

## Purchasing decision of tourism destination under tourism demand model-taking tourism statistics from Hawaii as example



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### ABSTRACT

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This paper is to determine the factors that influence the flow of international tourism to Hawaii and the purchasing decisions of international tourists on Hawaii tourism products. This paper uses an empirical tourism econometric model and time-series data from 2010 to 2019 to quantitatively explain the different factors that influence the choice of Hawaii for tourists from three major sub-markets: Canada, Japan and Australia. The research findings show that CPI of Hawaii, alternative destinations, GDP of the original country, employment in the hospitality industry and airline seat capacity are the main factors contributing to the high elasticity of demand of international tourists in Hawaii. This research contributes to understand Canadian, Japanese and Australian tourists and develop strategies to increase their satisfaction and willingness to return to Hawaii.

**Contribution/ Originality:** Based on holistic perspective of factors influencing international tourism demand in Hawaii, this study guarantees the diversity and universality of economics factors. Considering that existing studies lack of analytical perspective and cultural variables from tourism-generating region, the research fills out the gap in the destination market and the customer market.

## 1. INTRODUCTION

With the advancement of aviation technology, the convenient transportation results in exponential growth of international tourist arrivals (Peng, Song, Crouch, & Witt, 2015). The exploding international tourism demand generates positive economic effects for a destination (Rasool, Maqbool, & Tarique, 2021) which has attached attention from multiple stakeholders in leisure and tourism industry.

Hawaii, located in the middle of the Pacific, is extremely prevalent among the world's tourism destinations (Agrusa, Kim, & Wang, 2011). With tropical marine climate, it has world-renowned nature resources which are comprised of an abundance of sunshine and beach (Kaehu, 2018). Tourism has become the most economically significant industry in this state, with generating 17% of Gross State Product (Sheldon, Knox, & Lowry, 2005). Hawaii takes up 7% in 1.5 billion arrivals of global international tourism markets (Hawaii Tourism Authority (HTA), 2022; World Tourism Organization (UNWTO), 2022). The office website of Hawaii Tourism Authority sets up a massive database and a tourism dashboard to monitor existing condition of tourism, which provides an access to various aspects of tourism information (Park & Jamieson, 2009). According to the database, Japan, Canada and Australia are

the top 3 source markets for Hawaii international tourism, which accounted for 52.7%, 18% and 9% respectively of overall Hawaii international arrivals in 2019 (Department of Business Economic Development & Tourism (DBEDT), 2022). Therefore, analyzing the relationship between their demand and influencing variables is very helpful for Hawaii international tourism.

This report will identify plenty of relative factors based on existing literatures and actual situation of Hawaii international tourism. After an initial screening of these factors that affect demand for tourism in Hawaii, the 20 most representative variables are selected for the following regression analysis. Then, the multiple linear regression equation calculates the elasticity of demand for top 3 international market, thereby determining the sensitivity of international tourism demand. A full model which can be used to describe the total demand of Hawaii tourism is created based on the refinement of common influencing factors. Finally, the result of the report is used for the tourism sector of destination to determine the impact of different variables on international tourism demand so that they make rational decisions. Figure 1 shows the distribution of the islands and the general geography in Hawaii.

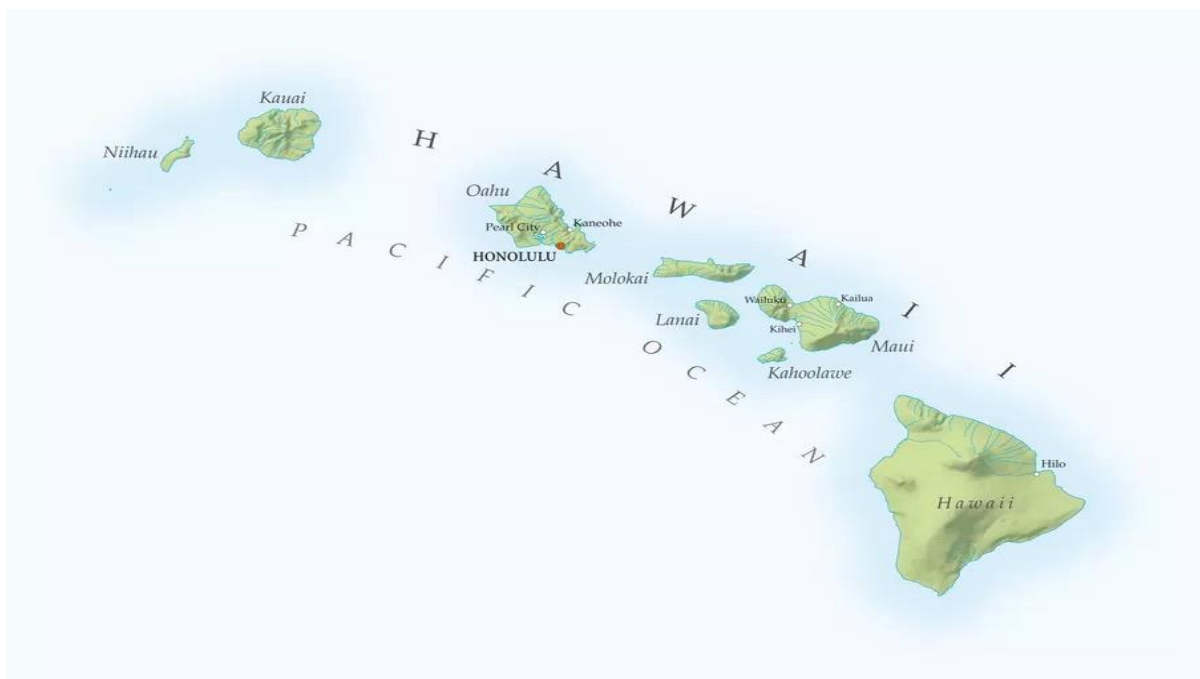


Figure 1. Geographic map of Hawaii.

Source: Trip Savvy (2022).

## 2. LITERATURE REVIEW

The analysis of tourism demand is necessary for marketing strategy and policy development (Dogru, Sirakaya-Turk, & Crouch, 2017). Many analytical methods are used to describe the relationship between the demand for a product and influencing factors. They test the relationship and construct formulas by considering variables, using statistical techniques of correlation and regression analysis. Econometric methods analyze product demand by predicting key economic variables and linking the overall economic situation to the factors affecting demand (Tribe, 2020). Among them, gravity model and regression methods are examples of static econometric models (Peng, Song, & Crouch, 2014). The gravity model was used to describe the pattern of international trade when it was first proposed. It has been used in the tourism literature in the last decade as an empirical model to simulate tourism demand. However, due to the different mechanisms and patterns of international flows between tourism and trade, the use of the gravity model lacks sufficient theoretical support (Morley, Rosselló, & Santana-Gallego, 2014). In contrast, regression analysis examines the causal relationship between tourism demand and the factors that influence it, and provides relevant statistics to measure its accuracy and validity. Therefore, it is the most appropriate method of estimating the model parameters for this paper's analysis of the factors influencing international tourism demand. In

the regression analysis of international tourism demand, tourist arrivals, tourism expenditures and tourism receipts are mainly used as tourism demand proxies, and regression analysis may produce different results depending on the proxies used (Dogru et al., 2017).

The factors affecting international tourism demand can be considered from the perspective of both origin and host countries. From the perspective of origin countries, the determinants of tourism demand depend on the purpose of tourists (Song & Turner, 2006). Economic factors affecting demand usually include disposable income and price of the relevant goods (Tribe, 2020). Gross Domestic Product (GDP) per capita is considered an indirect proxy of income (Croes & Ridderstaat, 2017). Also, Eppright, Arguea, and Huth (1998) conclude that tourists' spending at destination stems from their ability and willingness to pay, both of which are influenced by disposable income. And higher prices of substitute goods for tourist destinations can also increase tourist demand for travel (Tribe, 2020). Kozak (2001) suggests that when tourist satisfaction is higher than expected, tourists are more likely to plan repeat trips in the future, thus increasing tourism demand. In addition, the population size and demographic composition of origin countries also influence tourism demand and price of the relevant goods.

From the perspective of host countries, the economic variables that affect international tourism demand can be considered from destination GDP, exchange rate and price of the relevant goods. Turner and Witt (2001) demonstrate that there is a significant positive effect of GDP on tourism destinations. Webber (2001) finds that the variance of exchange rates is an important determinant of long-term tourism demand. The price of complementary items, such as hotel rates and local commodity prices, are also considered. Excise, as an important means of raising tourism revenues in host countries, may lead to higher prices for destination products, thereby reducing demand for inbound tourism (Durberry, 2008). Also, as a measure of price, the general Consumer Price Index (CPI) of the destination country can be used to reflect the relative prices of tourism products and services (Ongan, Işik, & Özdemir, 2017). The institutional quality and government spending have impacts on the demand for international tourism. Agbola, Dogru, and Gunter (2020) conclude that countries with robust institutional quality mechanisms can demonstrate strong judicial systems and high-quality government regulation, which is expected to attract more international visitors. As for environmental factors, climate variables are often used to explain seasonal tourism demand and destination choice (Li, Goh, Hung, & Chen, 2018). And with the quest for healthy travel, the search for fresh air can be a key incentive for international space mobility (Wang, Fang, & Law, 2018). In addition, airline seat capacity in the tourism industry can have a positive impact on infrastructure improvements in the destination (Seetanah, Sannasee, Teeroovengadum, & Nunkoo, 2019). And Stauvermann and Kumar (2017) claim that the number of educated and skilled labour is a prerequisite for the development of a competitive tourism industry.

### *2.1. Data Collection*

The data and data resources of dependent and independent variables used in this report are presented in detailed in Table 1.

### *2.2. Dependent Variables*

This report selects the number of arrivals to Hawaii from the top 3 source countries as the dependent variable to represent the demand of Hawaii international tourism. The statistics from 2010 to 2019 is obtained from Hawaii Tourism Authority.

### *2.3. Independent Variables*

These 20 independent variables are selected from World Bank, International Monetary Fund, U.S. Census Bureau, Office of Management and Budget, Crime Prevention and Justice Assistance Division, United States Environmental Protection, National Weather Service, Organisation for Economic Co-operation and Development (OECD), US Bureau of Labor Statistics, Hawaii Tourism Authority. These reliable data sources are mainly worldwide

websites, the official websites of Hawaii government and the official websites of tourism related departments. Detailed data sources are shown Table 1.

Table1. Data source.

Type of variables	Variables	Data source
Dependent variables	International arrival visitors	Hawaii tourism authority
Independent variables: Host country	Exchange rate	Organization for economic co-operation and development
	Gross domestic product per capita (Hawaii)	U.S. bureau of labor statistics
	Consumer price index (Hawaii)	U.S. bureau of labor statistics
	Revenue per available Room	Hawaii tourism authority
	Consumer price index (Maldives)	International monetary fund
	Government tourism expenditure	U.S. census bureau
	Crime index in Hawaii	Crime prevention and justice assistance division
	Airline seat capacity	Hawaii tourism authority
	PM2.5 weighted mean 24-hour	United states environmental protection agency
	Monthly mean avg temperature	National weather service
	Hospitality industry employment	Hawaii tourism authority
Independent variables: Origin countries	Gross domestic product per capita (Original country)	Hawaii tourism authority
	Transportation expenditure	Hawaii tourism authority
	Entertainment expenditure	Hawaii tourism authority
	Food expenditure	Hawaii tourism authority
	Shopping expenditure	Hawaii tourism authority
	Honeymoon and married (%)	Hawaii tourism authority
	Population (Origin country)	World bank
	Repeater (%)	Hawaii tourism authority

### 3. METHODOLOGY

Tourism demand modelling, as the core of tourism economics, contributes statistical and conceptual support to investigate the determinants of tourism demand (Dogru, Bulut, & Sirakaya-Turk, 2021). Consistent with empirical research, this report adapts quantitative study as the primary method. In order to analyze the influence of special factors towards Hawaii international tourism demand, linear regression analysis between 20 variables widely selected from various levels and tourist arrivals has been done. While factors with weak correlation are screened and removed, this study estimates a multiple linear regression model to explain 6 main variables for Hawaii international tourism demand by using data on number of tourists arriving from the top 3 source countries. Tourist arrivals will be set as the dependent variable Y, and the key independent factors will be set as X<sub>1</sub>, X<sub>2</sub>, ..., X<sub>k</sub>. For this task, Minitab statistical software is used for data analysis covering the time-series figure of 2010 to 2019. The linear tourism econometric model is of the form:

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_kX_k + u$$

When judging correlation between tourism demand and other factors, tourism model can be trained easily by simple linear regression to discover potential correlation. Additionally, multiple linear regression is used to consider complex relationship with precise understanding of each independent variables with the dependent variable.

In terms of the choosing standard of strong correlative factors, less than 0.05 of p-value and as high as possible of R-square are used as criteria. Usually, less than 0.05 of p-value indicates the relationship is statistically significant. Higher R-square value represents better goodness-of-fit with smaller differences between observation point and fitted points (Frost, 2019). Figure 2 illustrates the process of methodology. As can be seen in the flow chart, the raw data are calculated to derive the elasticity of demand for different factors.

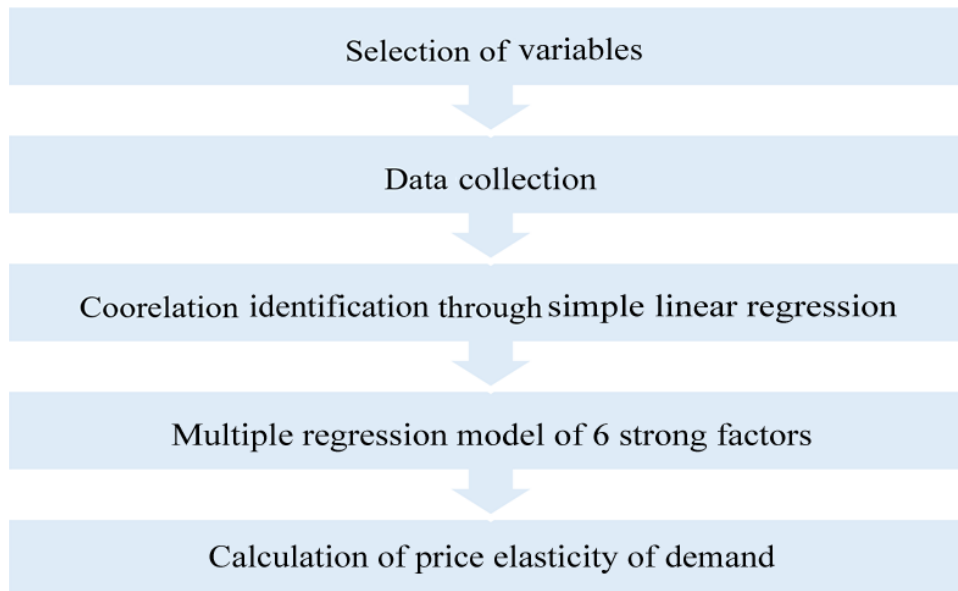


Figure 2. The flow chart of methodology.

#### 4. RESULT

As shown in Table 2, independent variables with weak correlation ( $R\text{-square} < 0.5$ ) will be ignored, while those lack of statistical significance will be excluded ( $p\text{-value} > 0.05$ ) (data crossed off by a black line). The strong relevant factors that can be used in the multiple regression analysis are preliminarily screened out in this step. However, there is multicollinearity between strong correlation factors, which reduces the accuracy of estimation coefficients and the statistical ability of multiple regression models (Frost, 2019). Thus, by calculating the variance inflation factor (VIF) between strongly correlated independent variables, it is obtained that the multicollinearity between them is not severe enough to warrant corrective measures.

##### 4.1. Analysis the Elasticity of Demand

After finding the available strong correlation independent variables according to the simple linear regression analysis, this report selects the top six variables (colored in red in Table 2) in each market according to R-square from high to low. Then the multiple regression equation for the three markets is obtained, and the elasticity of demand is calculated and analyzed. In the price of calculation, this report uses the following formula:

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Table 2. The regression of variables and demand.

	Independent variables	Japan		Canada		Australia		International arrivals	
		R-sq	P-value	R-sq	P-value	R-sq	P-value	R-sq	P-value
Employment	Hospitality industry employment	0.678	0.003	0.559	0.013	0.708	0.002	0.957	0.000
Hotel	Revenue per available room	0.248	0.000	0.248	0.000	0.188	0.000	0.951	0.000
Demographic	Population (Origin country)	0.620	0.007	0.560	0.013	0.571	0.012	0.859	0.000
Criminality	Crime index in Hawaii	0.166	<del>0.242</del>	0.246	<del>0.145</del>	0.149	<del>0.270</del>	0.438	0.037
Economic	Exchange rate	0.102	0.000	0.117	0.000	0.223	0.000	0.498	0.000
	Gross domestic product per capita (Origin country)	0.441	0.036	0.690	0.003	0.434	0.038	0.865	0.000
	Gross domestic product per capita (Hawaii)	0.567	0.012	0.497	0.023	0.569	0.012	0.6526	0.001
	Consumer price index (Hawaii)	0.647	0.005	0.615	0.007	0.598	0.009	0.894	0.001

	Independent variables	Japan		Canada		Australia		International arrivals	
		R-sq	P-value	R-sq	P-value	R-sq	P-value	R-sq	P-value
	Consumer price index (Maldives)	0.872	0.000	0.739	0.001	0.907	0.000	0.948	0.000
Visitor	Transportation expenditure	0.591	0.009	0.642	0.005	0.525	0.000	0.871	0.000
	Entertainment expenditure	0.235	<del>0.156</del>	0.000	<del>0.965</del>	0.744	0.001	0.944	0.001
	Food expenditure	0.910	0.000	0.153	<del>0.263</del>	0.472	0.001	0.758	0.001
	Shopping expenditure	0.584	0.010	0.189	<del>0.200</del>	0.101	<del>0.972</del>	0.087	<del>0.407</del>
	Airline seat capacity	0.853	0.000	0.680	0.003	0.937	0.000	0.956	0.001
	Repeaters (%)	0.017	<del>0.720</del>	0.077	<del>0.438</del>	0.000	<del>0.970</del>	0.100	<del>0.374</del>
Government	Excise	0.665	0.000	0.514	0.002	0.744	0.000	0.738	0.001
	Government tourism expenditure	0.577	0.011	0.339	<del>0.077</del>	0.603	0.008	0.822	0.000
Climate	PM2.5 weighted mean 24-hours	0.425	0.041	0.189	<del>0.209</del>	0.194	<del>0.203</del>	0.419	0.043
	Monthly mean average temperature	0.262	0.000	0.493	0.000	0.290	0.000	0.025	<del>0.087</del>
Travel purpose	Honeymoon and married (%)	0.643	0.001	0.584	0.010	0.532	0.017	0.515	0.019

4.2. Japanese Market

$$\text{Quantity demand}_x = -1126802 + 68264 F_x - 22844 S_x + 5721 C_x + 0.417 A_x - 2197 E_x - 5.2 H_x$$

Where:

$Q_x$  = Quantity demand<sub>x</sub> = Number of Japanese Tourist Arrivals

$F_x$  = Food Expenditure

$S_x$  = CPI (Maldives)

$C_x$  = CPI (Hawaii)

$A_x$  = Airline Seat Capacity

$E_x$  = Excise

$H_x$  = Hospitality Industry Employment

The constant = -1126802.0000

Calculate the ten-year average value of each independent variable:

$$F_x = \text{Food Expenditure} = 49.0620$$

$$S_x = \text{CPI (Maldives)} = 126.7557$$

$$C_x = \text{CPI (Hawaii)} = 259.5700$$

$$A_x = \text{Airline Seat Capacity} = 3447535.1000$$

$$E_x = \text{Excise} = 86.6754$$

$$H_x = \text{Hospitality Industry Employment} = 117370.0000$$

The result:

$$Q_x = \text{Quantity demand}_x = 1453863.1000$$

Calculate the price elasticity of demand:

$$F_x: 2.3030$$

$$S_x: -1.9917$$

$$C_x: 1.0214$$

$$A_x: 0.9898$$

$$E_x: -0.1310$$

$$H_x: -0.4165$$

The elasticity of demand between Japanese tourists' arrivals and food expenditure in Hawaii is 2.3030, which expresses Japanese tourism demand is more sensitive to food expenditure change. In the research of Asian tourist'

consumption behavior, Japanese tourists usually show more concern about the cost performance of local food (Choi, 2020). If they find that Hawaii can provide more cost-effective food, they will be more willing to choose Hawaii and pay a lot for food.

Moreover, the demand elasticity of Hawaii CPI and Malaysia CPI to Japanese arrivals is -1.9917 and 1.0214 respectively. This proves that the differences in level of consumption of destinations and alternative destinations have a great impact on the changes in Japanese tourists' demand. If they find that Hawaii consumption level is higher than expectation, they may choose substitute destinations.

Finally, the absolute value of demand elasticity of airline seat capacity, excise and hospitality industry employment is lower than 1. Thus, the changes brought by the relevant factors they represent, which include the convenience of aviation, the product tax to be paid when shopping and the development of the hotel industry, will not cause the significant fluctuation of Japanese tourists' choice.

#### 4.3. Canadian Market

$$\text{Quantity demand}_x = 147638 + 6685 S_x - 9743 C_x - 120600 P_x - 0.1405 A_x + 18.82 G_x + 29419 T_x$$

Where:

*Quantity demand<sub>x</sub>* = Number of Canadian Tourist Arrivals

*S<sub>x</sub>* = CPI (Maldives)

*C<sub>x</sub>* = CPI (Hawaii)

*P<sub>x</sub>* = Purpose: Honeymoon and Married (%)

*A<sub>x</sub>* = Airline Seat Capacity

*G<sub>x</sub>* = GDP per capita (Canada)

*T<sub>x</sub>* = Transportation Expenditure

The constant = 147638.0000

Calculate the ten-year average value of each independent variable:

*S<sub>x</sub>* = CPI (Maldives) = 126.7557

*C<sub>x</sub>* = CPI (Hawaii) = 259.7000

*P<sub>x</sub>* = Purpose: Honeymoon and Married (%) = 0.1837

*A<sub>x</sub>* = Airline Seat Capacity = 3447535.1000

*G<sub>x</sub>* = GDP per capita (Canada) = 108451.4426

*T<sub>x</sub>* = Transportation Expenditure = 17.0230

The result:

*Q<sub>x</sub>* = *Quantity demand<sub>x</sub>* = 501202.4000

Calculate the price elasticity of demand:

*S<sub>x</sub>*: 1.6906

*C<sub>x</sub>*: -5.0484

*P<sub>x</sub>*: -0.0442

*A<sub>x</sub>*: -0.9664

*G<sub>x</sub>*: 4.0720

*T<sub>x</sub>*: 0.9992

The absolute value of elasticity of CPI and GDP is 5.0484 and 4.0720 respectively. This is because Canadian economic recession prompts the price sensitivity towards tourism and purchasing decision-making (Smeral, 2010). Especially, as the main tourism form of Hawaii, holiday tourism market exhibits greater degrees of price sensitivity than business tourism (Cortés-Jiménez & Blake, 2011). Since tourism prices are often agented by CPI, high statistics of elasticity shows that Canadian tourists are hypersensitive to the tourism price level of the destination. High level of living and travel costs decreases tourist's inflow (Meo, Chowdhury, Shaikh, Ali, & Masood Sheikh, 2018). On the



contrary, Maldives, as a major international leisure tourism destination for Canadian, whose CPI of Hawaii island tourism, shows 1.6906 of elasticity with tourist arrivals.

It is conspicuous that transportation spending is relatively inelastic with Canadian tourism demand. This is possibly due to the importance that Canadian puts the place on package between tourism activities and transportation (Baldacchino & Ferreira, 2013). Moreover, the purpose of honeymoon and married takes up almost 1/5 of international tourists. However, it is shown for moderate elasticity with Hawaii tourism demand. Possibly, the demand of honeymoon and married is steady, whose demand will not be affected by apparent factors.

#### 4.4. Australian Market

$$\text{Quantity demand}_x = 2586 - 4.64 H_x + 2820 N_x + 0.0077 O_x + 0.158 A_x + 1658 S_x - 375 E_x$$

Where:

*Quantity demand<sub>x</sub>* = Number of Australian Tourist Arrivals

*H<sub>x</sub>* = Hospitality Industry Employment

*N<sub>x</sub>* = Entertainment Expenditure

*O<sub>x</sub>* = Government Tourism Expenditure

*A<sub>x</sub>* = Airline Seat Capacity

*S<sub>x</sub>* = CPI (Maldives)

*E<sub>x</sub>* = Excise

The constant = 2586.0000

Calculate the ten-year average value of each independent variable:

*H<sub>x</sub>* = Hospitality Industry Employment = 117370.0000

*N<sub>x</sub>* = Entertainment Expenditure = 23.9680

*O<sub>x</sub>* = Government Tourism Expenditure = 3930743.6000

*A<sub>x</sub>* = Airline Seat Capacity = 3447535.1000

*S<sub>x</sub>* = CPI (Maldives) = 126.7557

*E<sub>x</sub>* = Excise = 86.6754

The result:

*Q<sub>x</sub>* = Quantity demand<sub>x</sub> = 279684.1000

Calculate the price elasticity of demand:

*H<sub>x</sub>*: -1.9464

*N<sub>x</sub>*: 0.2417

*O<sub>x</sub>*: 0.1082

*A<sub>x</sub>*: 1.9525

*S<sub>x</sub>*: 0.7513

*E<sub>x</sub>*: -0.1163

The elasticity of demand between Australian tourist arrivals and airline seat capacity is 1.9525, which means tourism demand in Australia is most sensitive to changes in airline seat capacity. This may be because Australia is in Oceania and relies heavily on air transport to Hawaii. In contrast, a cruise from Australia to Hawaii takes nearly three weeks, so plane can be the first choice for Australian tourists when traveling time and convenience are single considerations (Hawaiian Cruise Guide, 2022). The convenience of transportation determines the accessibility of destination and thus influences the demand.

Secondly, the absolute value of demand elasticity between the number of hospitality industry employment in Hawaii and Australian tourist arrivals is 1.9464. This may be because Australian tourists value the abundance of human resources which can provide better products and services (Stauvermann & Kumar, 2017).



Compared to the above two variables, the absolute value of demand elasticity of entertainment expenditure, government tourism expenditure, CPI of Maldives and excise is lower than 1, which means that these factors are inelastic and have insignificant effects on Australian tourist demand.

## 5. CONCLUSION

This report has conducted a regression analysis of the factors affecting Hawaii international tourism demand, and highly relevant factors are modeled from the perspective of the top 3 source markets. Then, the elasticity of demand is calculated and factors with high elasticity are analyzed. The CPI of Hawaii and substitute destination, GDP of the origin country, airline seat capacity, hospitality industry employment, and consumer behavior disposition are the main factors which has high elasticity of demand. Secondly, based on the refinement of common influencing factors, a model reflecting the total demand of Hawaii tourism market for predicting is constructed. Finally, the factors of high sensitivity are summarized, and practical recommendations are proposed for the decision-making of Hawaii tourism stakeholders.

## 6. RECOMMENDATION

To support decision-making process of stakeholders, recommendations for Hawaii tourism industry are provided from a variety of perspectives.

Firstly, the government should keep a close eye on the price level in Hawaii and use macroeconomic instruments to regulate it. The Hawaii Tourism Authority should apply reasonable pricing strategies for tourism products and services to ensure that prices are tiered for different target markets.

Secondly, for Hawaiian Airlines, they could increase the total airline seat capacity by increasing the number of flights and using more high-capacity aircraft to create convenient transportation conditions, especially for countries like Australia that rely on air travel.

Third, as another key sector, the hospitality industry could provide more talents with high service quality through the optimization of the recruitment processes and the training of professional skills.

Finally, Hawaiian international tourism companies should adapt their marketing strategies to address the differences of consumer culture to improve the effectiveness of their promotions. For example, they can create the image of delicious food and reasonable price in advertising to attract Japanese who are more sensitive to food.

## 7. LIMITATION

One of the shortcomings of this report is that tourism demand model ignores the impact of major events on tourism. Tourism industry is relatively sensitive, which is easily affected by current affairs, economy, crisis and other factors. In addition, weather related types of data are eliminated from 6 strongly determinants, which shows weak numerical correlation on statistics. However, weather-related factors are indeed significant variables affecting tourism demand, since beach tourism is the main tourism form in Hawaii. This is because the essence of data type involves issues of tourist preference, so that the R-square will decrease accordingly.

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**Authors' Contributions:** All authors contributed equally to the conception and design of the study.

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