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THE STUDY OF PRICE ACCEPT THRESHOLD FOR THE "BLUE HIGHWAY" TOUR OF THE NORTH-EAST REGION IN TAIWAN

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Key words: "Blue Highway", stated preference method, discrete choice model, price threshold model .

ABSTRACT

The "Blue Highway" in the NE region of Taiwan includes the tour itineraries of Keelung-Suao, Suao-Hualien and Keelung-Hualien, each with its individual oceanic scenic features and its potential corresponding onshore scenic spots. This study explores the relationship between the "Blue Highway" tour portfolios and price attributes to collect the preference recognition of the public concerning the NE region "Blue Highway" tour itineraries and prices with the stated preference method. The utility function of the discrete choice model assumes the impact effect among attributes to be in a linear relationship plus percentages. The price threshold model improves the assumption of this efficiency function as a linear relationship plus percentages by thinking that a decision maker would consider the impact factor of price threshold value but not consider the trade-off relationship of all attributes. The study, through model parameter calibration/evaluation and the threshold value priority search process, reflects consumers' price upper limit concept in the interpretation model, comparing it to the discrete choice model and the price threshold model. As shown in the empirical results of the study, the interpretation competence of the price threshold model indeed is better than the discrete choice model. The study results can provide the government sector and operators references in studying and setting the "Blue Highway" tour alternative price strategies and marketing strategies.

I. INTRODUCTION

The "Blue Highway" in the NE region of Taiwan stretches across the counties/cities of Keelung, Taipei, Yilan and Hualien. It provides a connected navigation course of the harbors of Bisha Fishing Harbor of Keelung, Nanfang-ao Harbor of Suao and Hualien Harbor. The cruise distance is about one nautical mile from the coastal land of Taiwan, with views of extremely beautiful coast and oceanic landscape in the surrounding areas [23]. At present, the operation management problems encountered by the operators include insufficient experience, improper marketing campaign, and deficient client source, etc. Therefore, if the "Blue Highway" itinerary can link to the scenic features on land to form a tour spot itinerary of both the marine and onshore areas, it can effectively upgrade the tour value of the "Blue Highway" and enhance the tour intent of tourists. Upon planning for the tour itinerary, the price level will influence the tour intent of tourists. Therefore, the "Blue Highway" itinerary package and price strategy are the key points for research of this study.

In a traditional economy, product price level will influence the purchase intent of consumers. That is, the higher the price is, the lower the purchase intent of a consumer will be; while the lower the price is, the higher the purchase intent of a consumer will be. This viewpoint shows the price level and consumer efficiency relationship presenting a negative effect [26]. Based on the recreation demand model developed from the individual selection theory, a multiple attribute utility function can be constructed to study the trade-off relationship between price perception and other influencing attributes, and to reflect the effect perception and value sense brought by the product features to consumers. Since the utility function in the discrete choice model applies the assumption of a linear relationship with added percentages, the utilities provided among various attributes allow mutual compensation; that is, the attributes of low utility can be compensated by the attributes of high utility, making it unable to reflect whether or not the preferences of consumers about alternatives consider attribute threshold issues [1]. Among consumption behaviors, when consumers select a specific product, they may set the ceiling price limit to the price threshold to prevent them from purchasing a product they consider too expensive. Therefore, the Accept Threshold Model developed from the threshold concept can handle the problem of inability in compensation of the attribute values in the multiple attribute utility function [25]. The said model assumes that when a decision maker selects a product alternative, he/she tends to consider the limit of certain attribute threshold values, such as price attribute. When the price of an alternative is set too high, exceeding the Accept Threshold of a consumer, the consumer would reject the said alternative, not listing it as an

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option, and therefore would no longer consider the available utility value level from other attributes in the alternative. That is, the Accept Threshold Model assumes that when a decision maker evaluates alternatives, an Accept Threshold value exists. When the alternative attribute is in positive utility, the level value is less than the said threshold value, or when the said alternative attribute is in negative utility, the level value would be larger than the said threshold value, with the result that this alternative would be rejected and not listed as an optional alternative.

Price is an important attribute with a crucial impact on the "Blue Highway" tour itinerary preference. This study, with reference to the Accept Threshold Model concept, constructs the price threshold model to analyze the influence of "Blue Highway" tour scenic spot itinerary packages and price factors on the tour behaviors.

II. LITERATURE REVIEW

In a tour plan, price attribute directly influences consumers' preference and selection behaviors. When a price is set too high, a demander will not consume but change to other tour spots and tour forms. Therefore, there is a close relationship between the price set level and the demand quantity. In terms of economics, a lot of studies are provided to study the pricing strategy of suppliers, the frequently perceived ones include pricing strategies dealing with cost-orientation, demand-orientation and competition-orientation, etc. [21, 2, 13]. The so-called cost-oriented pricing strategy is mainly based on product cost, to be handled with the loss/profit equilibrium target or percentage addition method. This starts from the provider's viewpoint and with less concern about the demand quantity. The competition-oriented pricing strategy considers the market and product features, mainly with such methods as differential pricing, following pricing and bid-competition pricing, etc. This method of pricing requires the understanding of product changes among competitors and the interacting influences of their price strategies. On the other hand, the demand-oriented pricing method is based on the consumers' behavioral preferences, to build consumers' preferences utility function, and to study the consumers' willingness to pay. This method considers consumers' recognition of product value. Therefore, it can be linked to marketing strategy and attain larger revenue [14, 22, 3]. Concerning the recreation demand model developed from the individual demand theory, it can study the trade-off relationship between the price attribute and other influencing attributes in a tour behavior [7, 16]. Recently, with the development of the stated preference method concerning the tour preference or selection behavior in the tourism domain, the application of the stated preference method has been rather popular [19, 17]. For example, Haider and Ewing [11] apply the stated preference model to analyze the tourists' behaviors in the Caribbean Sea area. Dellaert and Lindberg [6] apply the stated preference model to collect preference data, and construct a model to understand the influence of price change on tourism preference. Lin [17] applies the stated preference model to study the Chinese tour area selection behaviors and research various factors with impact on tourists in selecting various domestic scenic spots. Pan and Chen [24] develop from the demand aspect, by using the stated preference model to learn consumers' selection preferences about hot spring recreation activity sites, and study the influencing relationship between tourism characteristics and social/economic characteristics on price and product attributes.

It can be known from the above literatures that the stated preference method uses the experiment design method to combine various alternatives and situations for the interviewees to fill out, and builds the tourism demand model with the simple and effective parameter calibration/evaluation method, applicable to interpret the selection behaviors of tour spots and recreation activities. At present, the studies concerning recreation demand deal mostly with onshore recreation demand analysis, with less involvement in the analysis of marine recreation activity or the "Blue Highway" tourism behaviors. The study focuses on the "Blue Highway" as its subject, as tour itinerary planning by combining a marine tour itinerary and an onshore scenic spot itinerary. Therefore the empirical analysis content of the study is less direct and uses the same journals for reference; but in the aspect of tour itinerary portfolio manner and influencing attribute data processing, the alternative portfolio experiment design experience of the aforementioned related journals can be referred to in order to overcome such difficulties. Concerning the related studies of the current recreation demand, there is no practical application in consideration of the tour price threshold model. In general, the tour itinerary price level would influence the tourism intent of consumers. Whether consumers have the consideration about tour price threshold is a key point for the research of this study.

The demand model built on the basis of preference utility can effectively process the problem of decision threshold. Tversky [25] proposes the Elimination by Aspects (EBA) model, assuming a decision maker would arrange orders of the attributes in accordance with the importance levels and set a minimal acceptable level for each attribute, then gradually eliminates the alternatives failing to achieve a satisfactory level from the most important attribute, until only one alternative is left. This strongly assumes the selection result of this inability of mutual compensation among attribute utilities can only find out the alternative to satisfy the minimal acceptable level, but not a alternative with the maximum utility. Lioukas [18] proposes Multinomial Logit Model, to verify the decision selection behavior indeed contains threshold values, and discovers the overestimation suspicion of the traditional MNL model concerning the estimated selection probability after alternative improvement. Therefore, in the aspect of policy formulation, threshold value is competent to provide a more reasonable forecast and analysis. Concerning the related studies of domestic threshold value aspect, Duan and Wu [10] had a study of applying the EBA model to inter-city transportation mean selection behaviors. Duan and Chang [8] applied the mixed decision model of both the abilities of compensation and the inabilities of compensation of the MNL model and the EBA model

to engage in the study of the commuter transportation mean selection behaviors in the Tainan area. Chang and Chung [4] assumed attributes only produce utility when their levels are larger than or equal to the Accept Level; that is, when exceeding the threshold values, among the attribute utilities, there exists the compensation nature; otherwise there exists no compensation nature and the said attribute utility value is 0. The said study engages in empirical analysis on the transportation mean selection data of the Greater Taipei area. The empirical study result finds threshold effect does exist in the decision selection behaviors. Chou and Duan [5] used the stated preference method to construct the Multinomial Logit Model, the Accept Threshold Model, and the Logit Model to evaluate the MRT system planning project in Tainan.

A comprehensive review of the related literatures of the aforementioned attribute threshold shows that most studies applied to the transportation field and are less applied to the study of tourism behavior. This study can, with reference to the Accept Threshold Model concept and the parameter calibration/evaluation disposition method, apply it to the study of the tourism alternative price threshold model. The aforementioned journals in disposing the Accept Threshold Model mostly deal with two alternatives. Since the "Blue Highway" has more than 3 routes, this study therefore needs to consider more than 3 alternatives. The model construction process is rather complicated and in need of the rewriting of program calibration/estimation parameters.

III. STATED PREFERENCE METHOD AND ACCEPT THRESHOLD MODEL

During the period of this study, the "Blue Highway" tour of NE region only had ocean navigation cruises. It didn't have a package tour that combines ocean cruises and onshore scenic spots together. Therefore, this study collected the stated preference data instead of gathering the revealed preference data of tourists toward package tours. This study simulated several package alternatives that combined ocean cruise and different onshore scenic spots and presented these alternatives to tourists. According to the preferences of tourists, the tourist's preference model of new "Blue Highway" tour could be constructed. The stated preference method uses some predetermined attributes and level values to combine into the alternatives of various situations to allow the interviewees to make evaluation and selection. The selection of attributes and level values and numbers can influence the entire experiment design quality and content [12, 15]. In general, attribute level values shall conform to experience laws and be within the numerical values of a reasonable range. The number of attributes should be determined in response to the study requirements, while the higher the amount of the level value numbers is, the better can it truly estimate the attribute boundary value of decision preference, but still increasing the complexity of the investigation data. When attribute levels are combined to form alternatives, it should avoid the appearance of an absolute strength situation of an alternative. When alternatives are too numerous, the attribute number should be no more than three; but when the alternatives are less numerous, the attribute quantity may be increased. The variation rank of level values is recommended to not be too small; otherwise it is rather hard to observe the influence changes of decisions.

In an earlier phase, the evaluation method of the interviewee's preference of alternatives was mainly the grade ranking and score evaluation methods. Later, scholars quoted the individual selection theory, and provided the interviewees' selection collections of several alternatives to allow them to select their most favorable alternative in the said collection; that is, the evaluation method of the first preference. The first preference method is for a decision maker to select the alternative with the maximum utility that can better demonstrate the selection behavior of an interviewee, which makes it rather easy in terms of information collection, as well as the operation and theoretical basis, being in the mainstream of stated preference method development [20, 9].

The first preference method is based on the discrete choice model, assuming a consumer to be a rational decision maker who, when facing the alternatives, would select an alternative to bring him/her the maximum preference utility. All alternatives j belong to At, i≠j, At: as the collection of all selectable tour alternatives of the interviewee t. This formula represents that when an interviewee t has higher preference of alternative i than other alternatives, he/she would select the alternative of i. Utility is a subjective perception and with deviation in actual measurement, by dividing the utility function into the measurable part and immeasurableε, is to be written as:

$$U(X_{it} \cdot S_t) = V(X_{it} \cdot S_t) + \varepsilon(X_{it} \cdot S_t) \quad (1)$$

The immeasurable part of utility in general is referred to as a random item of utility. In view of the utility random items, it assumes that the different probability distributions can acquire different discrete choice models; assuming ε_{it} to be the same and independent Gumbel distribution, it is able to lead to Multinomial Logit Model. Its basic model form shall be:

$$P_{it} = \frac{\exp(V_{it})}{\sum_j \exp(V_{jt})} \quad (2)$$

In which

$$V_{it} = \beta' X_{it} \quad (3)$$

P_{it} : The probability of the selected alternative i by a selector t,
V_{it} : The utility of alternative i brought to the selector t,
X_{it} : The attribute vector of alternative i,
β' : The parameter vector.

The utility function in the model is designated to be a linear model with added percentages, while the parameter value β' can use such calibration/estimation methods as the maximum likelihood method or the minimum square method to perform parameter calibration/estimation. The recently developed Gauss package program provides a simple method to cali-

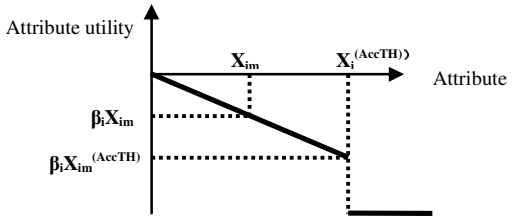

Fig. 1. Acceptable Threshold Concept Diagram of negative attribute.

brate/evaluate the parameter values, enabling the application of the Multinomial Logit Model to be more convenient. The decision characteristic of the application of the Multinomial Logit Model in alternative evaluation is to assume a decision maker is a pursuer of the maximum utility. During alternative evaluation, it is required to have full information of various alternatives, and engage in evaluation of all attributes so that the utilities provided among various attributes can be mutually compensated. The mutual compensation of attributes means that the attributes of low utility can be compensated from the attributes of high utility, and any minor change of any attribute value would influence the preference recognition of a decision maker; this would overestimate the recognition competence of people in a decision making process. In order to solve this problem, the threshold value concept is applied to the construction of preference utility model.

The Accept Threshold Model is for a decision maker to engage in evaluation of each attribute of an alternative, and as the attribute level values of a certain alternative reach the preset boundary tolerance values of a decision maker, it would be listed into the evaluation consideration; otherwise the decision maker would reject the said alternative.

Taking the Accept Threshold Model of positive utility attribute for example, as attribute i produces positive utility and a decision maker has the acceptable level value to the said attribute Xi (Ath), if the level value of the said attribute of a certain alternative is larger than or equal to the acceptable level value, its attribute utility can be expressed in a linear utility function. As the level value of the said attribute of a certain alternative is smaller than or equal to the acceptable level value, its attribute utility is negative and unlimitedly large. The mathematical expression of this formula is:

$$\text{If } X_{im} \geqq X_{im}^{(Ath)}, \text{ then } \quad V_{im} = \beta_i X_{im} \tag{4}$$

$$\text{In other conditions, } \quad V_{im} = -\infty \tag{5}$$

In the formula V_{im} : the utility of the ith attribute of alternative m; X_{im}: the level value of the ith attribute of alternative m; β_i: the parameter of attribute i (pending for calibration/evaluation); X_{im}(Ath): the acceptable threshold of attribute i to a decision maker (pending for calibration/evaluation).

For a similar reason, as negative utility occurs to an attribute, such as the tour price attribute, when the said attribute has an acceptable level value to a decision maker, and the level value of the said attribute of an alternative is smaller than or equal to an acceptable level value, its attribute utility is expressed in a linear utility function; if the level value of the said attribute of an alternative is larger than an acceptable level value, its attribute utility is negative and unlimitedly large. Of course, as any attribute utility of an alternative is negative and unlimitedly large, the probability of its selection by a decision maker is zero, with schematic diagram shown as in Fig. 1.

The calibration/evaluation steps of the Accept Threshold Model shall be described as follows:

a. List all level values of the experiment design of price attribute.
b. Arrange the threshold level values of price attributes in order from small to large.
c. Inspect whether all alternative portfolios of each interviewee are applicable to the said threshold level value. When, an interviewee selects an alternative larger than the price threshold in a certain alternative portfolio, then this interviewee is judged to be not applicable to the Accept Threshold Model, and shall be calibrated/evaluated with the linear Logit Model. If the same interviewee selects the alternatives below this Accept Threshold level value in his/her all alternatives, then the said interviewee is considered to be applicable to the Accept Threshold Model. Record the application situation of this interviewee.
d. Concerning the ones that are designated to be applicable to a threshold model, handle with the alternative elimination method; concerning the ones not applicable to threshold model, handle with the linear Logit model. Concerning the calibration/evaluation of the models engaged in the maximum likelihood method, calculate the logarithmic likelihood function value of the model and record it.
e. Repeat steps 3 and 4 after all price threshold values of price attribute are processed. Compare the logarithmic approximate function values of the price attributes under different threshold values, while the maximum threshold level value of the function value is the acceptable threshold value of the said price attribute.

IV. PREFERENCE COLLECTION AND ANALYSIS OF TOUR PLAN

This study takes the "Blue Highway" of NE region for empirical analysis, collects the preference data of the public concerning the "Blue Highway" tour itinerary by means of the stated preference method, and provides a description in response to the questionnaire content and sample characteristics as follows.

1. Questionnaire Design

1) Alternative Plan and Influencing Attribute

Concerning the most important 3 tour harbors in the navigation course of the "Blue Highway" in the NE region, Bisha Fishing Harbor of Keelung, Nanfang-ao Harbor of Suao and Hualien Harbor, take two tour harbors as the portfolio of a navigation course, and divide the entire "Blue Highway" in the NE region into three navigation sections. The navigation course from Bisha Fishing Harbor of Keelung to Suao Harbor is referred to as Keelung-Suao "Blue Highway"; the navigation

course from Suao Harbor to Hualien Harbor is referred to as Suao-Hualien "Blue Highway", while the navigation course from Bisha Fishing Harbor of Keelung to Hualien Harbor is referred to as Keelung-Hualien "Blue Highway". Concerning the potential onshore tour scenic spots available to comply with the "Blue Highway" in the NE region, in consideration of their importance and representing nature, the difference of the selected tour scenic spots tends to be rather large. The onshore scenic spots providing tour time and content items that can better comply with the "Blue Highway" include: Jioufen Old Street cultural tour, Fulung sea bathing site, Lungmen riverside ecology recreation park, Lungtong South Port oceanic park, Tungshan River water park, Suao cold spring park, Chiao River hot spring, Wulaokeng wild camp scenic spot, Tarugo Gorge National Park, Liyu Lake scenic spot, Hualien Ocean World, Chaofeng Pinglin recreation farm, etc. This preliminary selection can comply with the onshore scenic spot itinerary portfolio. Whether it can obviously influence the consumer preference utility perception level can be verified by the statistical indices from the construction process of the demand model.

2) Alternative Portfolio and Questionnaire Design

The experimental design strategy of a package tour alternative was based on one-day tour for tourists who can participate in ocean cruises and specific onshore scenic spots simultaneously in a day. Therefore, this study assumed that tourists would choose the most preferred package tour under the consideration of the trade-off between price and one-day tour combination that tour operate can offer. During a questionnaire design, the alternatives of each question are combined by the 3 major attributes, including the attribute variables of the "Blue Highway" of the NE region, onshore compatible scenic spot variables, and tour price variables. The combination method and content is as follows:

a. The "Blue Highway" of the NE region: it is divided into the navigation courses of Keelung-Suao, Suao-Hualien and Keelung-Hualien, etc., by providing 3 alternatives and one alternative without intent of participation to show the interviewees' replies.

b. Onshore scenic spot compliance portfolio: each starting/ending harbor of the "Blue Highway" is arranged with onshore scenic spot for compliance; that is, each starting/ending point of "Blue Highway" has 4 onshore scenic spot combinations, therefore the possible combinations of itinerary alternative shall be 4*4=16; that is, using 16-question units as a cycle. Considering that a questionnaire having 16 question units may discourage the interviewees by causing fatigue or rejection in reply, therefore these 16-question combinations are divided into two copies of questionnaires, with each questionnaire providing 8-question units evenly.

c. Tour price: the price includes only the fares for ocean cruise, transportation feeder fees to each onshore scenic spot, and a tour guide service charge. The ticket fares for entering scenic areas, dinning fees, hotel room spending, and addition fees for participating in some special activities are excluded in the tour price and should be paid by tourists themselves. This study decides the prices with reference to the current and most likely prepared prices in the future. The designed price level values respectively are between the minimum value of $1,000 and the maximum value of $3,000. Each value is designed with a price space of $200 or $300, randomly selected and combined. The aim is, that more trade-offs concerning attributes to price variables can be obtained through a diversified price level alternative portfolio.

In view of the personal tour experience and basic data, this study also designs questions for joint investigation in order to understand the social/economic data and tour experience characteristics of the interviewees. Personal social economic data includes gender, age, education, profession, income, residential city, and experiences in touring. Each was categorical data. For illustration, age variable is ten-year-old interval scale (i.e. under 20 years old, 21 to 30 years old, 31 to 40 years old, and and so on); education is categorized as graduate, college, high school, and under junior high school; profession is categorized as student, military/public servant, business, industrial and agricultural; income is also a interval scaled variable that is separate as under NT$20 thousand, NT$20 thousand to NT$30 thousand, NT$30 thousand to NT$50 thousand, and more than NT$50 thousand; finally, residential area is categorized as northern area, middle area, southern area and western area. These social economic data would be used as part of input variables for estimating stated preference model. But some might be deleted or adjusted (e.g. transfer income variable with four categories into two categories) further according to their significance to fit the model better.

2. Questionnaire Investigation and Analysis

This study is engaged in a choice-based sampling manner by dividing the interviewees into three groups; the first are the participants with ongoing or former experience of the tour "Blue Highway" of the NE region; the second are the ongoing tourists in the NE region recreation areas; and the third one are the general public of each county/city. It is mainly hoped to understand such preference recognitions as the practical demand and potential demand, etc. of the "Blue Highway" tour itinerary through different questionnaire investigation methods. The investigation period of this study was during October to November 2004. Although the investigating duration time was not during the summer hot-season, neither in the winter off-season, there were still many tourists who visited some scenic spots ad participated in ocean cruise in NE region during that time. Thus, the sample gathered by this study is still representative. The period of implementing questionnaire investigation is October and November of 2004, by screening the filled-out incomplete invalid questionnaires, with a total of 290 copies of valid questionnaire retained. Each copy of the questionnaire has 8 questions; therefore 2320 samples can be obtained in all. In accordance with the questionnaire investigation, the preference connection analysis between the social/economic conditions of interviewees and the "Blue Highway" tour alternative selections is shown as in Table 1. It is found that participants of female

Table 1. Selection preference frequency statistics of the "Blue Highway" tour alternatives in the NE region.

S.E. Variables	Choice	Keelung-Suao "Blue Highway"	Suao-Hualien "Blue Highway"	Keelung-Hualien "Blue Highway"	No participation in each alternative	Total
Gender	M	252 (26.3%)	315 (32.8%)	252 (26.3%)	141 (14.7%)	960 (100%)
	F	405 (29.8%)	471 (34.6%)	338 (24.9%)	146 (10.7%)	1360 (100%)
Age	Below the age of 30	393 (31.1%)	425 (33.6%)	314 (24.8%)	132 (10.4%)	1264 (100%)
	Ages 31~40	146 (26.8%)	185 (34.0%)	116 (21.3%)	97 (17.8%)	544 (100%)
	Above the age of 41	118 (23.0%)	176 (34.4%)	160 (31.3%)	58 (11.3%)	512 (100%)
Residence	County/ city of northern region	336 (30.4%)	375 (34.0%)	285 (25.8%)	108 (9.8%)	1104 (100%)
	Central/ southern regions	162 (28.5%)	199 (35.0%)	120 (21.1%)	87 (15.3%)	568 (100%)
	County/ city of eastern region	159 (24.5%)	212 (32.7%)	185 (28.5%)	92 (14.2%)	648 (100%)
Profession	Student	188 (32.6%)	196 (34.0%)	141 (24.5%)	51 (8.9%)	576 (100%)
	Military/Public servant	123 (29.0%)	154 (36.3%)	114 (26.9%)	33 (7.8%)	424 (100%)
	Business/ industrial/ agricultural	211 (26.9%)	270 (34.4%)	198 (25.3%)	105 (13.4%)	784 (100%)
	Others	135 (25.2%)	166 (31.0%)	137 (25.6%)	98 (18.3%)	536 (100%)
Marital status	Married	266 (24.6%)	377 (34.9%)	297 (27.5%)	140 (13.0%)	1080 (100%)
	Unmarried	391 (31.5%)	409 (33.0%)	293 (23.6%)	147 (11.9%)	1240 (100%)
Education	Above college	467 (29.5%)	547 (34.5%)	393 (24.8%)	177 (11.2%)	1584 (100%)
	Below senior high school/ vocational senior high school	190 (25.8%)	239 (32.5%)	197 (26.8%)	110 (14.9%)	736 (100%)
Income	Below $30,000	343 (28.6%)	399 (33.3%)	292 (24.3%)	166 (13.8%)	1200 (100%)
	Above $30,000	314 (28.0%)	387 (34.6%)	298 (26.6%)	121 (10.8%)	1120 (100%)
	Subtotal	657 (28.3%)	786 (33.9%)	590 (25.4%)	287 (12.4%)	2320 (100%)

gender, under the age of 30, residing in the northern counties/cities, of military/government/education careers, in unmarried status, with educational record above college, and high income participating in the tour alternatives account for rather high percentages. In the aspect of the tour alternative selection trend, most groups tend to select Suao-Hualien "Blue Highway" as the theme in tour alternative at the highest percentage, while the tour alternatives with Keelung-Hualien as the theme account for the lowest percentages. Reduction of tour intent of the tourists may be caused due to the rather long distance of Keelung-Hualien "Blue Highway" itinerary.

V. ESTIMATED RESULTS OF PRICE ACCEPT THRESHOLD MODEL

In order to explore the views of the public concerning the tour alternatives for the "Blue Highway" in the NE region, this study first constructs a Multinomial Logit Model to analyze the impact of different social/economic statuses and tour experience variables on the interviewees' intent of participating in tour itineraries, with the results shown in Table 2. The utility function in the Multinomial Logit Model applies a linear relationship with added percentages as assumption, indicating the

Table 2. Display table of the calibration/evaluation results of Multinomial Logit Model and price threshold model.

Name of attribute	Multinomial Logit Model（*t* value）	Price threshold $2600 (*t* value)
Tour price (unit: $1,000) /（1,2,3）	-0.3425(-7.943)**	-0.0969 (-2.127)**
Keelung-Suao "Blue Highway" (1)	1.4940 (9.006)**	1.0874 (6.559)**
Suao-Hualien "Blue Highway" (2)	1.4970 (8.921)**	1.0748 (6.386)**
Keelung-Hualien "Blue Highway" (3)	1.2065 (7.123)**	0.7775 (4.564)**
Jioufen Old Street cultural tour (1,3)	0.2622 (2.685)**	0.2807 (2.790)**
Chiao River hot springs (1,2)	0.2695 (2.640)**	0.2841 (2.711)**
Tarugo Gorge National Park (2,3)	0.6332 (5.878)**	0.6775 (6.178)**
Hualien Ocean World (2,3)	0.3899 (3.724)**	0.4187 (3.923)**
Gender as female (1,2,3)	0.2465 (1.837)*	0.2586 (1.891)*
Age below 30 (1,2,3)	0.2252 (1.689)*	0.1778 (1.405)
Career identity separately as student and military/government/education careers (1,2,3)	0.6672 (3.308)**	0.6042 (3.001)**
Monthly average income below $30,000 (1,2,3)	-0.5202 (-3.690)**	-0.5091 (-3.624)**
Residing counties/cities are located in northern or eastern region (1,2,3)	0.5002 (2.544)**	0.5175 (2.631)**
Never been in NE region for tour this whole year (1,2,3)	-0.3458 (-2.450)**	-0.2776 (-1.999)**
Never heard about the tour "Blue Highway" of NE region (1,2,3)	-0.3563 (-2.232)**	-0.3353 (-2.065)**
No consideration of consigning a travel agency for processing a tour (1,2,3)	-0.7575 (4.904)**	-0.7207 (4.569)**
LL(0)	-3216.19	-3216.19
LL(β)	-2991.57	-2834.88
ρ^2	0.070	0.119
Sample No.	2320	2320
Applicable threshold person No.		175
Total interviewee No.		290

Remarks： ** *indicates the parameter value under 5% obvious level is obviously different from 0.*
* *indicates the parameter value under 10% obvious level is obviously different from 0.*
( ) *The numbers in brackets represent alternative of the variables placed 1 refers to Keelung-Suao alternative, 2 as Suao-Hualien alternative, 3 as Keelung-Hualien alternative, and 4 as 0 alternative.*

utilities provided by various attributes can be mutually compensated; that is, the attributes of low utility can be compensated from the attributes of high utility. Concerning the Accept Threshold Model of price, it is thought that a decision maker would assume an acceptable level value in price in evaluating alternatives. When the alternative utility or attribute level value is less than the said level, this alternative is less likely selected. This study uses the Gauss application program to self design a program, build a price threshold model, and compare the differences between the Multinomial Logit Model and the price threshold model. The results are shown in Table 2.

The price threshold model was estimated in a trial-and-error way. Each time after giving a price threshold value, a model was estimated and the likelihood ratio was calculated. After all feasible price threshold values were given and got all the estimated model results, then choosing a model with the highest value of likelihood ratio as the final choice model. For illustration, at first, a price threshold value of NT$1900 was given, then it had an estimated model with the likelihood ratio of 0.102; secondly, using NT$2150 as the next price threshold value and having an estimated model with the likelihood ratio of 0.107. Repeating the same procedure until the last price threshold value, i.e. 2850, was given and having an estimated model with ρ2=0.112. After that, comparing all the models' likelihood ratios, under each price threshold value, then choosing a model with the highest likelihood ratio value. Here, when the price threshold value was set as NT$2600, the value of likelihood ratio of estimated model was the highest (i.e. 0.119). Therefore, it is the best fitted price threshold model.

Concerning the Accept Threshold Model of $2,600, in which ρ2 is 0.119, the model applicability is higher than the Multinomial Logit Model, indicating its better interpretation competence. In accordance with the likelihood ratio testing method to test whether statistical difference exists in these two models, its calculation formula shall be as: $-2\ln\lambda = -2\{\ln L(\beta)\text{logit} - \ln L(\beta)\text{ACP}\}$; $\ln L(\beta)$logit is the logarithmic likelihood function value of Multinomial Logit Model. $\ln L(\beta)$ACP is the logarithmic likelihood function value of Accept Threshold Model.

Only the Accept Threshold Model has a price threshold variable more than those of the Multinomial Logit Model, with free level as 1, under 5% obvious level, $\chi 2$（1,0.05）=3.84, but the likelihood statistical quantity of the two models is 313.38, with the result of describing that a statistical difference does exist in the two models. After adding the $2,600 price threshold it can also give the model a better interpretation competence. The Accept Threshold Value is $2,600 coming from the model parameter through calibration/estimation. This result shows

175 people have consideration of the "Blue Highway" itinerary in the price upper limit of $2,600; when a provider's set price exceeds $2,600, this alternative will be eliminated without considering the trade-off relationship between the price and product attributes. This can better conform to the consumers' price perceptions and preference selections.

In the aspect of variable, the parameter value of the Accept Threshold Model or t value is mostly similar to that of the Multinomial Logit Model. Only the parameter values in price aspect show a rather obvious difference. Hereby the variable parameter values and statistical significance analysis is described as follows:

a. Tour price: tour price is a coexisting variable, in units of $1,000. The price attribute t values of both the Multinomial Logit Model and the Accept Threshold Model are both fewer than the 5% obvious level, which are different from 0, with a parameter symbol in the negative, showing that the price drop contributes highly to an obvious tour utility effect of the "Blue Highway". As the threshold parameter value drops from -0.3425 to -0.0969, the result shows that with consideration of $2,600 after adding the price threshold, the influence level of price factor to utility is weakened. Like as it described in previous section, the price threshold value suggested by the best estimated model was NT$2,600 and this only includes the fare for "Blue Highway" ocean cruise, transportation fees for transferring tourists to onshore scenic spots, and the tour guide service charges.
b. "Blue Highway" of the NE region: the 3 navigation sections in the NE region "Blue Highway" are specific virtual variables. Parameter symbols are all in positive values, and t values under the 5% obvious level are all different from 0. The utility perception of Keelung-Hualien Highway is the lowest. Perhaps the rather long navigation course time influences the utility parameter value.
c. Complied with onshore scenic spot: onshore scenic spots are specific variables of the alternative. After statistical testing of the originally listed 12 onshore scenic spots, 4 scenic spots are listed as interpretation variables, while the statistical testing parameters of the remaining variables through statistical testing are obviously 0, and unable to be listed as interpretation variables. The onshore scenic spots with a better interpretation competence include Jioufen Old Street, Chiao River hot spring, Tarugo Gorge National Park, and Hualien Ocean World. Not only their parameter symbols are all in positive values, but also the t values under the 5% obvious level are all different from 0. This influence level of the onshore tour scenic spots can serve as a reference for the "Blue Highway" tour itinerary planning in the future.
d. Gender aspect: the t values under the 10% obvious level are all different from 0, with parameter symbols all positive, showing that female members of the public have relatively higher tour participation interest than the male members of the public.
e. Age aspect: the parameter symbols of the people under the age of 30 are all in positive values, while t values under the 10% obvious level are all different from 0, showing that the members of the public under the age of 30 have relatively higher tour participation interest than the members of the public above the age of 30.
f. Career identity aspect: according to the estimated significance of dummy variables indicated the separate profession of samples: student, military/government/education, business and industrial, it was found that the group of military/government/education and student, compared to other groups, had positive effects on the package tour. The t values of the members of the public with military/government/education careers and student status under the 5% obvious level are all different from 0, with parameter symbols all in positive, showing that the members of the public with military/government/education careers and student identity have relatively higher tour interest than members of the public with other careers and statuses.
g. Monthly average income: this study used four dummies to represent different income level effects on the choice behavior of tourist at first, however, according to the estimated results, it was found that there was only significant difference between the group of tourists with the income which under NT$30 thousand and the group of tourists with the income which more than NT$30 thousand. The t value of the variable under NT$ 30,000 was under the 5% obvious level are all obviously different from 0, with parameter symbols all in negative, showing that the interviewed members of the public with monthly incomes below $30,000 have relatively less tour participation interest than the members of the public with monthly income above $30,000.
h. Residential area: concerning the variable indicated that the respondents residing in the counties/cities of the eastern and northern areas, which t value under the 5% level is different from 0, with parameter symbol in negative, showing that the respondents residing in the counties/cities of the eastern and northern areas have relatively higher tour participation interests than the respondents residing in the central area and southern area.
i. Never been in NE region for tour this whole year: the t values under the 5% obvious level are all obviously different from 0, with parameter symbols all in negative, showing that members of the public who never been in NE region for tour this whole year have relatively less tour participation interest.
j. Never heard about the tour "Blue Highway" of NE region: the *t* values under the 5% obvious level are all obviously different from 0, with parameter symbols all in negative, showing that members of the public who never heard about the tour "Blue Highway" of the NE region have relatively less participation intent in the tours of the "Blue Highway".
k. No consideration of a package tour conducted by a travel agency while taking a 2-day domestic tour: parameters are in negative values, showing that the interviewed members of the public taking a tour for more than 2 days, if not considering the package tour conducted by a travel agency or re-

Table 3. Analysis of the subsidiary groups of the applicable price threshold model of the interviewees.

Related item	Option	Applicable to threshold	Total interviewee No.
Gender	M	78 (65.0%)	120 (100%)
	F	97 (57.1%)	170 (100%)
Age	Below the age of 30	92 (58.2%)	158 (100%)
	Ages 31~40	41 (60.3%)	68 (100%)
	Above the age of 41	42 (65.6%)	64 (100%)
Career & status	Student	42 (58.3%)	72 (100%)
	Military/government/education careers	29 (54.7%)	53 (100%)
	Business/industry/agriculture careers	60 (61.2%)	98 (100%)
	Other categories	44 (65.7%)	67 (100%)
Education	Above college	116 (58.6%)	198 (100%)
	Below senior high school/vocational senior high school	59 (64.1%)	92 (100%)
Monthly income	Below $30,000	95 (63.3%)	150 (100%)
	Above $30,000	80 (57.1%)	140 (100%)
Total		175 (60.3%)	290 (100%)

questing it to process the related tour matters on behalf, are rather reluctant to participate in the "Blue Highway" tour.

There are a total of 175 people applicable to the price threshold model, accounting for 60.3% of the total number of 290 people. After classification by gender, age, career status, education level, income, and social/economic status, the results are shown as in Table 3. The applicable threshold model ratio of each subsidiary group is about at 60%, in which the applicable price threshold ratio of the groups for female, under the age of 30, of military/government/education careers, with education level above college, and higher income is lower, indicating that the group of people in this category have less consideration of price upper limit.

VI. CONCLUSIONS AND RECOMMENDATIONS

In accordance with the analysis results of this study, in the consumer utility function, price threshold does exist. Therefore, operators may consider the price strategy of the "Blue Highway" tour itinerary by setting the price as much below the generally acceptable price threshold to the public as possible. In case the price parameter value is negative, more public participation can be attracted by means of reducing the price to upgrade the public utility. In the marketing strategy aspect, operators can consider their consumer characteristics and provide diversified tour service itinerary alternatives in view of different groups such as student groups or members of the public of lower incomes by promoting low-price economy alternatives under consideration of lessoning their tour cost load. It can be known from the model results that if the public understanding about "Blue Highway" can be enhanced, the tourists' tourism intent can be upgraded. Therefore, the future operators should strengthen the publicity and packaging of "Blue Highway" to facilitate more members of the public to understand and to develop the public participation intent.

Under the restrictions of time, budget, and related manpower, this study engages in a questionnaire design and investigation with the stated preference method; therefore, in selecting onshore scenic spots of the tour itinerary, it is unable to consider all the onshore tour scenic spots. The follow-up study may incorporate more potential onshore scenic spot alternatives into analysis and study. Besides, such attributes related to the arrangement of hotel, tour guide, land transportation method, and catering, etc. may also influence the tour price threshold. It is hoped that the succeeding studies can take these factors into consideration in order to construct a more comprehensive tour preference analysis model.

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