Pentahelix-"An Ecotourism Marketing Application" Focuses on the Development of Mobile Application Platform Based on Android and IOS

Dwi Asri Siti Ambarwati[(✉)], Dorothy RH. Pandjaitan, and Lidya Ayuni Putri

Management Depertment, Lampung University, Bandar Lampung, Lampung, Indonesia
dwi.asri@feb.unila.ac.id

Abstract. Tourism in general plays a vital role in the development of a region. In addition, tourism is also a priority sector for the Indonesian government to help the country's economic growth. This is because tourism has contributed quite a lot. The contribution of the tourism sector plays an important role as a source of income from the country's foreign exchange. Tourism is also a driver of the country's economic growth. One of them is the natural tourism sector. This sector is one that is strategic enough to be utilized in tourism development as part of state development. Lampung as one of the provinces in Indonesia that has a lot of potential for its natural beauty, makes Lampung a province that has begun to be used as a tourist destination. However, there are quite a lot of potential natural beauty in the Lampung area that have not been managed optimally. Related to this problem, one of the efforts that can improve ecotourism is by applying the innovation of the penta-helix development model. Penta-helix is a collaborative network that involves five factors, namely, Academician, Business, Community, Government and Media in the development of Lampung tourism. Penta-helix is needed to maintain and restore tourism destroyed by the pandemic by creating a special mobile application for ecotourism in Lampung. The research employs quantitative research to test the Penta-Helix Model which focuses on developing the commercialization of innovations in tourist loyalty behavior in Lampung tourism. The data collection method uses a survey by conducting a survey on each factor in the penta-helix model. The results showed that the dimensions of the mobile application can increase the satisfaction and loyalty of visitors to the ecotourism area in Lampung, and consumer engagement is more as a mediator who has a direct influence on visitor satisfaction and loyalty compared to being a moderator who strengthens or weakens the influence of the dimensions of the mobile application on the satisfaction and loyalty of visitors to Lampung eco-tourism.

Keywords: Penta-helix · mobile application · customer satisfaction · consumer loyalty · consumer involvement

1   Introduction

Tourism in general plays a vital role in the development of a region. In addition, tourism is also a priority sector for the Indonesian government to help the country's economic growth. This is because tourism has contributed quite a lot. One of the important things in the tourism sector is the increase in the country's foreign exchange income. Tourism is also a driver of the country's economic growth. One of them is the natural tourism sector. This sector is one that is strategic enough to be utilized in tourism development as part of state development.

Lampung as one of the provinces that has a lot of potential for its natural beauty, makes Lampung a province that has begun to be used as a tourist destination. However, there is still quite a lot of potential for natural beauty in the Lampung area that has not been managed optimally. The Ministry of Tourism carries out a tourism marketing development strategy through the Ordinary Program (Branding, Advertising, Selling), namely Branding Wonderful Indonesia as the main destination for world tourism [1]. However, the development strategy to advance the tourism sector in Indonesia was hampered by the Covid-19 pandemic in Indonesia in early 2020. Referring to data from the Tourism and Creative Economy Office of Lampung Province, it was noted that there was a sharp decline in the number of tourists visiting due to the Covid-19 pandemic (Table 1).

Related to this problem, one of the efforts that can improve ecotourism is by applying the innovation of the penta-helix development model. Penta helix is a collaboration network that involves five factors, namely, Academician, Business, Community, Government and Media in the development of Lampung tourism. Penta-helix is needed to maintain and restore tourism destroyed by the pandemic by creating a mobile application specifically for eco-tourism in Lampung.

Mobile application serves as a medium in building tourism in Lampung province, such as disseminating information, and visiting experiences. Reffering to the elaboration above, the purpose of this study is to develop a penta-helix model by giving birth to an ecotourism mobile application that is in accordance with the potential of ecotourism, especially in Lampung Province.

A. *Purpose of the Study*

This study was specifically conducted to analyze the role of mobile application variables, consumer involvement in tourists' sensitivity to tourist loyalty in Lampung. Another purpose is to investigate the profile of tourist visits in the eco-tourism area in Lampung Province from the aspect of age and employment status which can be beneficial

Table 1. Lampung Province Tourist Visit Data

Details	2017	2018	2019	2020
Domestic Tourist Visit	11.395.827	13.933.207	10.445.855	2.911.406
Foreign Tourist Visit	245.372	274.742	298.063	1.647

for policy makers, specifically for management policies in executing the company's marketing strategy in the face of very high business competition.

2   Literature Review

This research entitled "Penta-helix -An Ecotourism Marketing Application" focuses on planning the creation of android and IOS mobile application platforms, this is an application that involves penta-helix and is known as the ABCGM formula, namely: Academician, Business, Community, Government and Media that are able to encourage tourism growth to recommend ecotourism destinations in Lampung province to the public.

A. *Penta Helix*

Penta-Helix is a collaborative activity between lines/fields of academics, business, community, government, and media, otherwise generally called ABCGM which is useful for accelerating the development of potential in rural areas that are quite large. Basically, the Penta Helix element starts from the Triple Helix [2]. The elements that make up the Penta Helix are basically a Triple Helix consisting of elements from the Academic, Business Sector, Government, which in its development was added with one additional element, that is Civil Society (or Community in this study), to become a Quadruple Helix, to accommodate the perspective of society, in this case it is a "media and culture-based society" which has also become an overall part of innovation in the this Century. In its development, Community elements are able to encourage cross-disciplinary configurations and networks, as well as liberating the concept of "innovation" from various things and mere economic goals, but also involve creativity as part of the production process and innovation of human knowledge [3].

In general, the penta-helix model can be seen as a refinement of the triple helix model which only relies on actors from academia, government, and industry, but in the penta-helix model it also accommodates the increasing role played by civil society [4]. Referring to the existing literature, it is also agreed that it is important to be able to develop a triple helix model with a one helix more. However, along the way, there are disagreements regarding what can be included in this fourth helix. Penta Helix can basically be interpreted as a concept that depends on activities that generate feelings and also link individuals/groups in an event. In addition, the penta helix model also links community participation in an effort to encourage sustainable development in the tourism industry and actively involves the community to help guide the direction of the tourism industry improvement policy strategy that is being implemented. The concept of community involvement is generally broken down into three subcategories: political involvement, social assistance, and community participation. In relation to the development of the tourism industry, the community will be able to contribute to the opportunities that exist in optimizing various regional potentials such as unspoiled areas [5].

B. *Ecotourism Concept*

The general form of tourism products that are derived from the concept of sustainable tourism development is what is now becoming known as the concept of ecotourism

development. However, the meaning of the term ecotourism is still a topic of debate among researchers. The absence of a concise and binding definition of ecotourism, in turn, creates a vacuum that contributes to the increasing issue of greenwashing, which in turn poses a threat to the sustainable development of the sector itself. Realizing this, some researchers conducted a review of various descriptions of ecotourism and have tried to explore the central theme that is inseparable from various explanations in the literature.

In that case, ecotourism is a model of responsible natural tourism in unspoiled areas or naturally managed areas that have the aim of enjoying the beauty of nature by involving elements of education and support for conservation efforts and increasing the economic income of local communities.

C. *Mobile Application*

Mobile applications are software applications that can be operated via mobile devices (smartphones, tablets, etc.) that are connected to the internet services. The main thing that is the advantage of having a mobile application is that it makes it easy for users to get the latest information portable without using a PC or notebook and its users will get up to date information anywhere and anytime according to the presence of mobile device users and the area where they are as long as can be reached by internet communication network [6].

Along the way, the mobile application has now been integrated with various features available in mobile devices, such as GPS, Compass, etc. The existence of this integration also allows the role of mobile applications in carrying out certain complex tasks, such as tracking the user's whereabouts, providing navigation, providing route descriptions or location maps in digital form [7].

Mobile applications now allow transactions from any location in real time also more and more mobile users have a good experience when using mobile applications, because of the ease of using mobile phones to get information and make transactions anytime and anywhere, thus giving consumers the opportunity to enjoy the services offered without time or place restrictions [8].

D. *Consumer Involvement*

Consumer involvement or consumer engagement is defined as Variables of individual differences that are known to influence the way consumer decision making and communication behavior are used [9]. According to Henry [10], engagement can include both cognitive and affective aspects. These engagements can be at both high and low levels of engagement. At high engagement consumers allocate more time in the context of searching for product information, while at low engagement the time required is relatively less.

Consumer involvement states that there are purchases that have low and high involvement, there are also a number of stages of consumer involvement in deciding to make

a purchase, including product knowledge, information both internally and externally, psychological aspects, culture, lifestyle, and social systems which exists.

E. *Satisfaction*

Previous research has found that satisfaction is more of an affective side than a cognitive one. Satisfaction is an important thing in the main factor that customers need to consider when planning a purchase of a product or service. Satisfaction can be interpreted as a positive, effective, and emotional response given by customers for the use of certain products or services. This is generally recognized as influencing customer turnover. In an online environment when customers feel satisfied, they also have the intention to adopt their respective online services.

In a market where the level of competition is quite high, companies begin to compete to provide satisfaction to their consumers so that consumers have high loyalty to the products laughed at by the company. Referring to the opinion of [11] which states that satisfaction is an attitude that is decided referring to the experience gained by a person. Satisfaction is an assessment made on the characteristics or features of a product or service, by providing a level of consumer pleasure related to meeting consumer consumption needs. Customer satisfaction can be achieved through the provision of quality, service, and value. The key to increasing customer loyalty is to provide high customer value.

Customer loyalty is closely related to consumer satisfaction. The more satisfied the consumer is with his desires, or satisfied between expectations and reality, will cause the consumer to return to buy the product again and become a loyal consumer to the seller's product, therefore the researcher formulated the hypothesis as follows:

H1a: Mobile Application has a significant effect on traveler satisfaction.

H1b: Consumer Involvement strengthens the effect of mobile applications on tourist satisfaction.

F. *Loyalty*

Brand loyalty for tourists is generally divided into two, namely attitude loyalty and behavioral loyalty. The first ecotourism has a positive impact on the ecotourism area within it; they will then decide whether or not they are willing to make a return visit. This emphasizes that the services provided by ecotourism areas have a positive and lasting impact on brand value, and are potentially capable of generating brand commitment behavior towards ecotourism areas that lead to decisions to repurchase [12]. Taking into account that online shoppers have sufficient time and information, this also increases the potential for switching to high; in mobile application settings, switching is only one click away. Define e-loyalty as "customer's favorable attitude towards e-business results in repeat purchase behavior".

This shows that e-loyalty is made from two components: the loyalty of attitudes and behaviors, therefore the researcher formulated the hypothesis as follows:

H2a: Consumer satisfaction has a significant effect on traveler loyalty.

H2b: Consumer Involvement amplifies the effect of satisfaction on traveler loyalty (Fig. 1).
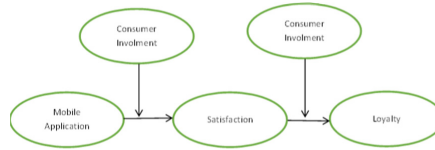
G. *Research Model*

Fig. 1. Research Model

3 Result Method

This research uses a quantitative type of research to test the Penta Helix Model which focuses on developing the commercialization of innovations in tourist loyalty behavior in eco-tourism in Lampung. Model testing is carried out with research work procedures through several stages, starting with the literature study stage to ensure the measurement of consumption behavior appropriately and in accordance with the theory and results of previous research, which then ends in the preparation of reports and publication articles. The following is a description of the stages of the research, which is followed by a picture display of the flow of the research procedure.

A. *Literature Studies*

The literature study is the initial stage in this research activity, the results of which will be used to prepare instrument measurements, so that the Penta Helix Model which focuses on developing the commercialization of innovations in tourist loyalty behavior in eco-tourism in Lampung which is built produces a tidal theoretical model. Literature review is very important so that the model that is built can be ensured to be the right model and that represents empirical conditions and can be generally applicable.

B. *Preparation of Instrument Measurements (Indicators)*

The preparation of instrument measurements is carried out based on the results of literature studies and previous research instruments that have met the requirements for the validity and reliability of measuring the Penta Helix Model which focuses on developing commercialization of tourist loyalty behavior innovations in eco-tourism in Lampung. The condition that the validity test results are declared valid with the construct validity test model, if they meet the loading factor values above 0.50 ([13] and measurement reliability tests with the Cronbach Alpha test model of above 0.70, the reliability test is declared reliable [13].

The indicators used as instrument measurements meet the requirements for validity and reliability tests that have been tested in previous research.

C. *Data Collection*

Data collection in this study is in the form of primary data collection by distributing questionnaires online and online which are accompanied by interviews if needed to dig up more detailed information, as well as collecting secondary data as documentation of data supporting model testing, such as data on tourist visits to eco-tourism in various regions in Lampung. The data collection time is planned for at most 4 weeks.

The distribution of the questionnaire was aimed at the target number of samples of at least 300 samples according to the size of the sample peck according to [13], with a sampling technique in the form of a non-probability sampling technique, that is, the selected sample cannot represent the characteristics of the actual population element, because the characteristics of the population cannot be known with certainty, so the sampling method uses the purposive sampling method (meets the criteria for the representative of the population element that corresponds to the research objectives and problems).

The target of the sample unit is individuals who know and understand the benefits of Eco-Tourism, especially individuals who visit in Lampung, so that the distribution of questionnaires through online (social media) in order to get the target sample is increasing and spread from almost all provinces in Indonesia.

D. *Tabulation and Editing of Data*

The results of data collection at the same time are tabulated in the Excel database application and at the same time edit if there are answers from respondents that are not responded to properly, that is, judging from empty answers, by spreading the question again if possible. If it is not possible to disseminate the questionnaire again to the same respondents, then the distribution of the questionnaire is propagated to other target samples.

E. *Data Analysis*

A quantitative approach will be used to explain the relationship between research variables. The goal to be achieved is to test the influence of penta-helix in increasing creativity and innovation capabilities and their implications for the development of the ecotourism sector in Lampung Province. The population in this study is the entire ecotourism sector located in Lampung Province, considering that the ecotourism sector is quite a lot and the development in each region has not been evenly distributed. The sampling technique is to use the purposive sampling method, which is to choose several districts that have an ecotourism sector, as well as a total sample of 500 respondents. The population is all subjects in the study, while the sample is part or representative of the existing population.

Representative sample sizes using Structural Equation Modelling analysis are in the range of 100 to 200 [13]. Then each variable and its indicators will be tested for validity as well as reliability. The measurement scale uses scores of 1 to 10, (1 = very inappropriate, and 10 = very appropriate). In this paper, the data obtained will then be treated using the Partial Least Square (PLS) program.

4   Results and Discussion

In this chapter, we will discuss the results of field studies conducted by researchers including the characteristics of respondents in research with descriptive statistical analysis. The analysis of the Structural Model (Inner Model) as well as the discussion of the results of hypothesis testing and the results of mediation tests. Data processing in this

study used the Structural Equation Model (SEM) model with the help of the Smart PLS v.3.2.9 application.

A. *Instrument Test validity and reliability*

Testing of this measurement model is carried out by testing validity and reliability. The indicators used are convergent validity, discriminant validity, and reliability. Convergent validity is the degree to which a measure can be positively correlated with alternative measures in the same form, discriminant validity is how far the construct to be studied is different from other constructs by empirical standards, and reliability is a measure that indicates the level of trust, reliability, consistency, or stability of the results of measuring statements without bias or error and provides guarantees that the data collection tools used all the time provide consistent results and all items in the data collection instrument also provide consistent results. The measurement model for the validity and reliability of this study can be seen in Fig. 2:

In addition to using the construct validity test, this study also conducted a construct reliability test which was measured using composite reliability and Cronbach's alpha derived from the indicator block that measured the construct. Reability tests are carried out to find out the level of consistency, trust, stability or reliability of the results of a measurement. The reliability value generally accepted for exploratory research is 0.7 for either cronbach's alpha or composite reliability. The table below presents the results of composite reliability and Cronbach's alpha tests using Smart-PLS Table 2.

B. *Hypothesis Testing*

The hypothesis that has been tested is using the Inner Model (structural model) which includes R-square output, parameter coefficients and t-statistics and then analyzed. Whether the hypothesis can be accepted or rejected can be seen in various ways, among others by observing the significance value between the contract, t-statistics, and P-values.
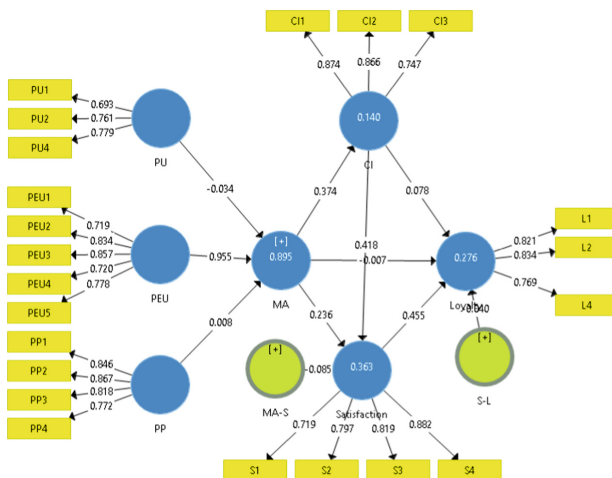

Fig. 2. Results of Reliability Test

Table 2. Reliability Test Results Table

	Cronbach's Alpha	rho_A	Composite, Reliability	Average Variance Extracted (AVE)
CI	0,779	0,814	0,869	0,691
Loyalty	0,734	0,739	0,849	0,653
PEU	0,843	0,844	0,888	0,615
PP	0,847	0,858	0,897	0,686
PU	0,602	0,614	0,789	0,556
Satisfaction	0,820	0,835	0,881	0,650

The hypothesis testing of this research was carried out using the SmartPLS (Partial Least Square) software 3.2.9. The calculation results obtained can be seen from the bootstrap results. The rule of thumb in this study includes t-statistics > 1.96 with a significance p-value of 0.05 (5%) and a positive beta coefficient. The results of hypothesis testing are presented in Table 4. 7 and the results of this research model can be described as in Fig. 3:

The initial hypothesis (a) examines the effect of mobile applications on consumer satisfaction, whether or not it has a positive effect. The test results showed that the t-statistic value was 4.186 and the p-value was 0.000. From these results, it is stated that the t-statistic is significant. It can be seen that the t-statistic is more than t-table > 1.96 with p-value < 0.05, so the first hypothesis (a) is received. This shows that mobile applications have a positive and significant effect on consumer satisfaction Table 3.

The second hypothesis (a) tests whether consumer satisfaction has a positive and significant effect on traveler loyalty. The test results showed a t-statistical value of 6.317
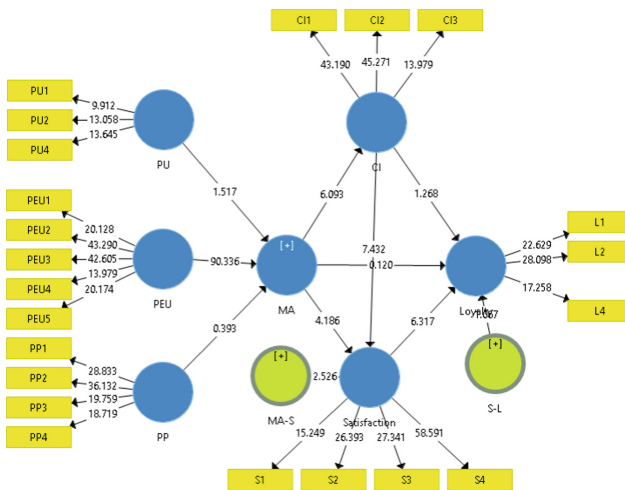

Fig. 3. Results of Research Model

Table 3. Results of Path Coefficients

	Original Sample. (O)	Sample Mean. (M)	Standard Deviation. (STDEV)	T Statistics (|O/STDEV|)	P Values
CI → Loyalty	0,078	0,081	0,062	1,268	0,205
CI → Satisfaction	0,418	0,420	0,056	7,432	0,000
MA → CI	0,374	0,374	0,061	6,093	0,000
MA → Loyalty	-0,007	-0,006	0,056	0,120	0,905
MA → Satisfaction	0,236	0,239	0,056	4,186	0,000
MA-S → Satisfaction	-0,085	-0,082	0,034	2,526	0,012
PEU → MA	0,955	0,955	0,011	90,336	0,000
PP → MA	0,008	0,009	0,021	0,393	0,694
PU → MA	-0,034	-0,033	0,022	1,517	0,130
S-L → Loyalty	-0,040	-0,040	0,038	1,067	0,287
Satisfaction → Loyalty	0,455	0,459	0,072	6,317	0,000

and a p-value of 0.000. From these results are stated significant t-statistics. Since the t-statistic is greater than the t-table > 1.96 with a p-value of < 0.05 so the second hypothesis (a) is received. This proves that consumer satisfaction has a positive and significant effect on tourist loyalty.

The first hypothesis (b) tests whether consumer involvement moderates the influence between mobile applications and consumer satisfaction. The test results showed a t-statistical value of 2.526 and a p-value of 0.012. From these results are stated significant t-statistics. Since the t-statistic is greater than the t-table > 1.96 with a p-value of < 0.05 so the first hypothesis (b) is accepted. This proves that consumer involvement moderates the influence between mobile applications and consumer satisfaction, the meaning of which is that the more consumers are involved in the preservation of nature, it will strengthen the influence of mobile applications on consumer satisfaction.

The second hypothesis (b) examines whether consumer involvement moderates the influence between consumer satisfaction and traveler loyalty. The test results showed a t-statistical value of 1.067 and a p-value of 0.278. From these results it Kwe know that t-statistics are insignificant. Since the t-statistic is smaller than the t-table 1.96 with a p-value greater than 0.05 so the fourth hypothesis is rejected. This proves that consumer involvement does not moderate the influence between consumer satisfaction and tourist

loyalty, the meaning of which is that the more consumers are involved in the preservation of nature, it will not strengthen or weaken consumer satisfaction with tourist loyalty.

C. *Discussion of Hypothesis Testing Results*

In this section will describe the results of the research analysis. The purposes in f this study is to determine the influence of mobile applications on consumer satisfaction of application users and see the indirect influence of mobile applications on tourist loyalty through consumer satisfaction. This study used four variables, namely mobile application, consumer involvement, consumer satisfaction and tourist loyalty. In this study, there are four hypotheses proposed and tested using the Structural Equation Modeling (SEM) method and assisted using the Smart PLS 3.2.9 software. Based on the tests carried out, the results of the study show that:

The first hypothesis (a) in this study proves that mobile applications have a positive and significant effect on consumer satisfaction. Based on the results obtained by the mobile application, it proves that there is a significant positive influence on consumer satisfaction, so this hypothesis is accepted. Respondents consisting of academics, mass media, industry, government and nature-loving communities, mobile applications consisting of perceptions of usability, perceptions of ease of use and pleasure when using applications [8, 14].

The first hypothesis (b) in this study proves that consumer involvement moderates the influence between mobile applications and consumer satisfaction. This means that the more consumers have high involvement in the environment or the higher consumers' concern for the sustainability of the natural environment, it will strengthen the influence of mobile applications to consumer satisfaction [9].

The results of the scond hypothesis (a) in this study proved that consumer satisfaction has a positive and significant effect on tourist loyalty. Refer to the results obtained consumer satisfaction proves the existence of a significant positive influence on the loyalty of entrepreneurs, so this hypothesis is accepted. And furthermore, the second hypothesis (b) in this study provs that consumer involvement does not modrate the effect of consumer satisfaction on tourist loyalty, so this hypothesis is not accepted.

5   Conclusion and Suggestion

A. *Conclusions*
 1. The first hypothesis (a) that formulates that mobile applications affect consumer satisfaction positively and significantly is accepted.
 2. The first hypothesis (b) that formulates that consumer involvement moderates the influence of mobile applications on consumer satisfaction is accepted and proven to strengthen that influence.
 3. The second hypothesis (a) that formulates that consumer satisfaction affects tourist loyalty positively and significantly is accepted.
 4. The second hypothesis (b) which formulates that consumer involvement moderates the effect of consumer satisfaction on tourist loyalty is rejected.
 5. Consumer satisfaction variables are proven to fully mediate the relationship between mobile applications and tourist loyalty

B. *Suggestion*

1. Mobile application is an important tool for the development and promotion of eco-tourism in Lampung because based on research that we have done; it shows that the existence of a mobile application can increase consumer satisfaction from tourists and increase loyalty to these tours so that cooperation carried out in this penta-helix model is needed.
2. Consumer involvement that can increase the satisfaction of using the application also shows the importance of the role of the nature-loving community and the government, academia, mass media, the role of industry actively to help campaign for the importance of nature sustainability for the sustainability of human life in general and the importance of building and promoting natural tourism in Lampung in partikular.

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