reached the point that it is called the era of industrial revolution 4.0 (4IR). This term was first used in Germany at Hannover Fair 2011 as the new concept of Germany's economic policy concept based on high-tech strategies. It marks the beginning era of the integrated technologies that create Cyber-Physical System (CPS), Internet of Things (IoT), Internet of Services (IoS), Internet of People (IoP), and Internet of Energy (IoE) simultaneously [1, 2]. This term is predicted to occur in 2020 based on the readiness of infrastructure and human resources, as well as the readiness of the transmission of knowledge about the use of internet technology [3].

Some experts then describe historically the breakdown of human civilization using the 4IR as a reference. For example, Oesterreich & Teuteberg [4] said that 4IR is the latest stage of the current civilization. The 4.0' civilization was started with its previous three rounds of the industrial revolution. He explained that the industrial revolution 1.0 occurred in England when the use of human power converted into engine power when the steam engine was discovered. Then, the industry revolution 2.0



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was marked when the electrical power had been utilized on a large scale. While the industrial revolution, 3.0 was begun when there were digitalization products, including the use of simple Internet devices.

The 4IR is an era where the internet becomes the main prerequisite for those who want to run their business. This has potential benefits for them to improve new impressive creation, up to date, and imaginable business opportunities [5]. At this stage, the development of cyberspace became very massive and seemed to be a real-world coup. Digital technology, for example, artificial intelligence, automatic and sensor technology, could increase company readiness to give a fast response to customer demands, supplier condition and abilities [5].

It also has changed the way people interact and communicate with each other. Producers no longer set up their shops physically, but now they build their shops online. Transactions no longer use real money but have been replaced by virtual money connected to a bank account. Product offerings no longer use display outlets in shopping centers but are replaced by selling them through startup applications, websites, or social media [6]. The offer of internet-based products not only applies to goods but also services.

The shifting, in terms of people's way of life, as the impact of 4IR also occurred in the general public. Everyone now has a tendency to use social media to interact, which can only be accessed via a smartphone that is connected to the internet. Data eMarketer shows that there are growing numbers of people who use the smartphone in Indonesia over the last five years, from 38.3 million in 2014 becomes 103 million in 2018. This means that almost half of the total population in Indonesia use a smartphone. Data eMarketer also mentions that currently, Indonesia is in the top three-smartphone users country for the Asia Pacific region, after China and India [7].

Social interaction and intensive communication through social media have led to the habit of showing off new things in cyberspace. In the tourism sector, traveling to an anti-mainstream place is one of the cultural products of such a habit. Uploading beautiful photos of nature that have not been visited by others, presenting local food that has not been enjoyed by the general public, and showing the existence of a local culture that has never been exposed before, has become a growing discourse in social media conversation [6].

Those habits make tourism companies expanding their business through the internet as well. Many small tourism business owners in Victoria, Australia, and Greece have changed their tourism business strategy from the old fashioned conventional systems into the e-commerce tourism business [8, 9]. Additionally, hotel operators also shift the way to promote their business by using online-based systems [10]. These examples show that 4IR has impacted the tourism sector in the way of how tourism actors to be able to use digital technology to fulfill their agility and competitiveness among tourism service providers.

East Nusa Tenggara (NTT) is one of the places that travelers prefer to stop by because it has many places with fantastic natural scenery, far from the city, and surrounded by exotic cultural communities. The state manages most of these locations through its management units in areas such as the National Park or the Natural Resources Conservation Center (Balai Konservasi Sumber Daya Alam-BKSDA).

Menipo Island in Enoraen Village, Amarasi Timur District, Kupang Regency is one of the potential locations to become the next tourist destination because of its natural beauty, unique location, and unique local culture. However, these potentials are now faced with emerging challenges as a result of 4IR. This paper will attempt to present such challenges to the management of Menipo Island in the future and formulate recommendations that allow management to answer the challenges.

2. Methodology

2.1. Location

This research was conducted in Enoraen Village, Amarasi Timur District, Kupang Regency, East Nusa Tenggara Province, for one and a half years from January 2018 to June 2019. Enoraen Village is the only village that is a gateway for tourists to visit Menipo Island. Meanwhile, Menipo Island is a conservation area with the status of Natural Tourism Park (*Taman Wisata Alam-TWA*) under the

control of Balai Besar Konservasi Sumber Daya Alam NTT (BBKSDA NTT). This research is social research conducted on the community and management of TWA Menipo as the research subjects.

2.2. Procedures

This study integrates quantitative and qualitative approaches. Quantitative data collection was carried out using social survey methods [11, 12] through structured interviews using questionnaires with 100 respondents ($n = 100$) as its sample. The sample distribution was taken randomly from the population in four *Dusun* in Enoraen Village, namely Oemoro I, Oemoro II, Bikoen I and Bikoen II. The research procedures are as follows:

First, the data taken is about community perceptions of participatory eco-tourism management in Menipo Island and its products (goods and services) that have the potential to be developed by the community in supporting Menipo's eco-tourism.

Second, a focus group discussion (FGD) [13, 14] involving local elites such as traditional leaders, religious leaders, community leaders, and heads of resorts of TWA Menipo, as well as representatives of youth, women's representatives and representatives of the general public. The FGD was conducted twice, 12 April 2018 and 25 October 2018. These meeting purposes are to inventory creative economic business preferences and identify the map of opportunities and constraints on community empowerment efforts in terms of a creative economy based on local resources.

Third, participatory rural appraisal (PRA) [15] is conducted through a simulation of establishing a group of Menipo Island eco-tourism. PRA was conducted on 3 May 2019. This meeting was attended by 18 people who were selected based on their expertise that had the potential to support the TWA Menipo eco-tourism management. Those people were the representatives of village institutions, customary institutions, weaving groups, boat owners, souvenir craftsmen, traditional food processors, TWA Menipo resort officers, and the research team. In addition to group simulations, the PRA also explored participants' opinions about Menipo's eco-tourism marketing strategy in facing the challenges of the industrial revolution 4.0.

Fourth, literature collection from scientific journals and popular writings is carried out. The topic sought was about the impact of the industrial revolution 4.0 on the management of participatory managed eco-tourism.

2.3. Data analysis

Quantitative data from the social survey were analyzed statistically using the percentage presented by creating diagrams or graphs. Data from FGD analyzed qualitatively using the *SWOT* (strength weakness opportunity threat) method [16], and it is presented in the SWOT table. While the PRA data were analyzed by categorizing the needs of institutions, job descriptions, and marketing strategies presented narratively. The three types of data are triangulated by dialogue with literature obtained from scientific journals and popular writings. The results of the overall analysis are presented in a descriptive narrative form.

3. Menipo Island

Menipo Island is located in the south of Enoraen Village at 124°07' -124°14' East Longitude and 10°08' -10°11' South Latitude coordinates. There is a strait overgrown with mangroves. This strait separates Menipo Island from the mainland of Timor Island, where administratively is the area of Enoraen Village. Menipo Island is home to many protected animals and habitat for semi-arid plants.

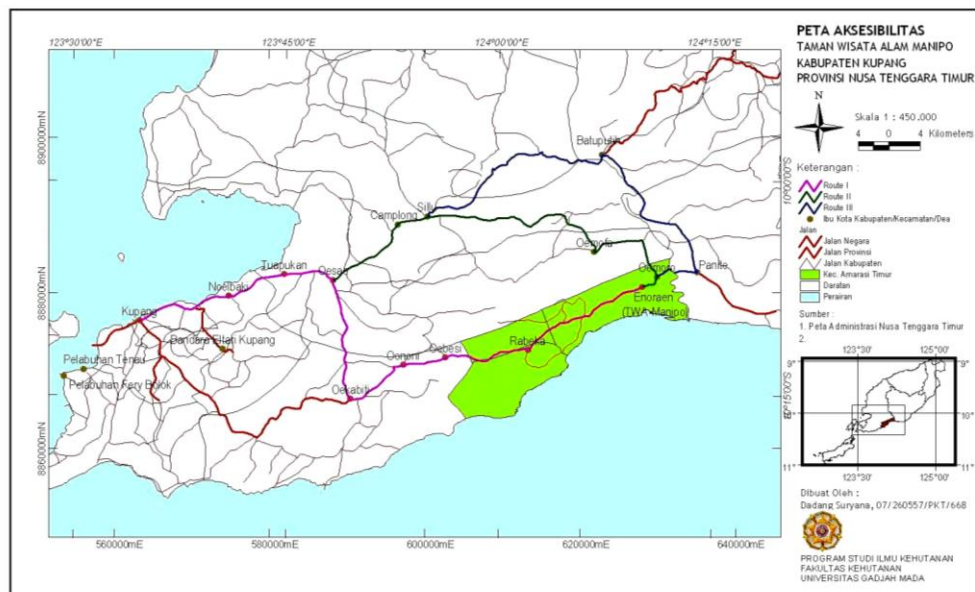


Figure 1. Map of accessibility to Enoraen and Menipo Island [17].

Menipo Island is a conservation area based on the Ministry of Agricultural Decree Number:1134/Kpts-II/92, 28 December 1992, concerning the changes in the function of the Menipo Wildlife Reserve located in the Kupang District of East Nusa Tenggara covering an area of 2,449.50 hectares to become the Tourism Natural Park.

TWA Menipo Resort undertakes the management of Menipo Island under the control of the Regional Conservation Section II office, BBKSDA NTT. However, in government administration, Menipo Island was included in the Enoraen Village area, Amarasi Timur District, Kupang Regency, NTT Province. Enoraen village is the only village directly adjacent to Menipo Island. This village has three main sub-villages (Dusun), namely Oemoro, Bikoan, and Fatufoaf. Menipo Island has the unique potential of plants and animals. This potential is described in Table 1.

Table 1. The list of potential plants and animals in TWA Menipo.

No	Potential	Type of species	information
A. Plants			
1.	Savana Vegetation	<i>Micro-laena stipoides</i> , <i>Desmodium capitatum</i> , <i>Paspalum scrobiculatum</i> , <i>Imperata cylindrica</i> . Shrubs group, such as perdu <i>Riccinus sp</i> and <i>Hibiscus sp</i> .	In the middle part of the island In the eastern part of the island
2.	Palmira palm tree Vegetation (Lontar)	Lontar and kesambi (<i>Schleisera oleosa</i>)	Grows sporadically in some spots on the island
3.	Pine tree Vegetation	Cemara laut (<i>Casuarina equisetifolia</i>) Group of thorn grass such as <i>Spinifex littoralis</i>	growing on sand dunes along the south coast Growing under and around the pine tree
4.	Mangrove Vegetation	<i>Rhizophora mucronata</i> , <i>Bruguera parviflora</i> , <i>Sonneratia alba</i> .	Located on the east and west ends of the island and slightly on the edge of the strait.
B. Animals			
1.	Mammals	<i>Rusa Timor (Cervus timorensis)</i>	

2. Aves	<p>Monyet ekor panjang (<i>Macaca fascicularis</i>) dan kelelawar. Burung madu matari (<i>Nectarinia soularis</i>), Kakatua putih kecil jambul kuning (<i>Cacatua sulphurea</i>), Kuntul karang (<i>Egretta sacra</i>), Kuntul/bangau putih (<i>Bubulcus ibis</i>), Pecuk ular (<i>Anhinga melanogaster</i>), Raja udang erasia (<i>Alcedo atthis</i>), Cikukua Timor, Timor Friarbird (<i>Philemon inornatus</i>); Gelatik Timor, Timor Sparrow (<i>Padda fuscata</i>); Kancilan timor, Fawn-breasted whistler (<i>Pachycephala orpheus</i>).</p>	<p>Waterbirds and terrestrial birds</p> <p>Timorese endemic birds</p>
3. Reptilia	<p>buaya muara (<i>Crocodylus porosus</i>)</p> <p>Penyu sisik semu (<i>Lepidochelys olivacea</i>). Penyu hijau and penyu sisik.</p>	<p>Around the strait waters to the end of the island</p> <p>The sandy beach of the south side of the island is a landing place to lay eggs when the big waves come.</p>

Sources: [17].

The richness of natural resources, such as flora and fauna, makes Menipo Island very potential to be developed into eco-tourism with specific interests. The coastline that extends from the west to the east, in the southern part of the island, with delicate brown sand that is directly connected to the high seas, presents beautiful scenery, especially in the morning and evening. In addition to recreational purposes, Menipo Island is commonly used as a research location for scientists to observe typically endemic flora and fauna of the semi-arid region.

A new paradigm in the eco-tourism management currently does not only strive for conservation activities, but there are elements of benefits obtained by the community around the area. Eco-tourism offers integration that fills one and another between efforts to conserve natural resources, empower local communities in the creative economy sector, and respect and preserve local indigenous culture [18].

Menipo Island as a tourist destination that can be put as a vital object for its stakeholders as a locus that should be preserved on the one hand, and can be utilized positively by the stakeholders on the other. This can be seen as exemplified in the management of mangrove tourism in several places in Indonesia that are able to produce ecological benefits for the purpose of conservation and economic benefits. It is because they have developed the economy of local communities by involving local people like officers, creative industry players, and actors providing tourism support services [19 - 21].

4. Local people's perceptions on Menipo Island eco-tourism

The level of somebody's knowledge about a place could be seen from how much time he spends living, staying, and doing activities in that place. In general, almost all respondents stated that they had lived in Enoraen Village for more than ten years. They also know that Menipo Island is a tourist destination. Nevertheless, only half of the total respondents had seen tourists visiting Menipo Island. This is due to farming activities in the garden, which is their primary job.

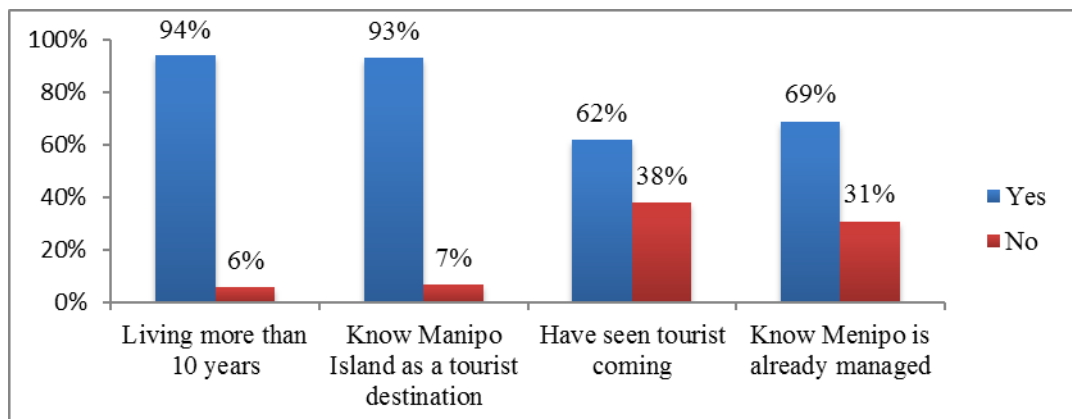


Figure 2. Respondent's knowledge about TWA Menipo [6].

Visitors' preferences are revealed from the respondents' information, which shows that the tourists who usually visit only see wild animals such as parrots, deer, bats, crocodiles, and turtles. In addition, tourists spend time to enjoy the natural beauty of Menipo Island by walking on the beach and meadows. Young visitors tend to take pictures in unique places around Menipo Island.

According to this survey, respondents have good knowledge about the management of Menipo Island. They mentioned that Menipo Island managed by the government. That information is explained in Figure 2.

The respondents' knowledge of Menipo Island certainly sparked a favorable opinion among respondents about the economic prospects of eco-tourism management in TWA Menipo on the economy of Enoraen Village. It is known that almost all respondents think that tourists who come will benefit the community. Respondents said they were happy if Menipo Island was used as a tourist destination.

Those positive opinions are in line with the enthusiasm of respondents about community involvement in managing eco-tourism, where the majority of respondents really want to be involved in eco-tourism management. The enthusiasm was also shown through the attitude of respondents who thought that their area (Enoraen Village) and Menipo Island could be developed into tourist destinations.

The reason is that, besides the potential of Menipo Island's natural resources in the Enoraen Village area, the development of tourist destinations on Menipo Island has the opportunity to open up employment opportunities, improve the household economy of local people, while also increasing income for the village government. Thus, it is expected that there will be funds that can be used to develop the construction of asphalt infrastructure for roads, bridges, pipelines, utilization of water springs, and other eco-tourism supporting facilities.

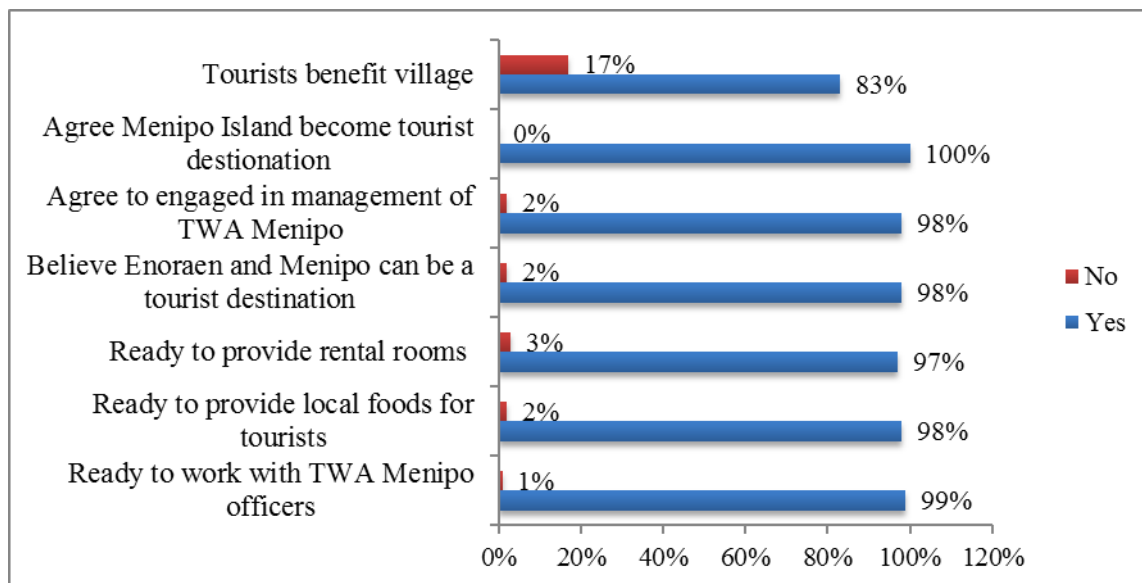


Figure 3. Seven positive opinions from respondents about TWA Menipo eco-tourism [6].

Respondents also stated their readiness to rent out their dwellings for tourist activities. This was followed by their willingness to offer food for sale to tourists as a form of service related to eco-tourism management.

The critical point obtained from the respondents' enthusiasm is the open attitude of the local community to build a commitment to the possibility of collaborating with the official management of Menipo Island. Respondents stated that they were willing to collaborate with the TWA Menipo Resort in order to support Menipo Island to become eco-tourism in the future. These positive opinions are presented in figure 3.

5. Potential Products of Menipo Island Ecotourism

During the FGD meeting on 12 May 2018, there were three crucial points about goods and services that were the potential to be developed into creative economic business products. Such products can be made using local resources in Enoraen Village. So that the potential for sustainability regarding raw materials and employers can get its certainty, both ecologically, economically, socially and culturally. These products can be seen in table 2.

Table 2. Potential of creative economy products in both goods and services.

No.	Tourism services	Art and cultural attractions	Souvenirs Products
1	Homestay	Traditional <i>Rabeka</i> dancing	Weaving (e.g., cloth, scarves, necklaces and other variants that can be developed).
2	Tent rentals	Traditional <i>Kuakiku</i> dancing	Grilled banana with grated coconut, banana crackers.
3	Lopo/Leasure houses	Gong and percussions instruments	Corn chips, cornflour, bosc corn, corn rice, boiled corn
4	Restaurants	Traditional weaving activities	Products from lead lontar / gewang (sweet tuak, laru, sopi, sugar water, sugar plate)
5	Toilets	Making woven from gewang leaves (mats, hats, nyiru, betel places, fans, baskets, etc.)	Woven from gewang leaves (mats, hats, nyiru, betel places, fans, baskets, etc.)

No.	Tourism services	Art and cultural attractions	Souvenirs Products
6	Car parks	Making tools to eat from coconut shells (bowls, spoons, cups, etc.)	Tableware from coconut shells (bowls, spoons, glasses, key chains, etc.)
7	Horse riding from village to jetty	A traditional game of mortar (lesung) to pound corn	Wood carvings and sculptures
8	Ferry services from the jetty to island by boat	Asramat traditional ceremony	Handmade of juk guitar
9	Tourist guide		
10	Information services from traditional leaders and folklore		

Sources: Social survey and FGD 12 May 2018 [17]

Various eco-tourism products that have been successfully inventoried in the FGD actually have quite good feasibility if they are to be realized. However, to be able to sell it effectively to visitors, the local people in Enoraen Village cannot move on their own. They must form groups that will organize and share the roles of each actor in providing their product. This is important because every product that emerges from a long discussion in the FGD does not stand alone, but instead becomes a part of the eco-tourism service system that complements each other.

For example, tourists who come will definitely need a parking lot, a place to stay, a restaurant, tour guide services, and ferrying transportation. Besides, tourists also want to see the real rural social life and local culture that are unique and different from what they have. Visitors will also bring memories by buying souvenirs as a representation of the presence of tourist destinations that have been visited. Therefore, every product offered to visitors will be better if the marketing is managed through groups.

6. Current Challenges on Menipo Ecotourism

The situation experienced by Menipo Island eco-tourism managers currently tends to be a dilemma. On the other hand, managers try to improve services, both in infrastructure and human resources, to satisfy visitors. Whereas on the other hand, the increase in tourist visits tends to run slowly. Data from the guest book on the TWA Menipo Resort reported that the number of tourists coming was increased slowly from 150 visitors in June to 700 visitors in September 2018. The FGD on 25 October 2018 identified the factors that caused the slow increase in tourist numbers. One of them is the weak marketing strategy of Menipo Island eco-tourism to the public.

The stakeholder's representatives realize that the current promotion of tourist destinations can be more easily done through social media. However, this requires an adequate internet network. The ownership of operational devices such as laptops or smartphones by stakeholders is also considered to be essential for marketing eco-tourism. In addition, the knowledge and skills possessed by managers in operating devices are also the keys to marketing strategies using internet technology.

FGD also identified that there are weaknesses in the Enoraen Village area if they want to implement such a strategy. Although the Internet network has reached the Enoraen Village area, the quality is inferior. There are so many spots that are not reachable by cellular signals. This is because there is no BTS (base transceiver station) built-in Enoraen Village. The closest BTS is quite far from Enoraen Village, which is in the village of Bena, which is to the east of Enoraen and located on the other side of the big river Noelmina.

This is a challenge for Menipo Island eco-tourism managers, both from the BBKSDA NTT and the local community who are involved. The results of the *SWOT* participatory mapping analysis of the challenges of Menipo Island eco-tourism in the 4IR era could be seen as in table 3.

Table 3. SWOT analysis of participatory mapping of the Menipo ecotourism challenges.

	Helpful to achieving the objectives STRENGTHS	Harmful to achieving the objectives WEAKNESSES
Internal Origin: attribute to organization	<ul style="list-style-type: none"> - The village area has been reached by internet technology. 	<ul style="list-style-type: none"> - Limited availability of devices and knowledge of information technology is still low.
	OPPORTUNITIES	THREATS
External Origin: attribute to environment	<ul style="list-style-type: none"> - The trend of traveling to anti-mainstream places is increasing in various circles of society. - The era of the internet-based industry 4.0 revolution provides many tourism package promotion platforms through the internet with global reach. 	<ul style="list-style-type: none"> - The possibility of changing tourist trends from visiting remote areas, cheaper and more easily accessible wildlife to other areas can occur as a result of dense information from internet media. - Internet access is still limited, and internet-based communication tools are still complicated for residents to get. This has the potential to organize tourism business agents to be taken over and managed by other villagers.

Sources: FGD meetings on 12 May and 25 Oktober 2018 after processed [17]

7. Discussion

Based on the previous description, this paper attempts to formulate a Menipo Island eco-tourism marketing strategy if the manager were willing to use the internet technology approach. Such an approach is critically important in order to answer challenges that arise as tourism becomes one of the industrial sectors, which is impacted by the 4IR [8, 9, 10]. As Menipo Island becomes a chosen spot to be promoted by eco-tourism stakeholders in East Nusa Tenggara, a consideration of the use of internet-based technology then could not be avoided.

The biggest challenge for Menipo eco-tourism is on deciding on the marketing strategy that is facing the current situation towards 4IR. Theoretically, the promotion of eco-tourism needs an integrated communication strategy. This concept is a tool for promoting products by benefiting media for delivering a message of promotion to the public [22]. Philip Kotler [23] argues that five potential ways could be used in marketing the products, which is called as mixed marketing communication, such as advertising, selling promotion, human relations, private selling, and direct selling.

However, this approach seems too conventional because it has not yet adopted the latest technology, such as the internet. Nevertheless, it has had its antithesis, namely *service-dominant (S-D) logic approach*. The critical element of S-D logic is available on its value that is actualized together amid the socio-economic actors. This value is more determined by the customer rather than inherent in the company-dominated offer [24]. S-D logic puts customers and tourism companies in the same position and does not dominate each other. This is in line with the principles that exist in e-commerce, software, and markets in the 4IR marketing system that puts forward a customer-centric approach. This approach is marketing principles that are personalized with customer insights, deliver innovative products that are driven by customers, and stay abreast of the latest changes and trends in consumer behavior [5].

In general, the S-D logic [25] approach emphasizes the importance of placing tourism managers and tourists in the same line of interaction concerning their planned activities to visit the tourist sites offered. Managers do not merely see attractions as merchandise. More than that, tourism managers put forward the best service offerings for prospective tourists in marketing these attractions. Thus, the added value that will appear in the form of hospitality in serving tourists can create a positive memory of the visitor's experience.

Figure 4 explains the conventional marketing communication approach that is integrated with the S-D logic approach. The technical methods listed in conventional marketing communication are still used because it is already comprehensive in promoting tourist destinations. However, the modification was made by adding the use of internet technology as the main basis for the operationalization of conventional marketing communications. Here, a transformation in the use of media in delivering information about the promotion of tourist destinations works. The use of the internet can be a channel to implement the principles of tourism marketing communication that is required in the S-D logic approach.

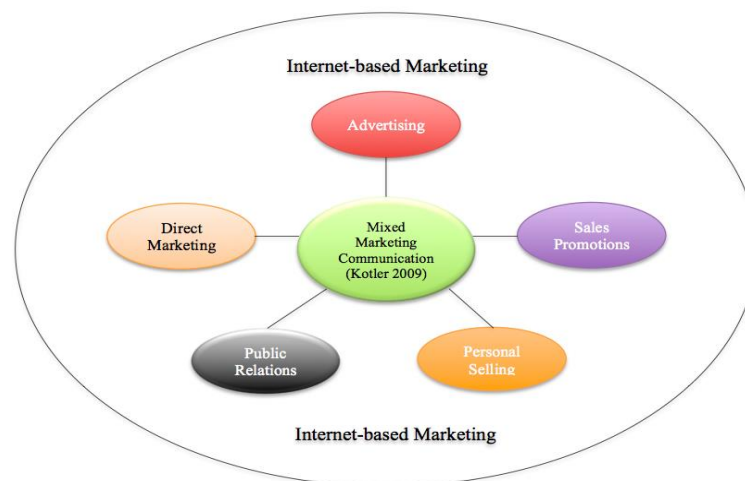


Figure 4. Integration marketing communication between conventional and internet-based.

In the context of Menipo eco-tourism, so far, the effort to promote Menipo Island has been made by the manager is relatively good. Managers already use internet-based marketing strategies through social media [25]. For example, there was the BBKSDA NTT initiative holding Menipo Festival 2019. In doing so, BBKSDA NTT has created flyers, brochures, and videography about TWA Menipo, which were disseminated by the NTT BBKSDA social media on the internet. Additionally, Enoraen Village's cultural arts were also performed by people of Enoraen Village, such as *rabeka* songs and dances, and other traditional musical instruments such as gongs and *juk*. Also, some activities attracted public attention to be directly involved in the festival, such as the Menipo photo competition for the general public, the painting competition for students, and the coloring competition for children. At the peak of the Menipo Festival event, which was held on 14 November 2019, there were quite a large number of audiences coming from various backgrounds.

The marketing strategy undertaken by BBKSDA NTT is a maximum effort from the manager to promote the Menipo TWA eco-tourism. Although they have used an integrative approach in conducting eco-tourism marketing communication, community involvement has not yet been seen in the marketing sector. This is very important because what became the basis for the management of TWA Menipo since the beginning was community empowerment. The strategy that can be applied is likely to maximize the role of eco-tourism groups in Enoraen Village to participate in TWA Menipo online marketing activities.

There is an alternative scenario to support local people to be engaged and involved in the internet-based marketing strategy related to the Menipo participatory eco-tourism management. The following are the steps that are likely to be undertaken in order to enable the strategies.

7.1. Group formation and division of tasks

The existence of a group is very crucial for managing Menipo Island eco-tourism in a participatory manner. In addition to accommodating the need for eco-tourism goods and services, strengthening

community relations with BBKSDA NTT and village governments, the eco-tourism group can be an organization that regulates the division of tasks with job descriptions of each actor who are involved. The group formation simulation was conducted at PRA on 3 May 2019, which was initiated by the research team from Environment and Forestry Research and Development Institute of Kupang (Balai Litbang Lingkungan hidup dan Kehutanan Kupang-Balitbang LHK Kupang). The results of the simulation are submitted to the community, village government and BBKSDA NTT, and it was expected to be followed up formally through a decree.

7.2. Strengthening infrastructure

The infrastructure in question is all kinds of information technology devices that enable each stakeholder actor to access the internet. It is aimed to support the implementation of marketing eco-tourism goods and services online. For example, the eco-tourism group approached the internet service providers to build BTS in the Enoraen Village area, so that the internet signal could be better and more stable. Devices procurement and software that can support the implementation of product marketing are also an essential part of this infrastructure development.

7.3. Upgrading knowledge for youth

The younger generation is the most technologically literate group. Therefore, strengthening the information technology skills and its management will be more useful to be prioritized for the younger generation. It is aimed to help eco-tourism marketing online. They must be involved in eco-tourism groups as actors who operate social media accounts and marketplace platforms as well.

7.4. Creating content

In industry 4.0, the term creative economy is known to rely on ideas on content offered online. Once again, suitable actors to implement this are the younger generation because they always have the creativity and lots of ideas. However, the content produced still relies on sources that involve the interests of all stakeholders. For example, the BBKSDA has an interest in conservation efforts, the village parties have an interest in village development, and the community has an interest in the household economy. All this interest can be accommodated by creating content packages offered to the public via the internet.

7.5. Management of social media, platform accounts, and startup

The final stage of the online marketing strategy is to determine which media will be used as a tool to sell or promote eco-tourism products. In the FGD on 25 October 2018 three media on the internet were identified in order to be used as a marketing tool.

The first is to promote eco-tourism products through social media. The possible option is to create an account on *Facebook*, *Instagram* and *YouTube*. Through these three social media marketing activities about the eco-tourism products can be accessed easily for the public. However, there are also disadvantages to this option, such as payment methods and difficulty in finding potential tourists who are serious about visiting.

Second, creating an account on the marketplace platform to sell eco-tourism products. The Menipo Island eco-tourism group can easily register their accounts on buying and selling platforms such as *Bukalapak* and *Tokopedia*, for example, as a way to promote Menipo Island eco-tourism. Products sold can be souvenirs, such as various menipo weaving products, snacks, and handicrafts, which represent the existence of Menipo Island. In the product description, in addition to product specifications, they can also be explained about the beauty and richness of the Menipo Island biodiversity as a promotional effort to the public.

The third is to build a startup platform for UMKM (micro, small and medium enterprises)-based businesses. This method is the most advanced technique because it requires at least three human resources who are experts in information technology. The three human resources will work as hackers, hipsters, and hustlers. Hacker is a person who is tasked to develop a startup application system. This

person must be an IT expert. Its position must be work in a location that has an adequate internet network, such as in Kupang City, which already has a 4G signal. Hipster is the person responsible for the startup displays that were built. This person must have graphic design skills and great aesthetic taste on startup application appearance. Therefore the public will be attracted and interested in using the application. The third is hustler, which is the person in charge of selling products that are sold on startup. Hustler must be someone who has adequate marketing skills. Therefore, the eco-tourism products that are offered can be understood easily by the public as well as the public wants to buy them.

8. Conclusion

A human civilization that continues to evolve always requires adjustment for humans as a bound element in it. The era of 4IR requires every human being to participate in using internet technology as a form of social interaction between people. Management of Menipo Island eco-tourism is also affected by the 4IR. However, this is undoubtedly a challenge and can even be an opportunity for economic, social and ecological prospects. Enoraen's people's readiness and positive opinion on managing eco-tourism in a participatory manner on Menipo Island is the leading social capital for implementing eco-tourism.

The formation of groups is the key to manage Menipo Island eco-tourism using internet technology. The eco-tourism group will be a tool to organize the actors involved in determining the roles and job descriptions. The young generation will become the avant-garde of the implementation of eco-tourism 4.0 due to this group has the most skills and knowledge of information technology infrastructure. In addition to this, social media, marketplace platforms, and startups are three options that make it possible to be chosen to operate Menipo Island eco-tourism 4.0. However, the most important thing is that the use of internet technology does not reduce the critical value contained in eco-tourism, namely conservation, good governance, and community welfare.

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