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Professional Management on Ecotourism and Conservation to Ensure the Future of Komodo National Park

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Abstract—Komodo National Park can be associated with the implementation of ecotourism program. The result of Principal Components Analysis is synthesized, tested, and compared to the basic concept of ecotourism with some field adjustments. Principal aspects of professional management should involve ecotourism and wildlife welfare. The awareness should be focused on the future of the Natural Park as 7th Wonder Natural Heritage and its wildlife components, free from human wastes and beneficial to wildlife and local people. According to perceptions and expectations of visitors from various results of tourism programs, the visitor's perceptions showed that the tourism management in Komodo National Park should pay more attention to visitor's satisfaction and expectation and gives positive impact directly to the ecosystem sustainability, local community and transparency to the conservation program.

Keywords—7th Wonders of Nature, Ecotourism, Komodo dragon, visitor's perceptions, wildlife management.

I. INTRODUCTION

KOMODO dragon is an extraordinary animal, becomes a unique destination object, attracts many tourists to see it directly in its natural habitat. According to Bright, the dragon lizard should be listed as a "must see wonder" at least once in a lifetime [1]. This magnificent and iconic unique creature is considered as a flagship species and highly valued as a nature object [2]. As a top predator, the world`s largest lizard, *Varanus komodoensis* is the keystone species for habitat and conservation in four island populations in the Komodo National Park (KNP), and on Flores island as fragmented small populations [3].

The conservation status of this endemic species is listed in red list Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora and is classified as vulnerable due to its demographic decline and limited distribution by the International Union for the Conservation of Nature [4]. Therefore, the survival and existence of this species became a more important issue since KNP gain its status as a member of seven wonders in 2012 [5]. This status makes numbers of visitor who were attracted by terrestrial and underwater beauty to KNP increased significantly around 120% in the last five years [6]. The total number of visitors to KNP between 2014-2016 in average is 94.582 visitors/year.

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KNP is listed as one of priority destination of the Great Tourism of Indonesia Year 2015 – 2019. Its main attractions are ecotourism, adventure tourism, and marine tourism [7]. KNP expects and is targeted to attract about 500.000 visitors in 2019 [8]. Big promotion and all of its policies will boost number of visitors to KNP; however, there are some concerns arose as reaction to government tendency that is seen in its policy in tourism to push Komodo island as a mass tourism object.

Over four decades, the vulnerable Komodo dragon's population is truncated and it gets a lot of attention about its conservation by researchers and tourist concerning several aspects such as ecology, its relationship with humans, and behavior [9]. The research result showed that Komodo population tended to fluctuate since 1980's up to present and depends on the availability of their prey such as *Cervus timorensis*, *Bubalus bubalis, Sus scrofa*, etc. [10]. Just like the locally extinct of the Komodo dragons on Padar Island, possibly as the result of reduced abundance of deer *Cervus timorensis,* caused by illegal harvesting [11]. The latest study showed that Komodo dragon is habituated to tourist activities near to their nests [12]. However, there are still some incidents such as human bitten by Komodo either in captivity or in their natural habitat. There is a local myth about how the people of Komodo island believe that the dragon is their twin sibling because they descended from the same ancestral. Because of this believe, people of Komodo Island would not harm the Komodo dragon even it preys on their livestock or bites their relatives.

The increasing number in human population in the enclave and surrounding areas is known to hunt Komodo dragons' prey and affecting the population of the Komodo dragons. As long as additional human populations still believe in the twin myths, then the rules of Komodo dragon protection from the threat of human disturbance will persist. Another disturbance is the behavior change under human influences and how people become a threat to the environments inside the KNP, land conversion and illegal logging (as resources of raw material for tourist handicraft) and on marine such as fishing using bomb or tiger trawl net and especially anchor of tourist cruise-ship that destroys the coral reef. Marine pollutions are increasing as high as the economic growing of human population, tourist activities in KNP, and surrounding area. The consequence of this environmental condition is that management authority must be involved to solve all problems to maintain sustainable tourism by introducing government

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policies [13].

This research hypothesized that ecotourism could be the best solution to assure the sustainability of both the tourism activity and the Komodo itself. Ecotourism is one of the strong approaches in sustainable tourism that could guarantee the ecosystem stability and dragon population survival in KNP because ecotourism is focused on enjoying and learning about nature, history and culture in a relatively unspoiled area. It is where tourism activities will be able to help the local community's for economy profit and support conservation activities that could be a solving solution of almost all the natural disturbance and economic poverty for the local people [14]. Due to the importance of tourist behavior for practical management achievement, the role of visitor must be recognized. For example, there are some research on the tourists' awareness and how much the value of willingness to pay in accordance with the conditions of KNP has been done [15].

There is some concern on tourist perception and expectation which must be fulfilled by the management to improve tourist services as the core business in the KNP, because the government has decided to declare the park as an international ecotourism destination. The aim of this study is to show how the management readiness and tourist attitude realize the decision in ecotourism. It is known that the tourists' manner and behavior depend on their perception on the destination that they visit. Sometimes, manner and perception must be directed by a program prepared by the management.

II. METHODS

A. Kind of Research

This direct research is using closed-ended questions on the questionnaire design and applied in the field by taking sample of respondent from population representation [16]. This quantitative approach uses structured interviews with Likert type-scale [17] and Method of Successive Interval (MSI) [18]. Principal component analysis (PCA) is widely used in data processing and performed to simplify and describe the interrelationships among multiple dependent variables and objects. The PCA transforms the original dependent variables into a new uncorrelated dimension, and this will simplify the data structure and helps one to interpret the data and dimensionality reduction [19]. The results will show the most significant factors which are expected to be addressed in order to manage ecotourist activities in a most sustainable fashion.

B. Population and Sample

The study was conducted from July to October 2017, and data used here are the tourist numbers from 2014 to 2016 to calculate the sample size of respondents using the Slovin's formula [20], [21]. According to the annual report of KNP, the average number of tourists from the last three years is 94.582 people per year. Statistically, the number of questionnaires for the 95 ± 7% confidence level will be fulfilled by 196 respondents. To add variations of respondents, some data were added to make a total of 201 respondents.

C. Data Collection

To moderate the sample's selection process, the technique of proportionate stratified random sampling is used where this method of sample intake is not randomly conducted but based on consideration and intentionally as research aims (sampling area). Sample intake was generally conducted by interviewing to each responder to find out how they thought and the experiences during doing tourism activities in several sites (Loh Liang in Komodo island and Loh Buaya in Rinca island, KNP).

D. Data Analysis

The assessment was conducted with the approach of PCA [22]. Methods of data analysis were using descriptive and quantitative analysis. Descriptive analysis is an analysis to describe the condition of tourism area in KNP. The results of the interviews containing the descriptions are included as supporting data for quantitative data analysis.
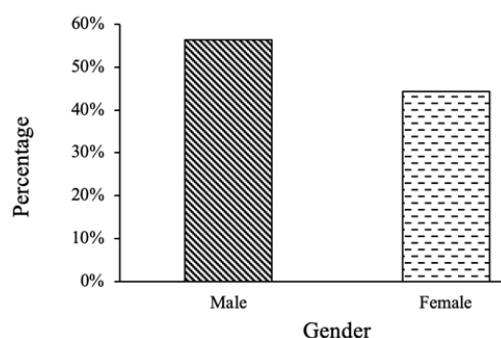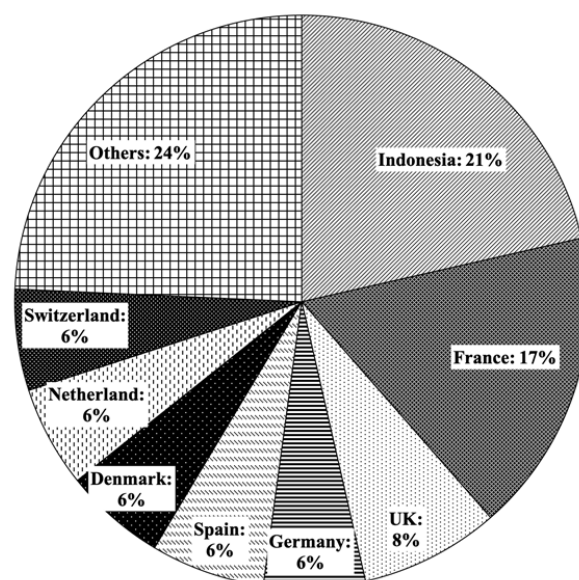

Fig. 1 Gender of 201 visitors

Fig. 2 Nationality of surveyed ecotourist

E. Result

The result obtained from 201 respondents consists of 59.70% male and 40.30% female (Fig. 1) where 81.09% is foreign nationals of 20 nationalities and dominated by citizen

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of France, Spain, and Germany (Fig. 2). Range of respondent ages is between 16–74 years old where the majority is between 25–34 years old (young adults) as much as 29.35% followed by 22.89% of 18–24 years old and 19.90% of 45–54 years old (Fig. 3). Visitors generally save money to finance the trip (30.35%) and 28.36% of visitors declared that the reason to visit the KNP is to show that they can afford to buy a relatively expensive holiday package (Fig. 4). The respondents' highest education background is post-graduates (39.30%) and graduates (34.33%) (Fig. 5).

The questionnaire is based on 37 questions. With R studio program, the cumulative variance is 68.59% from the first to nine components. The first to fifth is major component with the cumulative variance is 53.2%, and another four components (sixth to ninth) are the minor components with a cumulative variance of 15.38%.
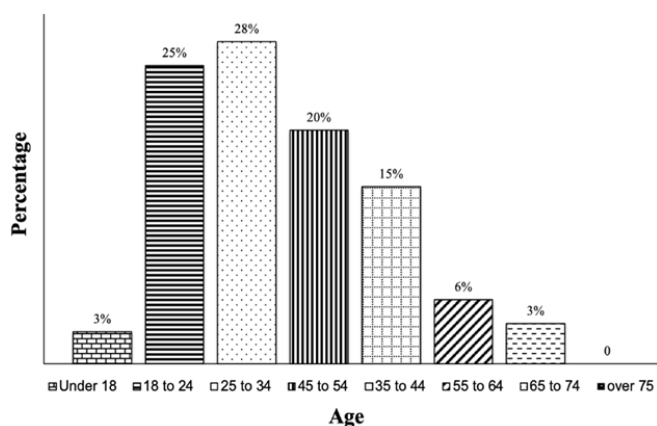
eight factors, 2nd component is awareness (15.16% of variance from total variance) with nine factors, 3rd component is underwater attractions (9.16% of variance from total variance) with five factors, 4th component is wildlife features (6.39% of variance from total variance) with three factors, 5th component is terrestrial attractions (5.23% of variance from total variance) with two factors. The sixth to ninth components with one factor in each component are minor components with accumulative percentage 15.38% of variance from total variance.

TABLE I
THE MAIN COMPONENTS AS RESULT OF PRINCIPAL COMPONENT ANALYSIS
FROM THIS STUDY

Components	Eigenvalue	Variance Percent
1	06.38	17.25
2	0.2507	15.16
3	03.39	09.16
4	02.36	06.39
5	0.1069	05.23
6	0.0854	04.40
7	01.50	04.04
8	01.34	0.16875
9	01.23	03.31

Fig. 3 Age group from all respondents

Fig. 4 Visitors` reasoning
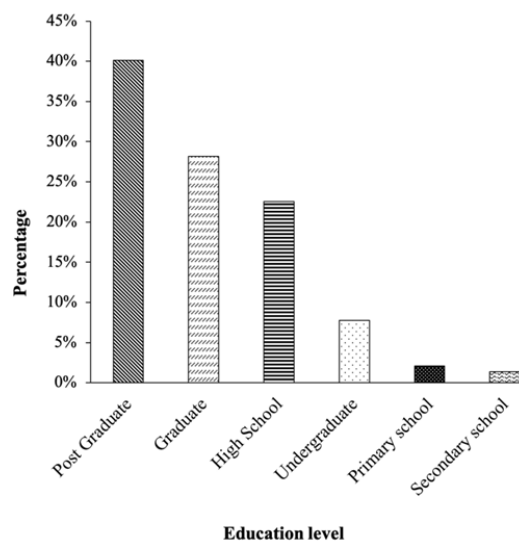
Fig. 5 Level of educations of all respondents

From the first major principal component namely management, the highest number is 17.25% of variance from the total. This component consists of eight factors which are sequentially composed: visitor would be satisfied if the company employs certified people and especially local certified people. Most of visitors would be pleased when the company supports local product, and abides by any codes of conduct and regulations to reduce the impact on the wildlife and its environment. The opportunity to get close to animals, plants and birds in their natural habitat would be good occasions, and the other satisfactions are as follows: the visitor could get some information about wildlife and how their money spent to wildlife conservation. The visitors also prefer if the company is owned or run by local people.
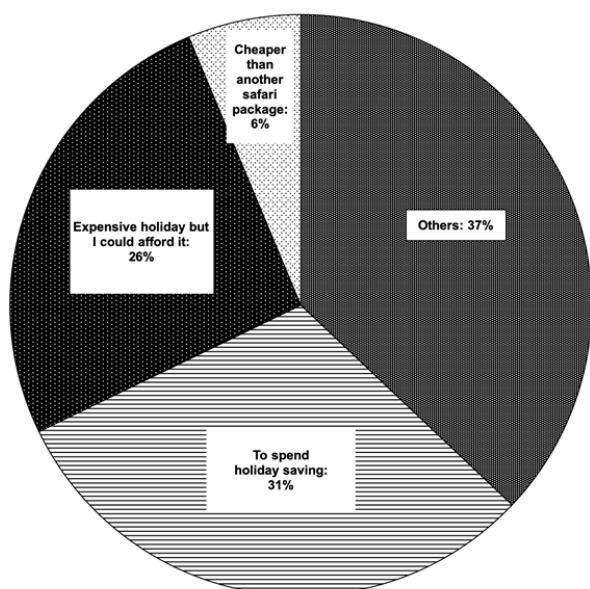
PCA [23] gives result of nine components in total with five major primary components, there are: 1st component is management (17.25% of variance from total variance) with

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The second major component is about awareness with 15.16% of total variance. The data show that visitors will enjoy the site if they could watch wildlife activities without disturbing its natural behavior. There are some information provided about the wildlife that might be seen, and environment that they visit is accompanied by knowledgeable and entertaining guide, being advised about something to do to reduce the impact on the wildlife and its environment, and able to take good pictures of plants, animals and birds. One of the important things is getting close to the wildlife in their natural habitat. In the visitors' mind, the KNP is associated with wildlife experience and nature watching.

The third of major component is underwater attractions with 9.16% of total variance. Some activities such as snorkeling, diving, swimming, sailing, and wildlife experience had become addictive attractions.

The component of wildlife features with 6.39% of total variance is the fourth of major principal component. Animal mating and the feeding behavior is attractive features when they visit KNP, and the presence of Komodo's juvenile would be an interesting view for them.

Terrestrial attraction with 5.23% of total variance is the fifth from mayor component. The high number of bird's diversity in KNP attracts birding and hiking activities to visit this island.

The last component, nature experience has four minor components. These minor supporting components which fulfill the matrix (15.38% of total variance). These components that motivate loyal recurring visitors to visit are the status of Komodo dragon as one of the world's seventh wonder of nature (4.40% of total variance), the location of KNP relatively reachable from another tourist attraction such as Bali (4.04% of total variance), the enjoyable of pristine landscape (3.63% of total variance), and how the presence of Komodo in group is another important feature when viewing Komodo and others animals in KNP (3.31% of total variance).

The result of PCA is shown that the presence of main or major components is the most important of the respondent`s expectation and compared to the minor supporting components as the perception of visitor. The PCA result clearly focused on how the characteristic and visitor`s profile give specific perception and expectation of what they will find in KNP. This research represented the global worldwide visitors from 20 countries and across four continents. It shows that these mature high education respondents are willing to spend their saving money to get relatively expensive trip package and set aside time to a well-planned holiday. The nature tourist is a visitor with special interest to wilderness and rural areas [24]. Underwater beauty and everything inside the KNP are a popular package, attractive enough to trigger travelers from all around the world.

III. ANALYSIS AND DISCUSSION

Natural resource management is used as a problem solving with adjustment to the field condition and reviews the root concept and mainstream characteristics in the management. In the case of existing management of KNP, it can be associated to the implementation of ecotourism program. For this purpose, the PCA result has been synthesized, tested and compared with the fundamental ecotourism basic concept and some field adjustment. A matrix has been made to rejustify the assessment result and compare it to the basic thought. The number of scores indicates the importance level of each component. It is scaled and compared with these basic concepts.

Based on visitors' expectations and perceptions, as well as tourism program evaluation results from other researchers such as UNESCO with their conservation outlook assessment [25], KNP is not yet fully managed based on ecotourism principles. It confirms doubts on future development of tourism activities of KNP conservation area. From IUCN Conservation Outlook 2017, even though the park management is guided by Management Plan 2000-2025 [26] and Strategic Plan 2000-2014, the management effort is still focused to increase the number of visitors and issues on Komodo dragon conservation. Wider attention to another area such as sea area issues is required to ensure effectiveness of longterm protection for KNP. The effective form of management and current management plan implementation including comprehensive zonation plan of conservation area is required in handling the area's inside and outside threats. The increase number of tourists is clearly visible and the management effort might insufficient to mitigate its negative impact especially the impact of increasing passenger capacity of the international airport in Labuan Bajo.

UNESCO focused on protection and management of KNP, and its Management Plan 2000-2025 as well as Strategic Plan 2010-2014 definitively needs revision and updated, especially to ensure zonation effectiveness and its sustainability of local ecosystem. The authorized management designed a specific plan to guide the managerial decision maker in line of the change of priority and its threats, especially in hope to increase number of visitors and reduce its impact of tourism activities. KNP received large support from Government Center of Indonesia [27] which hypothesizes that KNP's ecotourism as rural development strategy has failed to fulfill local resident needs.

TABLE II
CONTRIBUTIONS SCALE BETWEEN EACH COMPONENT USING PRINCIPAL COMPONENT ANALYSIS

Component	PC 1	PC 2	PC 3	PC 4	PC 5	PC 6 - 9
Environmental Conservation	26.7%	22.7%	14.3%	14.3%	14.3%	14.3%
Experience/ Knowledge for Visitor	33.3%	60.0%	71.4%	71.4%	71.4%	71.4%
Direct Profit for Local People	40.0%	17.3%	14.3%	14.3%	14.3%	14.3%

The PCA result showed that the visitors' perception and expectation are correlated to National Park objectives and

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management practices. It is interesting to extend discussion in concern to the sustainability of the tourist destination using some managerial concepts and point of view such as: to re-evaluate or compare the existing management with basic ecotourism concept and to immediately improve the sustainability of the Park and to satisfy respondents' expectations to see local certified people in the management and working with relevant authority to enforce the rules in reducing the impact on the wildlife and its environment; secondly, to maintain the collaboration, awareness enhancement and goal set to mid-term and spatial level of sustainability; lastly, to conserve the environment and all of the KNP biodiversity as its long-term goal, and to wisely use its resource to the level of sustainability.

IV. Conclusions

Six main components of visitors' perception and expectation are management, awareness, underwater attraction, wildlife features, terrestrial attraction and nature experiences where visitors expect professional management and direct benefit to the local resident, also transparency and efficiency of conservation budget.

Principal aspects of management involved ecotourism and wildlife. Ecotourism must be run by local people and must be beneficial for them. For that reason, local people must be certified in local biodiversity and visitors safety. For the benefit of wildlife, focus on protected species such as Komodo, sea turtles, wild deer, coral reefs and monkeys aside for other group such as large fishes and marine mammals is needed. Wild life on land as well as the ecosystem should be managed to maintain its natural quality. The awareness should be focused on the future of the Natural Park as 7th Wonder Natural Heritage and its wildlife components, free from human wastes and beneficial to wildlife and local people.

Even though flagship species still got its own attractiveness, there are new tendencies about how management, awareness and specific activities could attract more loyal and recurring visitors. Visitors will go to KNP especially for the Komodo uniqueness and then move forward to underwater beauty and snorkeling/diving activities. All tourists' expectation and perception will fulfill ecotourism destination characteristic. Professional Management is required to satisfy visitors' awareness expectation of this magnificent ecosystem. To attract more visitors, KNP needs to spend more attention on preserving the environment, overland and under water itself.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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