

Article

Investigating the Acceptance of Marine Ecotourism after the COVID-19 Pandemic in Taiwan

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Abstract: Due to its rich marine biological resources, Taiwan is a place worthy of developing marine ecotourism. This study explores the marine ecotourism intentions and marine ecotourism behaviors of tourists during the COVID-19 pandemic by using the unified theory of acceptance and use of technology (UTAUT) method. Under the UTAUT framework, this study considered the factor of environmental attitudes and issued questionnaires in four research areas, namely, Yilan Wushi Fishing Harbor, Port of Hualien, Hualien Stone Stairs Platform, and Taitung Chengfong Fishing Port. In total, 431 effective research samples were collected. First, this study verified the validity and reliability of the dimensions through confirmatory factor analysis. According to the results of structural equation modeling (SEM) analysis, performance expectancy, effort expectancy, social influence, and environmental attitude all have an influence on tourists' marine ecotourism intentions, while facilitating conditions had no influences on tourists' marine ecotourism intentions. Tourists' marine ecotourism intentions further influenced their marine ecotourism behaviors. In addition, this study evaluated the mediating effect of marine ecotourism intentions by nested-model analysis. Finally, this study provided substantive policy recommendations as a reference for tourism management units and local governments.

Keywords: marine ecotourism; marine ecotourism behavior; environmental attitude; unified theory of acceptance and use of technology; COVID-19 pandemic



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1. Introduction

The World Health Organization (WHO) declared COVID-19 as a public health emergency of international concern (PHEIC) on 30 January 2020. As COVID-19 is highly contagious and infects people in countries all over the world, the World Health Organization declared COVID-19 a pandemic on 11 March 2020, and countries around the world developed various pandemic prevention measures to try to stop the spread of this disease. As the COVID-19 outbreak eases, nature-oriented ecotourism has become a new tourism option for Taiwanese people.

Ecotourism is a type of tourism with environmental responsibility, and its ultimate goal is natural environment conservation and extension of the well-being of local residents [1]. The term ecotourism can be traced back to 1965 when Hetzer [2] suggested reflection on culture, education, and tourism and advocated ecotourism. Now, ecotourism has become the basic concept for international conservation and sustainable development. Compared with traditional tourism development models, ecotourism is expected to reduce negative externalities and improve the potential benefits that tourism activities can bring to local ecosystems, local communities, and industries [3]. Taiwan is surrounded by the sea and has rich quantities and varieties of marine biological resources; therefore, it is suitable

to promote marine ecotourism. Developing marine ecotourism can promote ecosystem conservation, and help tourists to get close to marine ecology and share conservation benefits. In addition, it can help local residents transform in order to engage in diverse marine ecotourism industries, which can help retain young residents, promote community development, improve the economic conditions of local residents, and develop the local economy.

In the past, various scholars studied ecotourism-related issues using to various theories [4–14]. For example, Lee and Jan [7] conducted studies by multiple theories (such as the theory of planned behavior, technology acceptance model, value-belief-norm theory, and social identity theory); Zhou [13] and Wang, Chen, and Zhou [11] applied the ecological theory; Zhao and An [14] and Ahmad, Kim, Anwer, and Zhuang [4] employed the theory of planned behavior; Xu, Yin, Ye, Wu, and Sun [12] adopted the social cognitive theory; Lu, Chan, and Cheung [9] used the embodiment theory; Liu, Curtis, and Upchurch [8] applied the theory of reasoned action; Dedek [5] employed the actor-network theory; Nunkoo and Ramkissoon [10] adopted the means-end chain theory; and Jamal and Stronza [6] used the collaboration theory. These studies have made considerable contributions to the research on ecotourism. However, according to the literature review, it seems that the unified theory of acceptance and use of technology (UTAUT) model was rarely adopted in past studies, indicating that there is still a research gap on this issue. Specifically, this study intends to explore the factors influencing marine ecotourism intentions and behaviors of tourists under the UTAUT framework. The next chapter discusses the literature and deduces our research hypotheses. Next, the research structure, measurement variables, research location, and research sample collection methods are described in the research methods chapter. Then, the empirical analysis results, common method variance analysis, confirmatory factor analysis, structural equation modeling, and nested-model comparison of the mediating effects are explained. Finally, the research conclusions and implications are presented.

2. Theory and Hypotheses

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) mainly explores the factors that affect individuals' behaviors and is used to predict and explain humans' behavioral intentions and actual behaviors. UTAUT dates back to the theory of reasoned action (TRA) based on the perspective of social psychology. Scholars continuously integrated past theories and added new viewpoints to more comprehensive research. Therefore, the model had been made accurate prior to forming UTAUT. The UTAUT model, by Venkatesh, Morris, Davis, and Davis [15], integrates the main factors based on eight theoretical models, including the theory of reasoned action (TRA), technology acceptance model (TAM), motivational model (MM), theory of planning behavior (TPB), combined TAM and TPB, (C-TAM-TPB), model of PC utilization (MPCU), innovation diffusion theory (IDT), and social cognitive theory (SCT). The variables include performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intentions, and behaviors. In addition, there are four interfering variables that have indirect effects, namely, gender, age, experience, and voluntariness of use.

2.2. Marine Ecotourism

Utami, Wirawan, Firn, Kepakisan, Kusdyana, Nicol, and Carwardine [16] pointed out that ecotourism is developed to encourage natural resource conservation by raising individual awareness of the importance of marine conservation areas. Ecotourism highlights the ecological protection of local communities and tourists, which leads to the sustainable development of marine conservation areas. Therefore, marine ecotourism mainly involves marine ecological landscapes, where tourists can fully understand and enjoy nature and have a full understanding of marine ecological education [17].

2.3. Hypotheses

Fennell and Weaver [18] suggested that the characteristics of ecotourism should include ecotourism attractions and learning opportunities, as well as ecological, socio-cultural, and economic sustainability. Eagles [19] argued that learning is an important motivation for ecotourism. Lee and Jan [20] argued that ecotourism behaviors can be defined as tourist behaviors, social culture, and environments that are beneficial for the destination economy and generate relevant learning experiences. Lee and Jan [20] argued that eco-tourists who focus on learning might stay at their destinations for a long time, in order to carefully observe nature, wild animals, and culture; for example, tourists can watch whales at marine ecotourism attractions to learn about marine ecology and local culture. This study suggests that, by visiting marine ecotourism attractions, tourists have opportunities to learn information and knowledge about marine ecological conservation, and then, have strong intentions toward marine ecotourism. Hence, this study proposes the following hypothesis.

Hypothesis 1 (H1). *The higher the performance expectancy brought to tourists by marine ecotourism attractions, the stronger their marine ecotourism intentions will be.*

Transportation, which is one of the basic premises of tourism, is a key factor connecting tourists to their destinations [21], thus, the accessibility of marine ecotourism attractions is one of the key factors influencing whether tourists will travel. Accessibility can be defined as the difficulty of getting from a given location to an activity place by a particular transportation system [22]. In tourism, accessibility is measured by travel distance, time spent, or cost [23]. Toth and David [21] argued that the continuous decrease in relative travel costs and distance greatly increases the demand for leisure tourism. This study holds that, if tourists think that marine ecotourism attractions are accessible, their marine ecotourism intentions will be strong. Hence, this study proposes the following hypothesis.

Hypothesis 2 (H2). *The easier tourists' expected efforts to visit marine ecotourism attractions, the stronger their marine ecotourism intentions tourists will be.*

People engaged in ecotourism may not be motivated by the intrinsic quality of the activities [24]. Some past studies have suggested that the motivation for travel may be self-improvement, including the desire to demonstrate social status through symbolic conspicuous consumption to seek approval, such as online social media posts or photographs [25]. Sharing unique travel experiences online, such as ecotourism, is a way for tourists to satisfy their basic evolutionary needs to gain social status [26]. This study holds that the greater the social influences on people engaged in marine ecotourism, the stronger tourists' marine ecotourism intentions will be. Hence, this study proposes the following hypothesis.

Hypothesis 3 (H3). *The greater the social influences on tourists, the stronger their marine ecotourism intentions will be.*

In 2015, the United Nations launched the 2030 Sustainable Development Goals (SDGs), and proposed 17 core goals for governments and enterprises to work together towards sustainable development—GOAL 14 “Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.” In order to create facilitating conditions for marine ecotourism, governments have introduced marine ecological protection policies and marine ecotourism policies. The facilitating conditions are objective factors that make it easy to achieve usage behaviors in a particular environment [27]; for example, the Hualien Stone Stairs Harbor was the first to promote whale watching marks among Taiwan's whale watching operators. The operators that own whale watching marks mean that their boats, feedback to communities, interference to whales and dolphins, and allocation and training of interpreters are recognized through open procedures, and quality will be guaranteed for

tourists who choose the operators with whale watching marks. Hence, this study proposes the following hypothesis.

Hypothesis 4 (H4). *The more facilitating the conditions of marine ecotourism attractions offered to tourists, the stronger their marine ecotourism intentions will be.*

Widgren [28] defined environmental attitude as a characteristic developed by individuals over time, and people with this characteristic will continue to care about environmental issues and eventually lead to environmental protection behaviors; therefore, environmental attitudes should include environmental values and environmental beliefs. Overall, an environmental attitude refers to people's belief in the natural environment (such as good or bad, positive or negative), and individual psychological reactions to environments or environment-related things, such as whether they approve of it or not, whether they like or dislike it. As an evaluation, feeling, and behavior tendency, environmental attitude is consistent and persistent and can be learned through socialization. Some scholars have argued that consumers' purchasing behaviors often depend on their attitudes towards the environment [29]. Past studies showed that environmental attitudes have a significant influence on ecotourism [30]. Hence, this study proposes the following hypothesis.

Hypothesis 5 (H5). *The more positive tourists' environmental attitude, the stronger their marine ecotourism intentions will be.*

Past studies showed that personal behaviors are influenced by behavior intentions in a particular way [31], meaning behavior intentions are often a more accurate index to predict personal behaviors [32]. Kroesen, Handy, and Chorus [33] mentioned that if tourism is regarded as a behavior, its significance can be interpreted as the customer behavior of tourists making tourism decisions. In studies on tourism behaviors, Gu, Deakin, and Long [34] argued that tourists' decisions will be influenced by personal psychological factors and social factors; Jang and Namkung [35] argued that tourists' mental states can significantly influence their future trips. Past studies on tourism showed that tourists' intentions influence their behaviors [36], meaning if tourists have strong marine ecotourism intentions, they will take actions to engage in marine ecotourism. Hence, this study proposes the following hypothesis.

Hypothesis 6 (H6). *The stronger the marine ecotourism intentions of tourists, the greater the possibility that they will engage in marine ecotourism.*

3. Methods

3.1. Conceptual Framework

According to the perspective of the unified theory of acceptance and use of technology (UTAUT) method, as proposed by Venkatesh, Morris, Davis, and Davis [15], this study explored the factors influencing tourists' marine ecotourism intentions after the COVID-19 outbreak, as well as the mediating effects of marine ecotourism intentions. This study constructed an integration model to explain the relationship among the variables, and the conceptual architecture is shown in Figure 1.

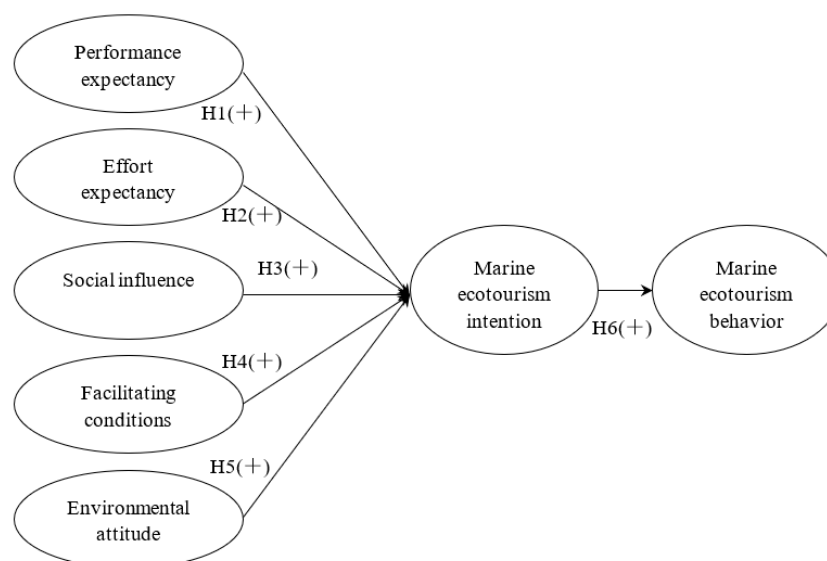


Figure 1. Conceptual framework.

3.2. Measures

A 5-point Likert scale was adopted in this study to measure items, where each item was scored from “Strongly disagree” (1 point) to “Strongly agree” (5 points). The demographic variables are gender, educational level, marital status, family status, age, previous tourism experience at marine ecotourism attractions, tourism intentions for scenic spots around marine ecotourism attractions, and consumption. The constructs, measurement items, and corresponding references are shown in Table 1.

Table 1. Constructs, measurement items, and references.

Constructs	Measurement Items	References
Performance expectancy	1. I will carefully listen to the ecological narrator explain marine ecology. 2. I will learn about the marine ecological environment of the places I will visit. 3. I will watch whales and dolphins carefully. 4. Participating in marine ecotourism will make me care more about the ocean.	Lee and Jan [20]
Effort expectancy	1. I think it is convenient to go to the eastern region for a whale watching tour. 2. I think it is cheap to go to the eastern region for a whale watching tour. 3. I think it is easy to go to the eastern region for a whale watching tour. 4. I think it does not take much effort to go to the eastern region for a whale watching tour.	Stepniak and Rosik [37]
Social influence	1. I think it will be enviable to post photos on social media after visiting marine ecotourism attractions. 2. I think it will get people’s attention to post photos on social media after visiting marine ecotourism attractions. 3. I think it will get people’s attention to post messages on social media after visiting marine ecotourism attractions. 4. I think it will help to interact with people by releasing information on social media after visiting marine ecotourism attractions.	Beall, Boley, Landon, and Woosnam [3]

Table 1. Cont.

Constructs	Measurement Items	References
Facilitating conditions	1. The government promotes the certification of whale watching marks for Taiwan's whale watching operators. 2. The government develops more tourist attractions worth visiting near whale watching sites. 3. The government trains marine ecological narrators. 4. The government maintains and conserves diverse marine animals.	Hsiao, Kuo, and Tuan [38], and Lee, Liu, and Borazon [39]
Environmental attitude	1. I think human intervention in nature can lead to serious disasters. 2. I think the balance of nature is very delicate and easy to be damaged. 3. I think mankind must live in harmony with nature. 4. I think mankind is making serious damages to the environment.	Dunlap and Van Liere [40]
Marine ecotourism intention	1. I will probably participate in marine ecotourism in the foreseeable future. 2. I intend to visit marine ecotourism destinations in the foreseeable future. 3. I am highly likely to visit marine ecotourism attractions after the COVID-19 pandemic.	Pham and Khanh [41], and Beall, Boley, Landon, and Woosnam [3]
Marine ecotourism behavior	1. I will not damage the marine ecosystem on my whale watching tour. 2. I will respect the local culture of marine ecotourism attractions during my trip. 3. I will choose tourism products that will not damage the local environments of marine ecotourism attractions during my trip.	Lee and Jan [20]

Performance expectancy is defined in this study as the information and knowledge about marine ecological conservation that tourists can obtain from watching whales at marine ecotourism attractions.

Effort expectancy is defined in this study as the accessibility and other levels of effort for visitors to visit marine ecotourism attractions.

Social influence is defined in this study as the attention paid by communities and people around them to photos, articles, or messages that visitors post on social media after visiting marine ecotourism attractions.

Facilitating conditions are defined in this study as the degree to which tourists believe that governments or relevant units can provide measures for marine ecotourism quality assurance.

Environmental attitude is defined in this study as individual psychological reactions to environments or environment-related things, such as whether they approve of it, and whether they like or dislike it.

Marine ecotourism intention is defined in this study as tourists' intentions to visit marine ecotourism attractions in the near future.

Marine ecotourism behavior is defined in this study as tourists' behaviors that benefit or reduce negative influences on the environment, economy, society, and social culture of marine ecotourism attractions.

3.3. Study Area

Taiwan, as an island, faces the Pacific Ocean on the east, the East China Sea on the north, the South China Sea on the south, and the Taiwan Strait on the west. With this unique geographical location, its sea area is influenced by ocean currents, including the Kuroshio Current, China coastal current, northeast monsoon current, and southwest monsoon current, and is rich in various marine resources. As a result, the marine industry has developed rapidly, and in particular, marine ecotourism has become the focus of attention.

Taiwan has multiple forms and types of marine ecotourism, including whale watching (whales and dolphins), free diving, snorkeling, recreational fishing, bird watching, environmentally friendly boating (boats), yacht tours, marine ecological tours, and intertidal zone tours. Therefore, various types of marine ecotourism based on natural resources, which have minimal influence on the local environment and aim to achieve local benefits and conservation, can be included.

Taiwan is rich in marine ecological resources; for example, there are at least 29 species of whales and dolphins, which is more than 1/3 of the world's whale species. In recent years, the ecological observation activity of whale watching has become a popular marine ecological tour in the Yilan, Hualien, and Taitung areas. The weather is unstable in winter in the eastern region, thus, the period from April to October each year is the golden time for whales and dolphins to appear in the eastern waters of Taiwan, as spring and summer are the courtship periods for whales and dolphins, and there is a 95% chance of seeing groups of whales and dolphins. More than 60% of Taiwan's whale and dolphin species are concentrated in the offshore areas of Yilan, Hualien, and Taitung. Taiwan has four main whale watching locations: the Yilan Wushi Fishing Harbor has whale watching on Guishan Island; the Port of Hualien; the Hualien Stone Stairs Platform; and the Taitung Chengfong Fishing Port has whale watching at Sanxiantai. The Stone Stairs Platform in Fengbin Township in Hualien is the birthplace of whale watching in Taiwan. In 1997, Taiwan's first whale watching boat "Sea Whale" departed from the Hualien Stone Stairs Platform, which started the whale watching trend. There are a number of common species of dolphins in the waters off eastern Taiwan, such as spinner dolphins, Risso's dolphins, pantropical spotted dolphins, Fraser's dolphins, and bottlenose dolphins, as well as large whales, such as sperm whales, pilot whales, melon-headed whales, killer whales, and humpback whales.

3.4. Sample and Procedure

Convenience sampling was adopted in this study to select samples, as follows: questionnaires were issued at four locations, including Yilan Wushi Fishing Harbor, Port of Hualien, Hualien Stone Stairs Platform, and Taitung Chengfong Fishing Port, from April to May in 2021 to avoid under-representation. The questionnaires were collected in two ways. The first method was over the internet, passengers who could not answer questionnaires on the spot were asked to leave their e-mail addresses and online questionnaires were sent to them. The second method was on-site questionnaires, which were provided for on-site visitors to complete. All the questionnaire interviewers received professional training to conduct the survey without disturbing visitors. A total of 500 questionnaires were issued, and a total of 450 samples were collected, among which, 431 were valid, for a valid response rate of 86.2%. Most questionnaires that could not be collected were issued online. Among the valid questionnaires, the on-site questionnaires accounted for 58.93%, and online questionnaires accounted for 41.07%.

Regarding sample distribution, in terms of gender, 58% are male and 42% are female. In terms of educational background, 15.78% have a senior high school degree (or below), 61.48% have a university degree, and 22.74% have a master's degree (or above). In terms

of marital status, 45.94% are single, and 54.06% are married. In terms of family status, 41.76% have children, and 58.24% have no children. In terms of age, 26.91% are 30 years old (or below), 31.79% are 31 to 40 years old, 20.88% are 41 to 50 years old, 13.46% are 51 to 60 years old, and 6.96% are over 61 years old. In terms of previous whale watching experience, 33.64% of visitors have whale watching experience, and 66.36% of them have no whale watching experience. In terms of intentions to visit scenic spots around whale watching ports, 33.64% of visitors would visit scenic spots near whale watching ports and 15.08% of them would not. In terms of customer behaviors, 82.60% would spend money at scenic spots near whale watching ports, and 17.40% would not spend money at scenic spots near whale watching ports.

In order to confirm the sampling representativeness, the effects of non-response were evaluated in this study by the wave analysis method; therefore, the non-respondent bias was evaluated by comparing the first batch of data returned (early respondents) with the second batch of data returned (late respondents). According to Armstrong and Overton [42], the key characteristics of early response data and late response data are verified by t-testing; for example, the age of passengers reached the significant level of 5%, and there was no significant difference in age between early and late respondents; therefore, the non-respondent bias of this study is insignificant.

4. Empirical Results

4.1. Descriptive Statistics and Correlation Analysis

The descriptive statistics and Pearson correlation coefficient analysis results of all research variables are shown in Table 1, which shows a significantly positive correlation among all the variables. Generally, Cronbach's α is the reliability measurement method commonly used in social sciences research. As it is easy to calculate, this study used Cronbach's α to measure the consistency and stability of the questionnaire, where a larger α indicates a greater correlation and higher consistency between items in this factor. A Cronbach's α above 0.7 indicates high reliability, and below 0.35 indicates low reliability. According to Table 2, all dimensions have Cronbach's α above 0.8, which meets the requirement of internal consistency and indicates that all dimensions in this study have high reliability.

Table 2. Descriptive statistics and correlation analysis.

	1	2	3	4	5	6	7
1. Performance expectancy	1						
2. Effort expectancy	0.661 ***	1					
3. Social influence	0.692 ***	0.626 ***	1				
4. Facilitating conditions	0.431 ***	0.460 ***	0.489 ***	1			
5. Environmental attitude	0.769 ***	0.662 ***	0.796 ***	0.511 ***	1		
6. Marine ecotourism intention	0.690 ***	0.631 ***	0.716 ***	0.457 ***	0.757 ***	1	
7. Marine ecotourism behavior	0.696 ***	0.658 ***	0.725 ***	0.486 ***	0.770 ***	0.831 ***	1
Mean	4.2338	4.3556	4.3753	4.0853	4.2256	4.314	4.3055
S.D.	0.68095	0.60846	0.59987	0.70966	0.67038	0.6739	0.66102
Cronbach's α	0.943	0.801	0.837	0.862	0.880	0.919	0.896

*** $p < 0.001$, $n = 431$.

4.2. Results of Confirmatory Factor Analysis

Confirmatory factor analysis was used to verify the measurement model. According to Table 3, the t-value loadings of all dimensions are higher than the significance level of 1.96, and the factor loading (λ) of all observable variables to individual latent variables is between 0.59 and 0.94. These values are all above the threshold of 0.45, as proposed by Bentler and Wu [43], indicating that the scale has considerable convergent validity. The individual item reliability of observable variables is between 0.35 and 0.88, which are all above the threshold of 0.20, as proposed by Bentler and Wu [43], and indicates that all observable variables have reliability. The composite reliability (CR) of the seven dimensions is between 0.82 and 0.94, and most past scholars suggested that the CR of latent variables

should be higher than 0.6 [44]. The results show that CR values of all dimensions are higher than 0.82, indicating that all dimensions have reliability. The average variance extracted (AVE) of the seven dimensions are between 0.53 and 0.81. AVE above 0.36 is considered barely acceptable [44]. This study is consistent with the views of Bentler and Wu [43] as well as Fornell and Larcker [44]. The AVE of all dimensions in this study is higher than 0.53, indicating that all dimensions have convergent validity.

Table 3. Individual item reliability, composite reliability, and average variance extracted.

Construct	No. of Items	Factor Loading (λ)	Individual Item Reliability (λ^2)	t-Value	Composite Reliability (CR)	Average Variance Extracted (AVE)
1. Performance expectancy	4	0.85–0.93	0.72–0.86	21.66–25.55	0.94	0.81
2. Effort expectancy	4	0.66–0.83	0.44–0.69	14.70–19.82	0.82	0.53
3. Social influence	4	0.59–0.86	0.35–0.74	12.90–21.63	0.85	0.60
4. Facilitating conditions	4	0.65–0.88	0.42–0.77	14.58–22.16	0.87	0.62
5. Environmental attitude	4	0.76–0.87	0.58–0.76	18.26–22.39	0.89	0.68
6. Marine ecotourism intention	3	0.84–0.94	0.71–0.88	21.36–25.62	0.92	0.80
7. Marine ecotourism behavior	3	0.83–0.90	0.69–0.81	20.67–23.83	0.90	0.74

4.3. SEM Analysis and Goodness-of-Fit Test

Table 4 shows the goodness of fit of the structural equation model. This study used absolute fit measures, incremental fit measures, and parsimonious fit measures to test the goodness of fit of the overall model. The closer the goodness of fit is to the ideal value, the more usable the model will be and the more strategic implications the estimated parameters will have [45].

Table 4. Results of the goodness of fit indexes.

	Index	Standard Value	Result
Absolute fit measures	χ^2	-	992.55
	Goodness of Fit Index (GFI)	>0.80	0.849
	Adjusted Goodness of Fit Index (AGFI)	>0.80	0.813
	Root Mean Square Residual (RMR)	<0.05	0.0402
	Root Mean Square Error of Approximation (RMSEA)	<0.08	0.0764
	Standardized RMR	<0.08	0.0658
Incremental fit measures	Normed Fit Index (NFI)	>0.90	0.900
	Relative Fit Index (RFI)	>0.90	0.885
	Incremental Fit Index (IFI)	>0.90	0.926
	Comparative Fit Index (CFI)	>0.90	0.926
Parsimonious fit measures	χ^2/df	<3	3.507
	Parsimony Goodness of Fit Index (PGFI)	>0.50	0.685
	Parsimony Normed Fit Index (PNFI)	>0.50	0.784

In terms of absolute fit measures, Doll, Xia, and Torkzadeh [46] suggested that the Goodness of Fit Index (GFI) can be relaxed to above 0.8. MacCallum and Hong [47] suggested that the Adjusted Goodness of Fit Index (AGFI) can be relaxed to above 0.8. The Root Mean Square Residual (RMR) should be less than 0.05, and the Root Mean Square Error of Approximation (RMSEA) and Standardized RMR should be less than 0.08. In this study, GFI = 0.849, AGFI = 0.813, RMR = 0.0402, RMSEA = 0.0764, and Standardized RMR = 0.0658, indicating that the goodness of fit of the model is still within the acceptable range.

In terms of incremental fit measures, the Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), and Comparative Fit Index (CFI) are above 0.9, indicating the high goodness of fit of the model [45]. In this study, NFI = 0.900, RFI = 0.885, IFI = 0.926,

CFI = 0.926, and Standardized RMR = 0.0658, indicating that the goodness of fit of the model is still within the acceptable range.

In the parsimonious fit measures, the goodness of fit of the theoretical model proposed in this study is acceptable ($\chi^2/\text{df} = 3.507$). Generally, χ^2/df less than 3 [48] is required, while Schumacker and Lomax [49] considered that χ^2/df less than 5 is acceptable. The Parsimony Goodness of Fit Index (PGFI) and Parsimony Normed Fit Index (PNFI) are above 0.5, indicating that the model is not overcomplicated [50]. In this study, PGFI = 0.685 and PNFI = 0.784, indicating that the model is not overcomplicated. Therefore, the goodness of fit of the theoretical model in this study is still within the acceptable range.

4.4. Causal Path Analysis of the Theoretical Model

The linear structural equation model has seven latent variables, and the causal path relationship of the model proposed in this study is shown in Figure 2. This study verified the causal path relationship of the theoretical model, and the analysis results are shown in Table 5. The estimated parameters of the theoretical model are, as follows: performance expectancy (ξ_1) has significantly positive influence on marine ecotourism intentions (η_1) ($\gamma_{11} = 0.12$, $t\text{-value} = 2.02$); effort expectancy (ξ_2) has significant influence on marine ecotourism intentions (η_1) ($\gamma_{12} = 0.14$, $t\text{-value} = 2.26$); social influence (ξ_3) has significantly positive influence on marine ecotourism intentions (η_1) ($\gamma_{13} = 0.39$, $t\text{-value} = 3.85$); facilitating conditions (ξ_4) has insignificant influence on marine ecotourism intentions (η_1) ($\gamma_{14} = 0.03$, $t\text{-value} = 0.86$); and environmental attitude (ξ_5) has significantly positive influence on marine ecotourism intentions (η_1) ($\gamma_{15} = 0.27$, $t\text{-value} = 2.39$); marine ecotourism intentions (η_1) have significantly positive influence on marine ecotourism behaviors (β_{21}) ($\beta_{21} = 0.94$, $t\text{-value} = 22.09$).

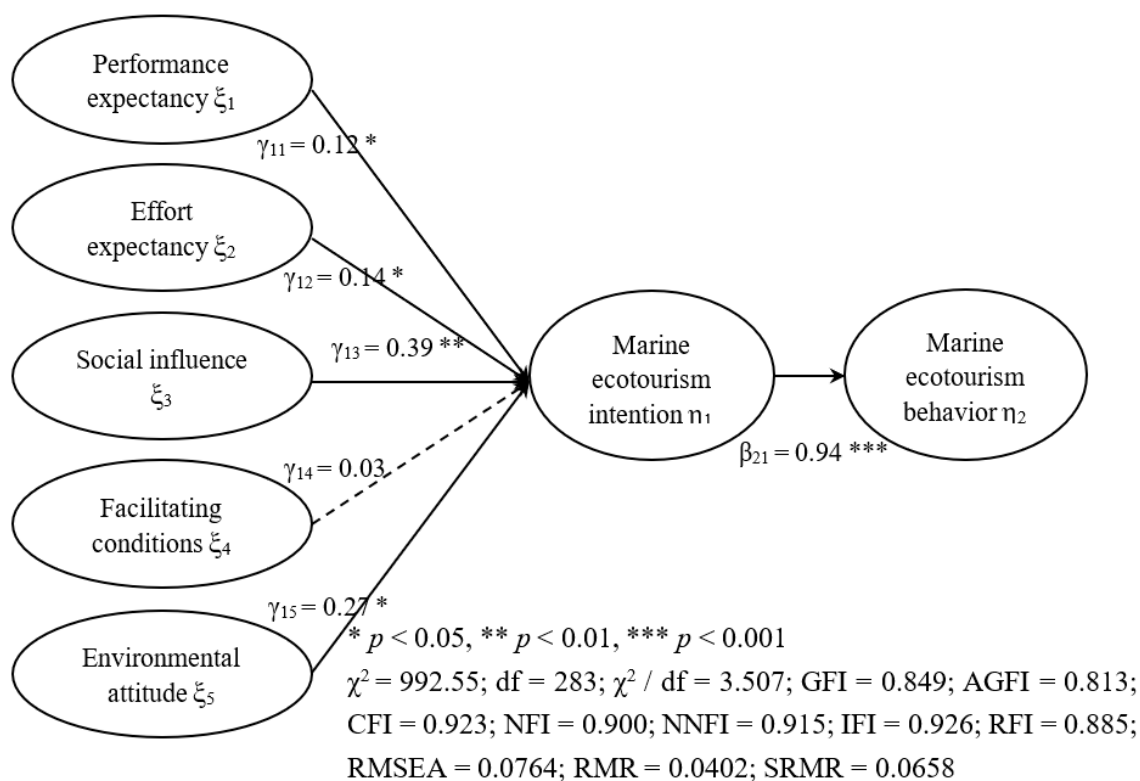


Figure 2. Structure of the theoretical model.

Table 5. Parameter estimates for structural equations model.

Hypothesized Model (Paths)	Parameter Estimates	t-Value	Result
H1: Performance expectancy $\xi_1 \rightarrow$ Marine ecotourism intention η_1 (γ_{11})	0.12 *	2.02	Supported
H2: Effort expectancy $\xi_2 \rightarrow$ Marine ecotourism intention η_1 (γ_{12})	0.14 *	2.26	Supported
H3: Social influence $\xi_3 \rightarrow$ Marine ecotourism intention η_1 (γ_{13})	0.39 **	3.85	Supported
H4: Facilitating conditions $\xi_4 \rightarrow$ Marine ecotourism intention η_1 (γ_{14})	0.03	0.86	Non-supported
H5: Environmental attitude $\xi_5 \rightarrow$ Marine ecotourism intention η_1 (γ_{15})	0.27 *	2.39	Supported
H6: Marine ecotourism intention $\eta_1 \rightarrow$ Marine ecotourism behavior η_2 (β_{21})	0.94 **	22.09	Supported

*** $p < 0.01$; ** $p < 0.05$.

4.5. Direct and Indirect Effect Analysis

The effects of all latent variables on marine ecotourism behaviors are shown in Table 6, where the direct effect of marine ecotourism intentions on marine ecotourism behaviors is 0.94. The indirect effect of performance expectancy on marine ecotourism behaviors through marine ecotourism intentions is 0.228. The indirect effect of effort expectancy on marine ecotourism behaviors through marine ecotourism intentions is 0.057. The indirect effect of social influence on marine ecotourism behaviors through marine ecotourism intentions is 0.4085. The indirect effect of facilitating conditions on marine ecotourism behaviors through marine ecotourism intentions is 0.0285. The indirect effect of environmental attitude on marine ecotourism behaviors through marine ecotourism intentions is 0.247. Among all latent variables, social influence has the greatest effect.

Table 6. Results of direct and indirect effect analysis of marine ecotourism behavior.

Factors	Direct Effects	Indirect Effects Via	Total Effects
		Marine Ecotourism Intention η_1	
Performance expectancy ξ_1	-	$\gamma_{11} \times \beta_{21} = 0.1128$	0.228
Effort expectancy ξ_2	-	$\gamma_{12} \times \beta_{21} = 0.1316$	0.057
Social influence ξ_3	-	$\gamma_{13} \times \beta_{21} = 0.3666$	0.4085
Facilitating conditions ξ_4	-	$\gamma_{14} \times \beta_{21} = 0.0282$	0.0285
Environmental attitude ξ_5	-	$\gamma_{15} \times \beta_{21} = 0.2538$	0.247
Marine ecotourism intention η_1	$\beta_{21} = 0.94$	-	0.94

4.6. Mediating Effect Analysis of Marine Ecotourism Intention

In order to investigate whether all latent variables influence marine ecotourism behaviors through marine ecotourism intentions, this study evaluated the mediating effect of marine ecotourism intentions by nested-model analysis. The chi-square difference test was used in the nested-model analysis to verify the significance of the hypotheses. This study verified the competing model of the mediating effect according to Tippins and Sohi [51]. Table 7 shows a comparison of all models, including the null model and the other three comparative models (direct model, completely mediating model, and partially mediating model). The path coefficients among all latent variables in the null model were limited to 0. All latent variables in the direct model directly influenced marine ecotourism behaviors. In the completely mediating model, the mediating variable of marine ecotourism intentions was added, and all latent variables influenced marine ecotourism intentions, which had further influence on marine ecotourism behaviors. In the partially mediating model, all latent variables had influences on marine ecotourism intentions and had direct influences

on marine ecotourism behaviors. The four models are shown in Figure 3. The mediating effect analysis results show that the goodness of fit of the partially mediating model is better than that of the completely mediating model, as shown in Table 7. Therefore, marine ecotourism intentions had a partially mediating effect between latent variables and marine ecotourism behaviors.

Table 7. Results of mediating effect of competing model analysis for marine ecotourism intention.

Models	χ^2	df	χ^2/df	$\Delta\chi^2$	GFI
1. Null model	952.06	278	3.425	-	0.854
2. Direct model	835.64	215	3.887	116.42	0.855
3. Completely mediating model	992.55	283	3.507	156.91	0.849
4. Partially mediating model	952.06	278	3.425	116.42	0.854
Models	AGFI	RMR	RMSEA	SRMR	NFI
1. Null model	0.816	0.0387	0.0751	0.0633	0.904
2. Direct model	0.814	0.0406	0.0819	0.0661	0.899
3. Completely mediating model	0.813	0.0402	0.0764	0.0658	0.900
4. Partially mediating model	0.816	0.0387	0.0751	0.0633	0.904
Models	RFI	IFI	CFI	PGFI	PNFI
1. Null model	0.888	0.930	0.854	0.677	0.773
2. Direct model	0.881	0.923	0.923	0.666	0.764
3. Completely mediating model	0.885	0.926	0.926	0.685	0.784
4. Partially mediating model	0.888	0.930	0.930	0.677	0.773

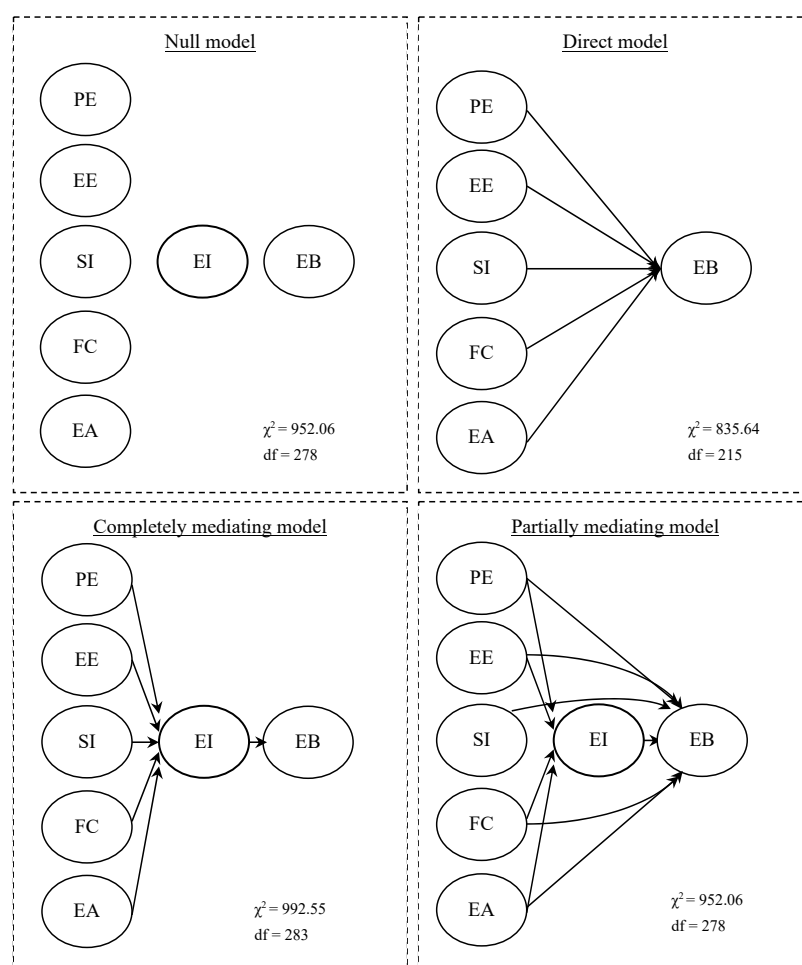


Figure 3. Nested-model comparison of mediating effect for marine ecotourism intention. Note: PE: Performance expectancy; EE: Effort expectancy; SI: Social influence; FC: Facilitating conditions; EA: Environmental attitude; EI: Marine ecotourism intention; EB: Marine ecotourism behavior.

5. Discussion

First, in terms of theoretical model construction, this paper used the UTAUT model which was proposed by Venkatesh, Morris, Davis, and Davis [15] as the basis of the theoretical model, and added the dimension of environmental attitude to establish an extended UTAUT model. In terms of dimension measurement, in order to evaluate the internal quality of the model, this study employed confirmatory factor analysis (CFA) to test the dimension measurements and indicators, such as the confidence of an individual program, and the significant level of estimated parameters, CR, and AVE, to estimate the measurement model. The confidence and validity of each dimension were found to have met the required standards. Second, according to the empirical results of structural equation modeling (SEM), the extended and revised UTAUT model, as proposed by this study, had a good model fit, including χ^2/df , Standardized RMR, Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), Comparative Fit Index (CFI), Parsimony Goodness of Fit Index (PGFI), Parsimony Normed Fit Index (PNFI), and other types of goodness-of-fit. While the path of facilitating conditions to marine ecotourism intentions failed to reach a significant level, all other paths of the structure model reached a significant level. An analysis of the mediating effect of marine ecotourism intention also revealed that marine ecotourism intention had a partially mediating effect. According to empirical analysis results, the UTAUT model can be revised based on different research topics and can serve as a reference for subsequent studies. As an important theoretical model in behavior theory, if the UTAUT model can be combined with other dimensions, as based on the research situations, it can increase the explanatory power and degree of fit for models in predicting individual behavioral intentions and actual behaviors.

Regarding the theoretical model proposed by this study, social influence is the most important factor to affect marine ecotourism intention, followed by environmental attitude and performance expectancy, with effort expectancy being the least influential factor. Meanwhile, facilitating conditions, which we will explain in the conclusion of the next chapter, have no impact.

Among the factors affecting travelers' marine ecotourism intention, social influence is the most influential, mainly because word of mouth no longer relies on physical contact between people due to the rapid development of social software. Tracking, following, and interacting on social media can exert more social influence, and the influence of the beautiful pictures and text introductions posted on social media is much greater than before. Thus, many tourists may not want to engage in marine ecotourism, in fact, they only want to participate in marine ecotourism so that they can post photos. Photo-oriented tourism is a research topic worthy of future attention.

Environmental attitudes should include environmental values and environmental beliefs. In recent years, due to the increasingly severe environmental damage and the rise of environmental protection activities, there are more customers with environmental protection awareness, and consumer environmentalism and citizen's environmental protection awareness are on the rise. More and more tourists understand the importance of environmental protection, and the evaluation degree of people's belief in the natural environment is also showing a positive attitude. Under the influence of environmental protection education, many tourists have engaged in marine ecotourism and really want to learn information and knowledge about marine ecological conservation through marine leisure activities and the marine ecological environment by listening to ecological commentators' commentaries on marine ecology. These two factors are very positive for marine ecotourism development.

The final part concerns effort expectancy, which is a measurement dimension in the traditional model and is used by the UTAUT model to measure the degree of devoted effort or the degree of difficulty, as perceived by people to engage in certain behaviors. Considering that eastern Taiwan is a relatively remote area in Taiwan, this study specifically focused on the effort expectancy in traffic accessibility. There is only one railway and one highway for transportation to large cities in the west, and no high-speed railway or

expressway due to the formidable block caused by the Central Mountain Range. While we originally expected effort expectancy to have the largest impact, the empirical results indicated that it had the smallest impact, which is possibly because people in Taiwan could not carry out overseas travel and had no interest in crowded domestic attractions due to the COVID-19 epidemic. Therefore, due to risk awareness, tourists were willing to spend more time on transportation to visit domestic attractions with fewer people, indicating that the impact of transportation was not that great. In addition, the results of this study further explain the tourism status under the COVID-19 epidemic.

6. Conclusions

The literature review shows that there are few studies on marine ecotourism intentions and marine ecotourism behaviors by the unified theory of acceptance and use of technology (UTAUT). Especially, due to the COVID-19 pandemic since 2020, tourists' marine ecotourism intentions and behaviors were rarely studied. The empirical results of this study show that under the COVID-19 pandemic, performance expectancy, effort expectancy, social influence, and environmental attitude had an influence on tourists' marine ecotourism intentions, whereas, facilitating conditions had no influence on tourists' marine ecotourism intentions, and this might be because Taiwan still needs to improve the development and management of marine ecotourism. The empirical results show that tourists' marine ecotourism intentions have a significantly positive influence on their marine ecotourism behaviors, which is the same finding as previous studies on the relationship between ecotourism intentions and ecotourism behaviors [52].

This study empirically found that facilitating conditions do not affect tourists' intentions to engage in marine ecotourism. We believe that the main reason is that government agencies play an extremely important role in protecting marine ecology and the development of marine ecotourism. However, they have failed to do their due functions. For instance, whale-watching in Taiwan has been developing for 20 years. Compared with regulations on whale-watching in other countries and regions, Taiwan acts slowly in formulating corresponding laws to regulate the behaviors of ships engaging in wildlife observation and entertainment activities at sea. Finally, the whale-watching industry cooperated with the Ocean Conservation Administration to formulate regulations for friendly whale-watching in 2021. However, these regulations still lack strict implementation and execution from the government.

Furthermore, government agencies can formulate effective regulations to protect marine tourism sites in order to develop marine ecology. In Taiwan, the Ocean Conservation Administration under the Ocean Affairs Council is the government agency responsible for marine ecological conservation, marine pollution prevention, and marine resource management. In particular, they are the policy-making agencies for maintaining and conserving marine biodiversity in the government. However, the Ocean Conservation Administration was not established until April 28, 2018. Therefore, the formulation and revision of relevant laws and regulations cannot keep up with marine ecotourism development.

Moreover, in terms of financial expenditure, local governments have a limited budget allocated for marine ecotourism development. The government has few resources to develop and construct more tourist attractions near the whale-watching sites. Thus, marine ecotourism development can only rely heavily on private practitioners. Therefore, tourists may suspect that government investments in developing marine ecotourism are insufficient. The study found that facilitating conditions do not affect tourists' intentions to engage in marine ecotourism.

In order to develop marine tourism, government agencies can develop effective laws and regulations to protect the natural environment of tourist attractions, and government agencies and private non-profit organizations can encourage people to be aware of the importance of marine environment conservation through education, publicity, and media. Regarding future marine ecotourism development, it is important to precondition and cultivate marine environmental awareness among tourists and induce behaviors that take

responsibility for the marine environment. Tourism operators should invest in establishing marine ecological images for their tourism sites, including obtaining tourism quality management certifications, complying with relevant regulations, and improving marine tourism quality. Through the interpretation of professional narrators, visitors can understand the ecology of whales and dolphins, deeply experience the benign interaction between human and marine animals, appreciate these whales and dolphins, and understand why whales and dolphins are needed and how to cherish and protect them, in order that more people can learn how to live in harmony with them. This is the significance of marine ecotourism development.

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