

DEMAND AND SUPPLY OF
HOTEL ROOMS IN TAIWAN
(1972 - 1976)

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ABSTRACT

DEMAND AND SUPPLY OF HOTEL ROOMS IN TAIWAN (1972-1976)

By

Sheng Cheng Chi

This study attempts to estimate future demand and supply of hotel rooms in Taiwan to provide knowledge for policy making so as to obviate over- or under-construction of hotel rooms.

In order to estimate the demand for hotel rooms, it is necessary first to project the visitor arrivals. A number of techniques can be used to make this projection, such as:

(1) Gravitation Model, (2) Computer Systems Simulation, (3) Correlation and Regression Analysis, and (4) Time Series Analysis -- Secular Trend. In this study, the secular trend analysis is used to project visitor arrivals in Taiwan because of its simplicity, objectivity and the limitations of data which makes other techniques not applicable.

Based on the estimates of demand and supply of hotel rooms in Taiwan, there appears to be an oversupply of about 1500 rooms in 1972. This excess supply may be reduced by an increase in demand in 1973 and 1974. However, an additional 1600 and 4200 rooms might be needed in the years 1975 and 1976 respectively. This analysis suggests that international tourist hotels located in the Taipei region may be more in demand in the future.

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Sheng Cheng Chi

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Any errors remaining in this study are the sole responsibility of the author.

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CHAPTER 1

INTRODUCTION

Taiwan, a country of great contrast, has not until recently become a tourist attraction. The importance of tourism to Taiwan's economy can be seen from its tourism revenue. In 1971 alone, Taiwan's revenue from tourism amounted to \$114.5 million, which ranked number four in Taiwan's export industry.¹

"Economists agree that demand for non-essentials such as tourism tends to be quite elastic."² Elasticity of demand in the tourist industry is shown not only by its peculiar sensitivity to fluctuations in personal income, but also to changes in the cost of tourist goods and services.

On the other hand, "Supply in the tourist industry is essentially rigid."³ Personal services are created at the time of consumption. Most tourist activities consist either

¹Taiwan Tourism Bureau, Monthly Report on Tourism. (Taipei: March, 1972), p. 26.

²Robert W. McIntosh, Tourism Principles, Practices, Philosophies. (Ohio: GRID. Inc., 1972), p. 207.

³Kurt Kraft, "Tourism as a Factor in Economic Development", International Travel and Tourism. (Washington, D.C.: Institute of Certified Travel Agents, 1967), p. 81.

in providing services or in transforming goods and selling them to consumers. Successful tourism requires certain specialized installations which are generally costly, i.e., hotels, restaurants, transport services, etc. Most of these cannot be moved in response to a demand suddenly arising at some other places. Immobility in time and space of tourist services are the causes of this almost total inelasticity of supply.⁴

This difference in the nature of demand and supply in the tourist industry will always be one of its crucial problems. It is for this reason that the forecast of tourist demand is needed. Decisions have to be taken now about hotel constructions costing millions of dollars which will not be usable for some years ahead.

This study attempts to estimate future demand and supply of hotel rooms in Taiwan to provide knowledge for policy making so as to obviate over- or under-construction of hotel rooms.

⁴Kraft, p.82.

CHAPTER 2

TAIWAN'S TOURISM POTENTIAL

This chapter will briefly review Taiwan's tourism potential and factors favorable to Taiwan's tourism development.

I. Taiwan's Strategic Location¹

The geographical location of Taiwan is one of its major assets. It is strategically located on one of the most frequently travelled routes in Asia (Appendix 1 and 2). Taiwan lies in direct line between Japan and Hong Kong, Asia's most active tourist playground. Tokyo is 1300 miles to the northeast of Taipei and Hong Kong 500 miles to the southwest. Flying time to Hong Kong is just over one hour and to Tokyo is slightly over three hours by jets. Because of this location, Asian tourists can include a Taiwan stopover for no additional air fare. Opening of Kaohsiung Airport to international traffic will reduce the flying distance to Hong Kong to 300 miles.

II. Transportation Within the Country²

Mobility is the most important key to tourism development in Taiwan. Taiwan presently has an improving internal

¹Taiwan Tourism Bureau, Taiwan Visitor Industry Summary, (Taipei: 1971), p. 21.

²Ibid. p. 8.

transportation structure consisting of domestic air travel, railways and highways (Appendix 3).

Internal air travel is currently provided by China Airlines, Far Eastern Air Transport and Winner Airlines. Domestic service extends nearly the length of the island from Taipei to Kaohsiung. International airports also serving domestic flights include airports at Taipei and Kaohsiung. Priorities with respect to tourism development and decentralization include Hengchun and Taichung airport development.

Railway in Taiwan play an important part in both passenger and freight traffic. There are two major railroad trunklines in Taiwan with one each on the west and the east coasts.

The Taiwan Highway Bureau, the governmental agency responsible for roads, currently has a long range program of new highway construction plus improvement plans for existing roads. Priority is being given to the construction of a north-south freeway between Keelung and Kaohsiung.

III. Visitor Attractions³

Taiwan offers a multitude of attractions and activities for visitors of many diversified interests, but most important is that Taiwan is the only part of China generally open to world travellers today. In Taiwan, the visitor can acquaint himself with authentic Chinese tradition, art, festivals and celebrations, cuisine, architecture and way of life.

³Taiwan Tourism Bureau, Taiwan Visitor Industry Summary, (Taipei: 1971) p. 13.

1) Hospitality Resources

Many visitors consider the people of Taiwan to be the island's greatest visitor attraction. Thousands of years of traditional family education on customs has instilled a hospitality in the people. Another quality of the people is expressed in the ability of foreign visitors to move about freely by day or night in all areas of the cities without harm or fear for personal safety. One of Taiwan's most important hospitality resource is the island's remarkable storehouse of Chinese culture and art, the National Palace Museum in Taipei. The museum is a visual experience enabling visitors from throughout the world to experience the beauty and story of Chinese culture and art.

2) Natural Resources

The island of Taiwan possesses spectacular scenic beauty in its wooded and rugged mountains. Natural features such as the Taroko Gorge and the rock formations of Yehliu, mountain lakes and reservoirs such as Sun Moon Lake, rugged coastlines and picturesque rural farming villages surrounded by rice paddies and other agricultural settings. The visitor can experience tropical, sub-tropical, temperate and alpine climatic zones in a short space of several hours. In addition to scenic and cultural attractions, Taiwan offers the visitor a range of sports and recreational activities, such as golf courses, beach facilities, boating, surfing and underwater sports (For locations of principal visitor attractions, see Appendix 3.).

3) Shopping

Shopping opportunities for unique and reasonably priced items are one of the major attractions for visitors to Taiwan. The important visitor shopping items include ornamental marble products, jade and coral jewelry, wood and stone carving, rugs, etc. Shopping in Taiwan is a sight-seeing adventure in itself.

4) Dining and Entertainment

The Chinese restaurant has become a world-wide institution. Taiwan offers the finest, most authentic Chinese cuisine available. The major cities of Taiwan also provide a wide range of night life and entertainment. The evening entertainment includes the traditional Chinese opera, classical Chinese symphony and orchestra concerts, plays and folk dance shows. The traditional songs and dance performances of the aborigines also provide a touch of local flavor.

CHAPTER 3

FORECAST OF VISITOR ARRIVALS

This chapter will attempt to develop a forecast of visitor arrivals to Taiwan.

I. Choice of Model

In order to estimate the demand for hotel rooms, it is necessary first to project the visitor arrivals.

There are a number of different techniques which might be used in making this projection, such as (1) Gravitation Model, (2) Computer Systems Simulation, (3) Correlation and Regression Analysis, and (4) Time Series Analysis -- Secular Trend.

1) Gravitation Model¹

The logic of the Gravitation Model is based on the concept that a specific and measurable relationship exists between the number of visitors arriving at a given destination from specific markets and a series of independent variables, the most important of which are: a) the magnitude of the population of the market area, b) the distance between the destination and that market. Other independent variables - such as the income of the residents of the market area,

¹L. J. Crampon, "A New Technique to Analyze Tourist Markets", International Travel and Tourism, (Washington, D.C.: Institute of Certified Travel Agents, 1967), pp. 239-243.

the average age of the residents of the market area, and the general propensity of the residents to travel - can be injected into the model.

The relationships among these variables can be expressed by the equation:

$$V_{od} = b_1 P_o T_{od}^{b_3} = b_2 V_d P_o T_{od}^{b_3}$$

Where:

V_{od} = the number of visitors from a given market area or origin, o, visiting a given destination, d

P_o = the population of o

T_{od} = the travel distance between o and d

V_d = the total number of visitors to d from all origins

The values of b_1 , b_2 and b_3 , the constants, must be computed:

b_1 : the value of V_{od}/P_o when T_{od} is equal to one

b_2 : b_1/V_d

b_3 : the slope of the exponential curve

The gravitation model is a tool that can be applied to evaluate markets that can serve a destination -- that is, a nation, a state, a community, or an individual attraction.

However, a model that considers only the population of a market and the distance between the market and destination leaves something to be desired. By using various estimates of tourists' propensities to travel, which vary from one market to another, or by injecting additional independent variables into the model, the precision of the estimates can

be improved. The difficulties being "the injection of additional independent variables", which can be quite tedious and causes bias created by personal judgment.

2) Computer Systems Simulation Model²

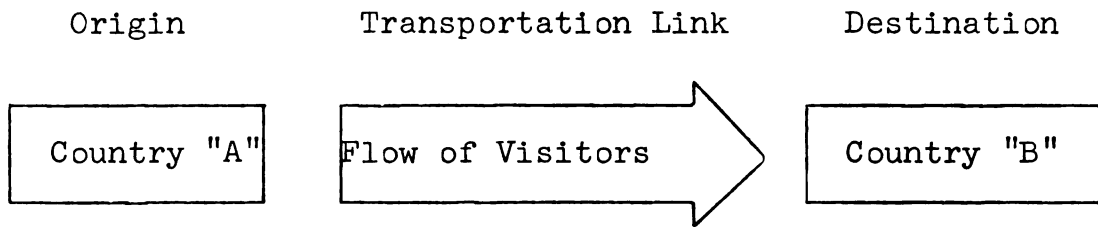
A Computer Systems Simulation is one of the methods for projecting demand. There are two features of primary significance in this approach. First the prediction of tourism demand at the destination is broken into two phases. Phase one involves the use of observed participation rates at the origin correlated with socio-economic data to give estimates of future demand at the origin. Phase two consists of predicting the probable future distribution of this demand at the destinations by simulating the flows of visitors on the computer with the model appropriately modified to represent future conditions.

The second feature of this approach is that the computer simulation takes into consideration all of the demand at all the origins simultaneously and distributes to the destinations. It is a dynamic model of a dynamic situation.

The model consists of three basic groups of components: (1) origin countries, (2) destination countries, and

²Michael Chubb, "'RECSYS-SYMAP' - Michigan's Computerized Systems Simulation Approach to Demand Distribution Prediction," Predicting Recreation Demand (East Lansing: Recreation Research and Planning Unit, Michigan State University, September, 1969), pp. 23-33.

(3) the transportation link in between.

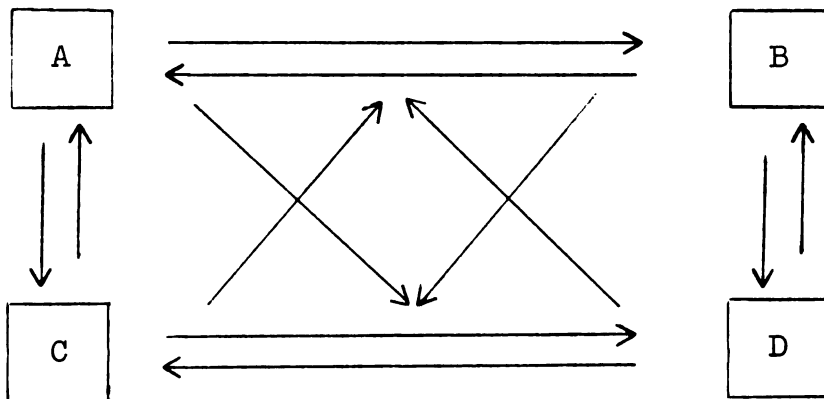


In constructing the computer systems model, simulation equations are written based on the principle that:

$$\text{The demand (for any link)} = P \times \frac{1}{\text{Resistance of the link}}$$

where P is the propensity to participate at the origin. The resistance of a link is defined as a function of distance and cost.

Look at just four countries to see the possible combinations of linkages:



Here there are a total of 12 possible direct flow routes. This means 12 equations to be solved in the model.

In the complete model, the number of origins, destinations, possible direct flow routes and so the equations to be solved can be quite fantastic.

There are obviously some problems with the technique. It requires especially trained personnel to set up the original model and data processing programs. It also requires a large amount of special data. These are serious problems that have to be faced by any tourism organization that might consider using the computer systems simulation method.

3) The Correlation and Regression Analysis³

The statistical tools of correlation and regression analysis were developed to estimate the closeness with which two or more variables were associated and the average amount of change in one variable that was associated with a unit increase in the value of another variable.⁴

A general linear model would look like this:

$$Y = B_0X_0 + B_1X_1 + B_2X_2 + \dots + B_kX_k + e$$

where the dependent variable Y (number of visitors) is the function of X_i ($i = 0, 1, 2, \dots, k$)

X_i 's are the independent variables representing the various factors affecting Y, such as GNP, distance, population, etc.

B_i 's ($i = 0, 1, 2, \dots, k$) are the constants

e is the error term

The use of a correlation and regression model would have many of the same problems as a computer systems

³William A. Spurr and Charles P. Bonini. Statistical Analysis for Business Decisions (Illinois: Richard D. Irwin, Inc., 1967), pp. 551-630.

⁴Ibid. p. 551.

simulation model. Especially trained personnel and large amount of special data would be required.

These three models described above are all based on the concept that a specific and measurable relationship exists between the number of visitors arriving at a given destination from specific markets and a series of independent variables. These models will not be used in this study for the following reasons:

(1) All three models above require large amount of specific data, which would require accurate information on visitor arrivals during the past. Also, future conditions of the destination and originating area have to be accurately modified. Unfortunately, Taiwan's visitor data is scanty and not always accurate. It is new in the tourist industry and not many studies on foreign visitors to Taiwan have been conducted. It would be hard to estimate with great accuracy future arrivals of foreign visitors. .

(2) The number of calculations needed in all three models can be quite fantastic based on the number of origins which can feed visitors to each of the various destinations. Many sophisticated approaches to demand distribution prediction are severely handicapped because they became too complicated.

4) Time Series Analysis -- Secular Trend⁵

Secular trend is the gradual growth or decline of a series over a long period of time.

⁵William A. Spurr, pp. 463-497.

The secular trend analysis is used to estimate visitor arrivals to Taiwan for the following reasons:

(1) This analysis uses data readily available. Therefore, time and cost for data collections are saved.

(2) This analysis uses a "time" proxy for all independent variables affecting visitor arrivals in Taiwan, thereby eliminating most errors created by subjective judgement except the selection of sample period.

(3) Computer test runs of the regression models show very high "co-efficient of determination", which suggests that the regression lines fit the observed data very well.

II. Secular Trend Analysis for Visitor Arrivals in Taiwan

This section will discuss the set up and the conditions of the secular trend model for visitor arrivals in Taiwan.

1) Data Used and Period Under Study

Data for visitor arrivals in Taiwan by nationalities are available only from 1962 through 1971, therefore, only ten years' data are used in these projections. Because of the limitations of the data, only short term projections of visitor arrivals up to 1976 are made.

2) Assumptions

The projections are based on two basic assumptions:

(1) Political and economical stability throughout the world in general, and in Taiwan and in countries supplying visitors to Taiwan in particular.

(2) Factors affecting visitor arrivals to Taiwan will remain the same during the period under study as during the sample period.

3) Market Groups

Tourists from different originating countries are believed to have different spending patterns and pursuits. In order to make projections more accurate and for the estimations of hotel room requirements, the market is divided into six sub-markets. These market groupings are based on each country's unique characteristics or the similarities amongst the countries within the same group.

The six sub-markets are as follows:

- (1) Japan: Japanese visitors constituted 26% of all visitor arrivals in Taiwan in 1964 and increased to 47% in 1971. It is by far the largest market for Taiwan's tourist industry.
- (2) U.S.: U.S. visitors constituted almost half of the total visitor arrivals in Taiwan in 1962, and had been the number one market for Taiwan's tourist industry until 1967 when Japan took her place. U.S. is now the second largest tourist market for Taiwan.
- (3) Asia (Excluding Japan): This market includes Ryukyu, Philippines, Thailand, Vietnam, Korea, and Malaysia. This market constituted about 9-13% of the total visitor arrivals in Taiwan in the period 1962-1971.

- (4) Europe: This market includes Belgium, France, Germany (FR), Italy, Netherlands, Spain, Switzerland, United Kingdom. European visitors have not constituted an important market for Taiwan's tourist industry, only 3% in 1971.
- (5) Canada, Australia and New Zealand: This market grouping is based on many similarities of these three countries. They have very high GNP per capita and are relatively new market for Taiwan. This market constituted about 2-5% of the total visitor arrivals in Taiwan in the period 1962-1971.
- (6) All Others: This market group includes all countries and areas not listed in the preceding five markets. This market constituted about 13-23% of the total visitor arrivals in Taiwan in the period 1962-1971.

4) Regression Models

The models use "visitor arrivals" from each sub-market as dependent variables, and "time" as independent variables.

Three least square regression models are used in the analysis of secular trend for each sub-market:

- a) $Y_i = A_i + B_iX + e$
- b) $Y_i = A_i + B_iX + C_iX^2 + e$
- c) $\log Y_i = A_i + B_iX + e$

Where:

Y = the number of visitor arrivals from each sub-market

X = the time variable, X = 1 for 1962

X = 2 for 1963

.

.

.

X = 15 for 1976

i represents different sub-markets

i = 1 represents Japanese market

i = 2 represents U.S. market

.

.

.

i = 6 represents All Others

A, B, and C are the constants

e is the error term

The regression equations with largest R^2 are selected for prediction (Table 1). Model b is selected for Japan, Asia, and All Others Markets. Model c is selected for U.S., Europe and C. A., and N.Z. markets.

Table 1. Summary of R^2 for Three Secular Trend Models for Visitor Arrivals in Taiwan*

Sub-Markets Models	Japan	U.S.	Asia	Europe	C.A. and N.Z.	All Others
a	.9004	.9574	.9743	.9571	.7824	.9315
b	.9913	.9635	.9784	.9821	.8008	.9501
c	.9700	.9737	.9071	.9880	.9161	.9464

*Result of computer run feeding data of visitor arrivals in Taiwan during 1962-1971 into models a), b) and c).

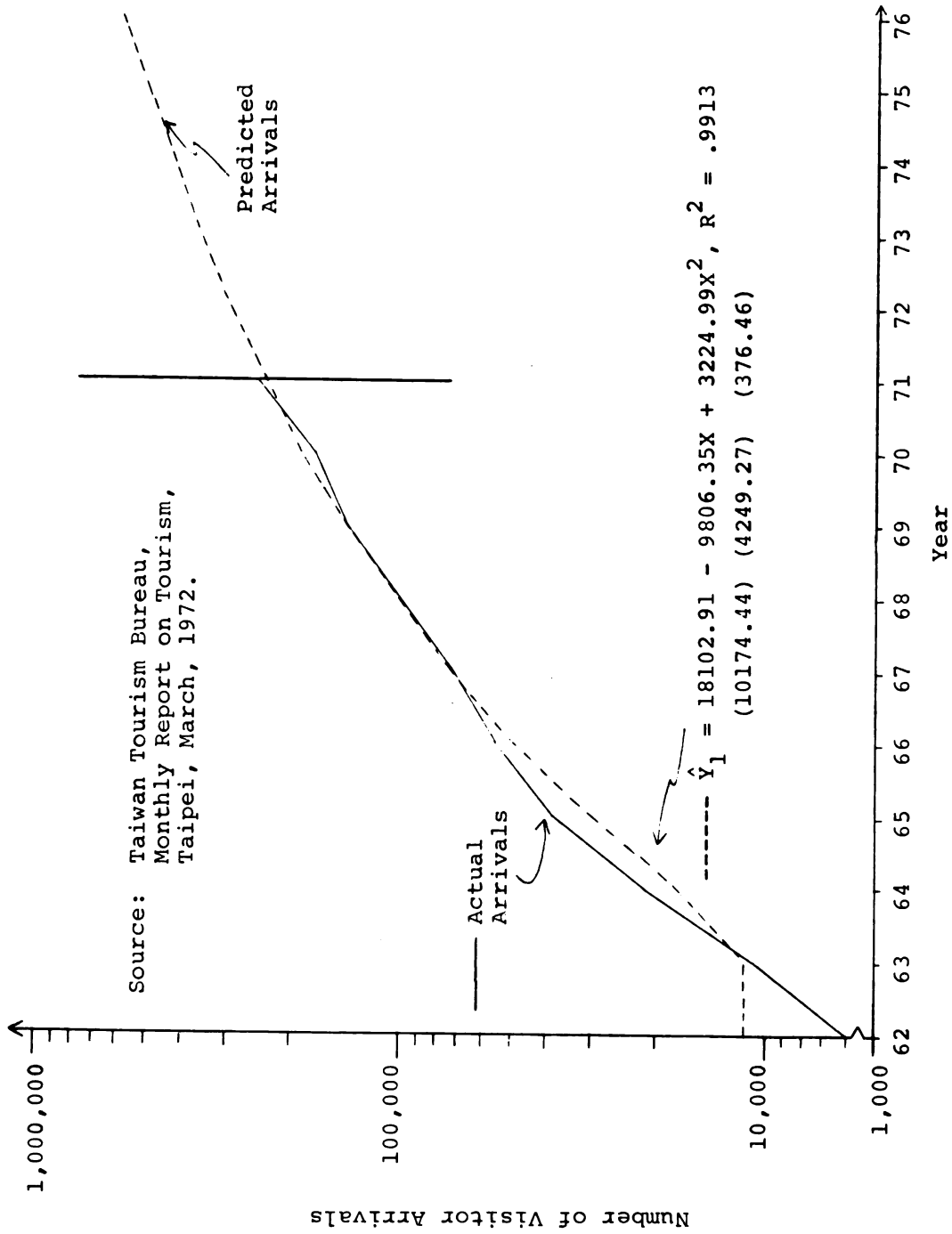


Figure 1.--Japanese Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

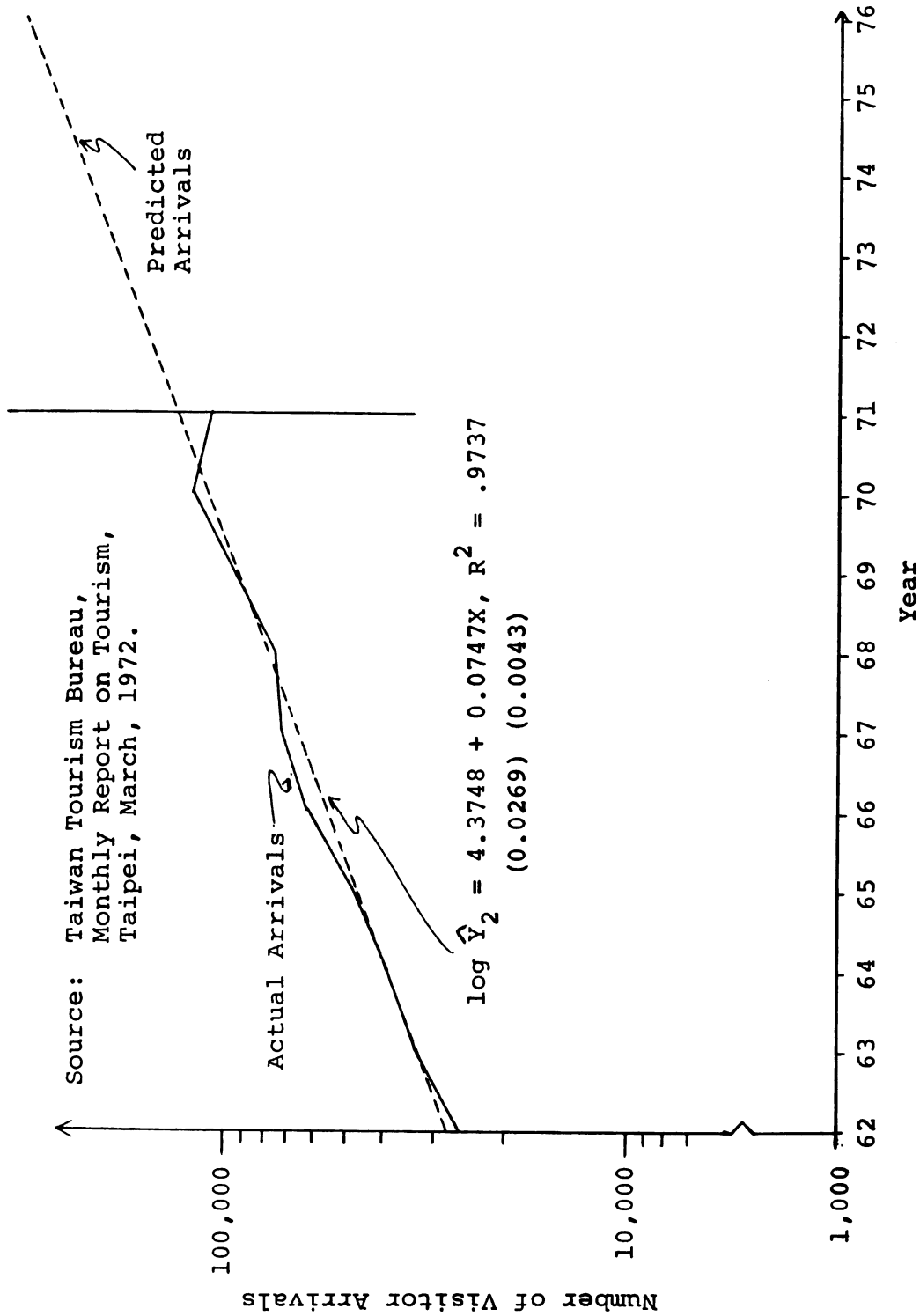


Figure 2.--United States Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

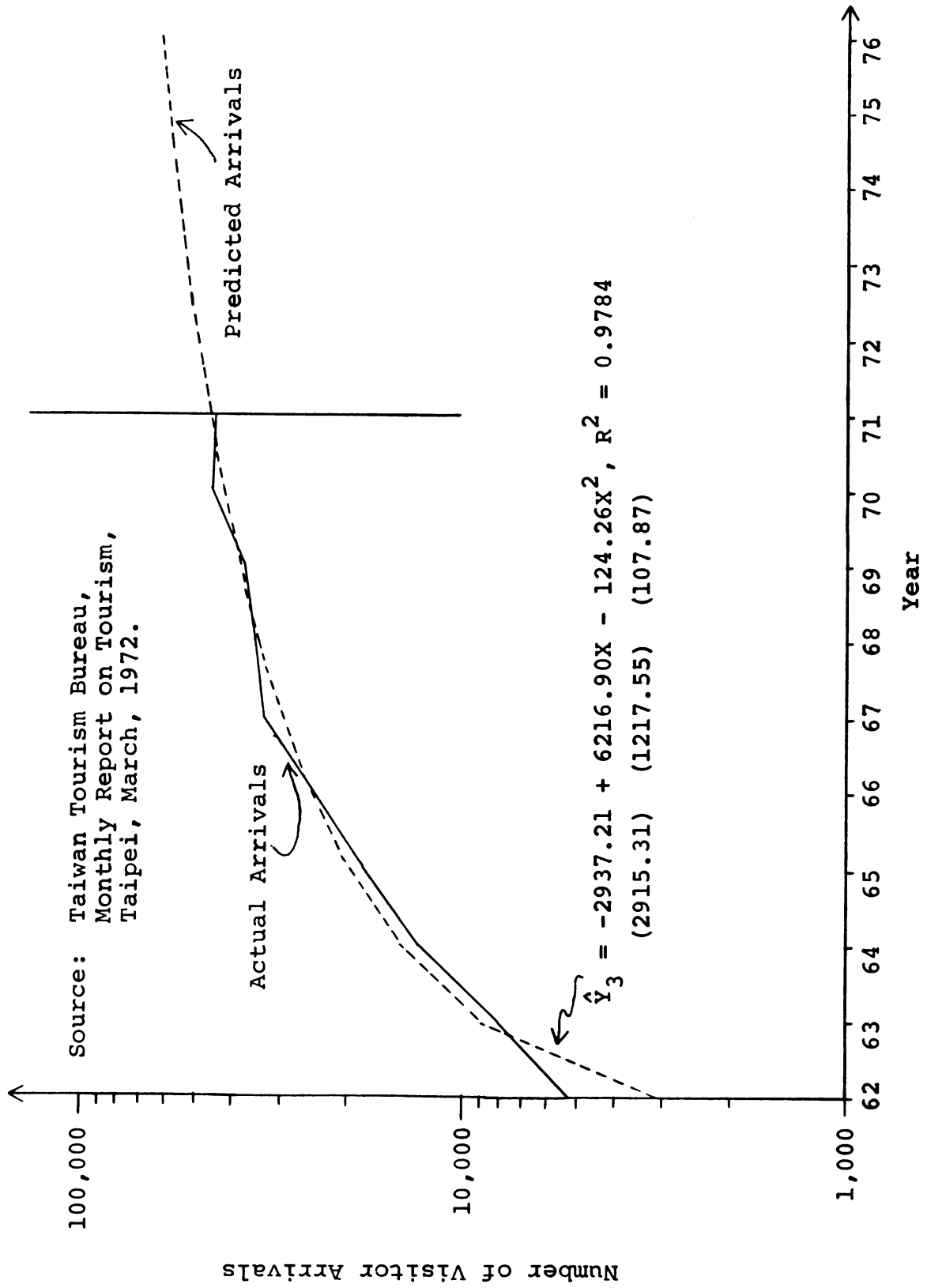


Figure 3.--Asian Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

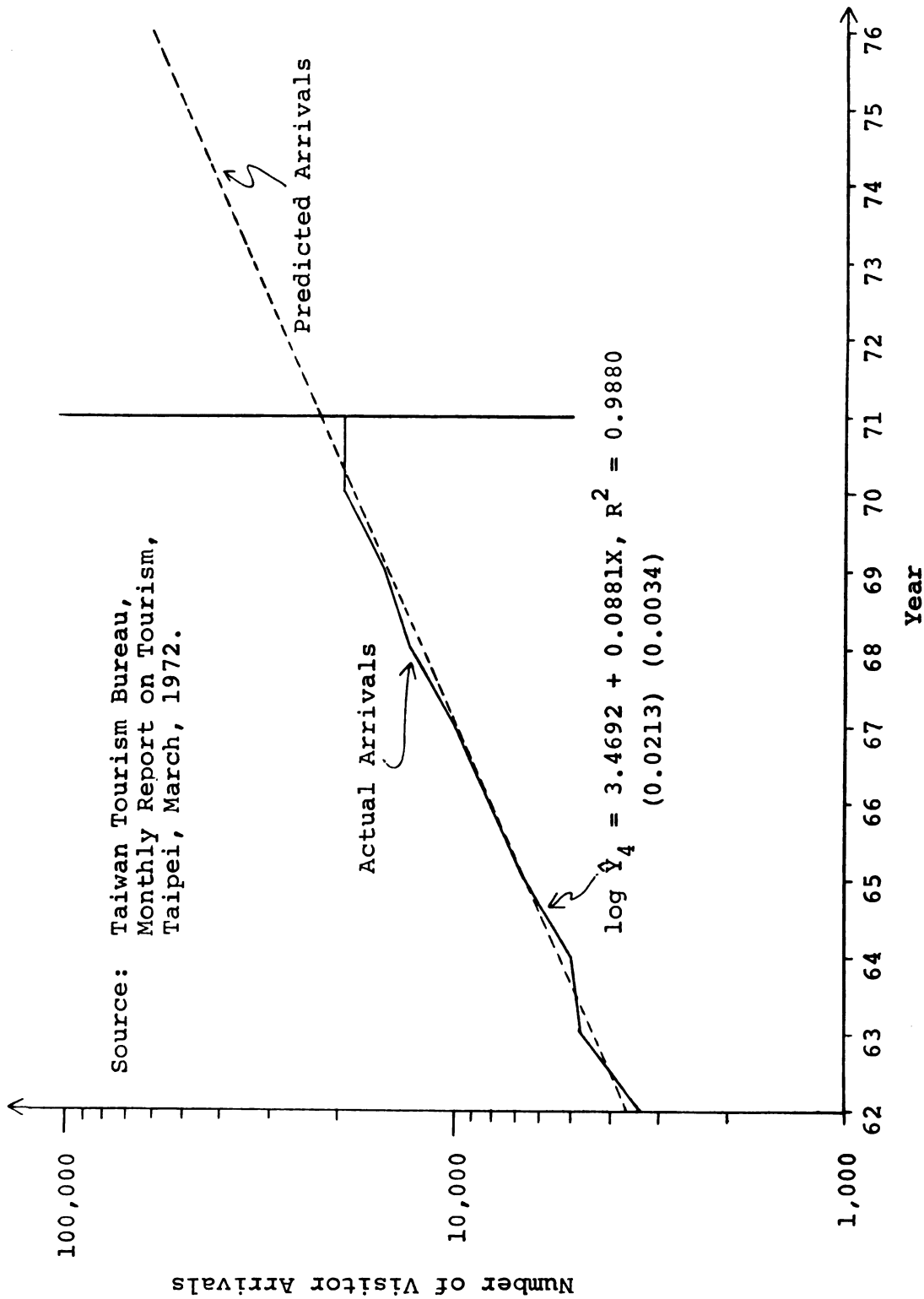


Figure 4.--European Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

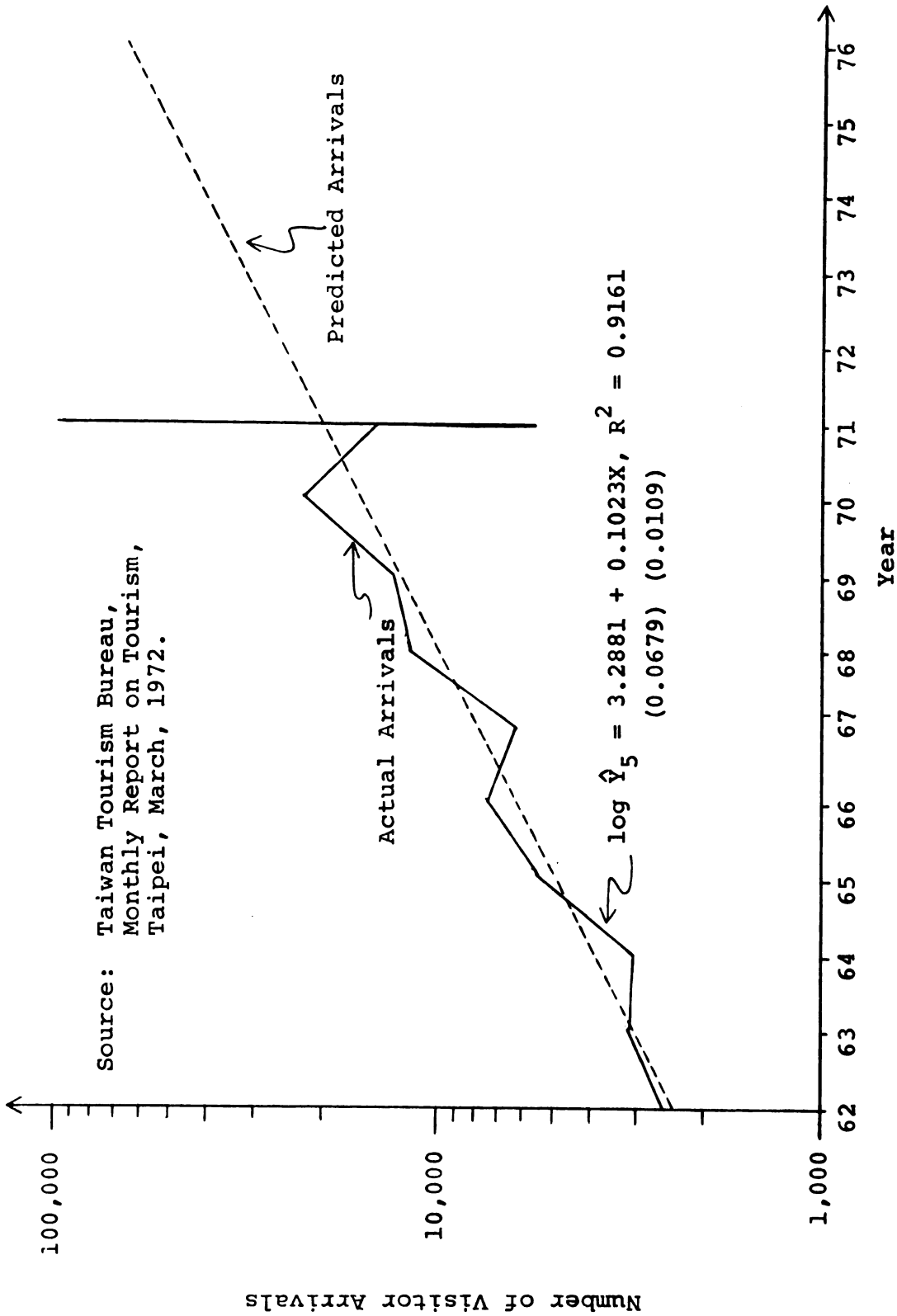


Figure 5.--Canadian, Australian and New Zealand Visitor Arrivals in Taiwan, Actual and Estimated to 1976.

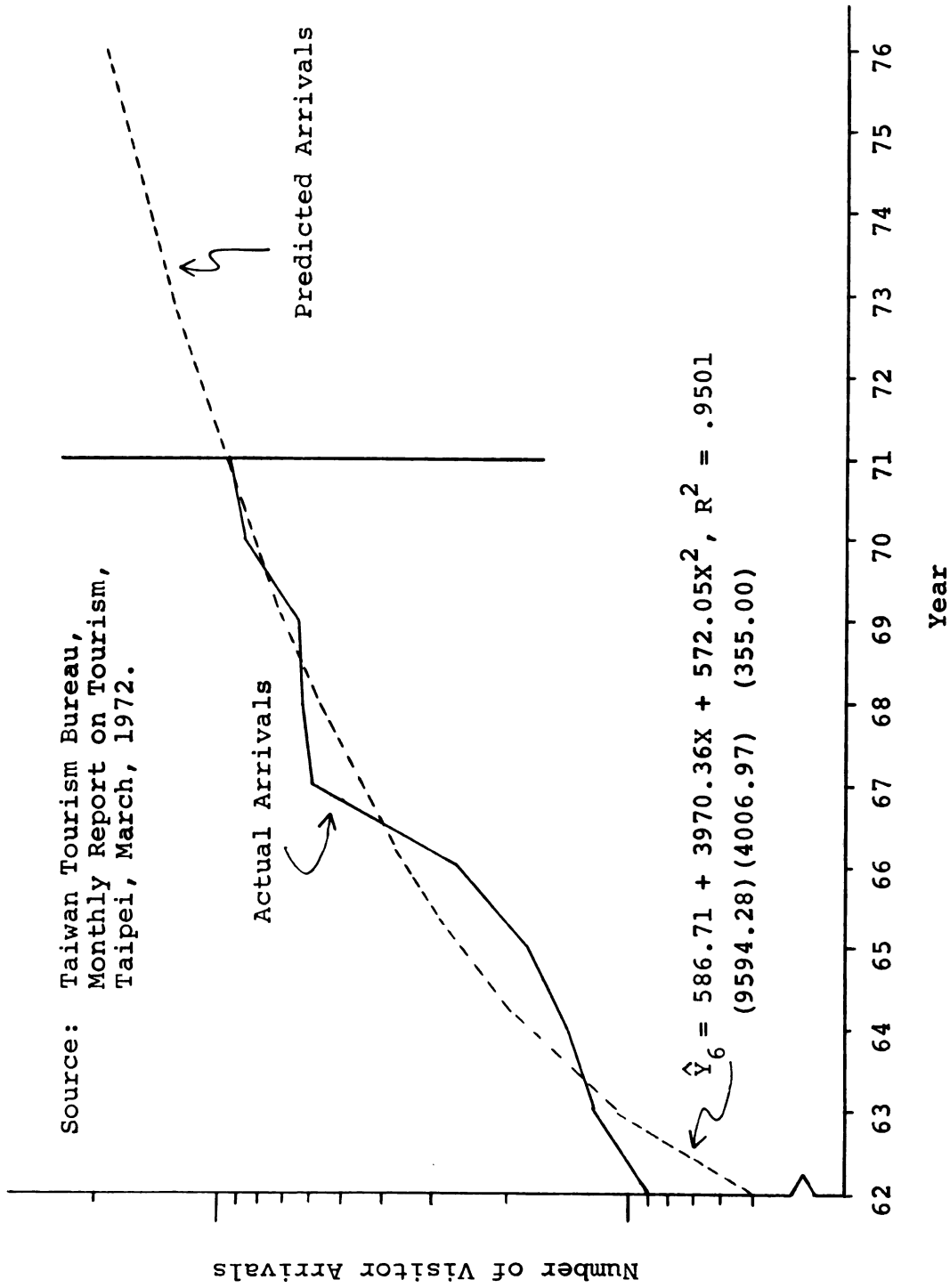


Figure 6.--All Other Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

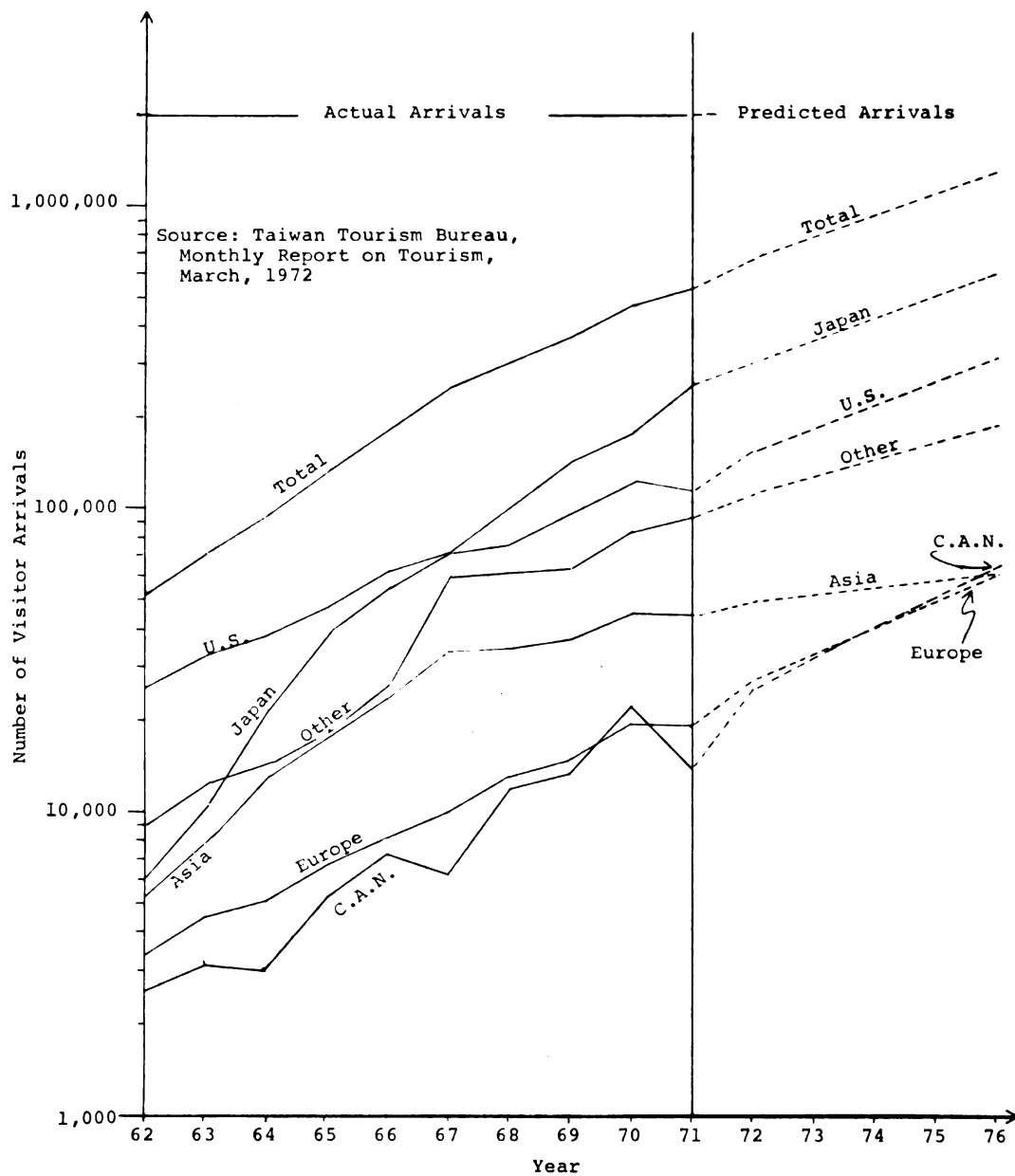


Figure 7.--Total Visitor Arrivals in Taiwan-Actual and Estimated to 1976.

Therefore, the prediction equations, the actual and estimated visitor arrivals from each market (Figures 1-6, also appendix 5-11) and the total arrivals⁶ (Table 2, Figure 7) follow.

Table 2. Visitor Arrivals in Taiwan: Actual and Forecast to 1976

Markets		Japan	U.S.	Asian	European
Year					
Actual*	1962	6,070	25,954	5,310	3,398
	1963	10,848	33,085	8,066	4,645
	1964	21,519	38,754	13,031	5,114
	1965	38,499	47,843	17,858	6,715
	1966	54,306	62,963	23,982	8,310
	1967	72,063	71,044	33,808	10,012
	1968	103,229	76,188	34,865	13,286
	1969	143,624	97,932	37,497	15,050
	1970	177,446	121,745	45,685	19,684
	1971	255,699	111,444	44,615	19,552
Forecast**	1972	300,457	157,299	50,412	27,467
	1973	364,826	186,828	53,772	33,648
	1974	435,644	221,900	56,882	41,219
	1975	512,913	263,556	59,744	50,494
	1976	596,631	313,032	62,357	61,856

⁶The predicted numbers of total visitor arrivals in Taiwan are the total of visitor arrivals from six sub-markets.

Table 2. (Continued)

Year	Markets	Canadian Australian N. Z.	Others	World Total
1962		2,602	8,970	52,304
1963		3,148	12,232	72,024
1964		3,077	13,986	95,481
1965		5,304	17,807	133,666
Actual* 1966		7,253	26,134	182,948
1967		6,351	59,970	253,248
1968		11,969	62,233	301,770
1969		13,471	63,899	371,473
1970		22,810	85,082	472,452
1971		14,279	94,166	539,755
Forecast** 1972		25,928	113,479	675,043
1973		32,817	130,607	802,498
1974		41,536	148,879	946,060
1975		52,573	168,294	1,107,574
1976		66,541	188,854	1,289,271

*Taiwan Tourism Bureau, Monthly Report on Tourism, Taipei, March, 1972.

**From Prediction Equations. Note that the predicted numbers of total visitor arrivals in Taiwan are the total of visitor arrivals from six sub-markets.

CHAPTER 4

ESTIMATION OF DEMAND AND SUPPLY OF HOTEL ROOMS IN TAIWAN

This chapter will estimate the demand and supply of hotel rooms in Taiwan, and make comparisons between demand and supply to see if there are excess or shortage of hotel rooms.

I. Estimation of Hotel Room Requirements

This section will estimate the hotel room requirements from the projections of visitor arrivals.

Planning future accommodation requirements on the basis of projections of tourist traffic is a difficult and hazardous task. There are many variables involved in estimating hotel room requirements from forecasts of future tourist trade.

The demand for hotel rooms depends essentially on the following factors:¹

- 1) Estimated number of visitors
- 2) The number of visitors requiring hotel accommodation

¹Michael Peters, International Tourism, (London: Hutchinson & Co., 1969), p. 165. Also see Loke Jame Wong, Demand and Supply of Hotel Rooms in Singapore (1970-1975), (Singapore Tourist Promotion Board, 1969), p. 17.

- 3) The length of their stay in hotels
- 4) Total number of nights spent in the country
- 5) The average number of hotel guests accommodated in an occupied room
- 6) Seasonal flow characteristics
- 7) Locations of the stay

To ensure that there are enough rooms to accommodate visitors the whole year round, it is necessary to calculate the minimum number of hotel rooms required for the maximum number of visitors who require hotel accommodations in any one day/night. A daily census of potential hotel guests is necessary, but this is too tedious a task. However, it is not unreasonable to expect that the maximum demand for hotels will occur during the peak period of visitor arrivals.

For Taiwan, there has been no marked seasonality of visitor arrivals. Still, during the period 1969-1971, arrivals in October averaged about 10% of total arrivals and were higher than the monthly average for the year (Table 3, Figure 8). It is noted that there were peaks within the peak period, however, it would probably be totally uneconomical to make completely adequate provision for exceptional peaks.² Hence, the average 10% expected visitor arrivals in October will be used to estimate the number of visitors requiring hotel accommodations.

²Peters, p. 166.

Hence, the formula used in calculating hotel room requirements for each market group of arrivals is:

$$H = N \times S \times Q \times L/P \times M \times R \quad - - - - \text{Formula 1}$$

Where:

H - the number of hotel rooms demanded

N - the total number of visitor arrivals from each market expected during the year (Table 2)

S - the percentage of visitors expected to arrive during the peak month of October, for reasons discussed previously, 10% is used in this study

Q - the percentage of visitors requiring hotel room accommodation. The data provided by Tourism Council of Taiwan (Table 4) are used in this study

M - the number of days in the month. October is the peak month, therefore, M is 31 in this case

L - the average length of stay per visitor, data provided by tourism council are used (Table 5)

Table 3. Seasonal Fluctuation of Visitor Arrivals in Taiwan, 1969-1971

Month Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1969	25,636	29,095	30,472	32,729	31,678	27,263	32,370
1970	31,631	34,368	37,194	43,987	44,762	39,139	42,379
1971	37,456	50,398	44,163	47,992	47,881	40,803	38,599

29

Month Year	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1969	28,444	26,753	43,105	37,477	26,451	371,473
1970	42,237	34,998	46,504	43,745	30,544	472,452
1971	48,352	34,627	60,554	48,389	40,541	539,755

Source: Taiwan Tourism Bureau, Monthly Report on Tourism, Taipei, January, 1972.

Source: Taiwan Tourism Bureau,
Monthly Report on Tourism,
Taipei, January 1972.

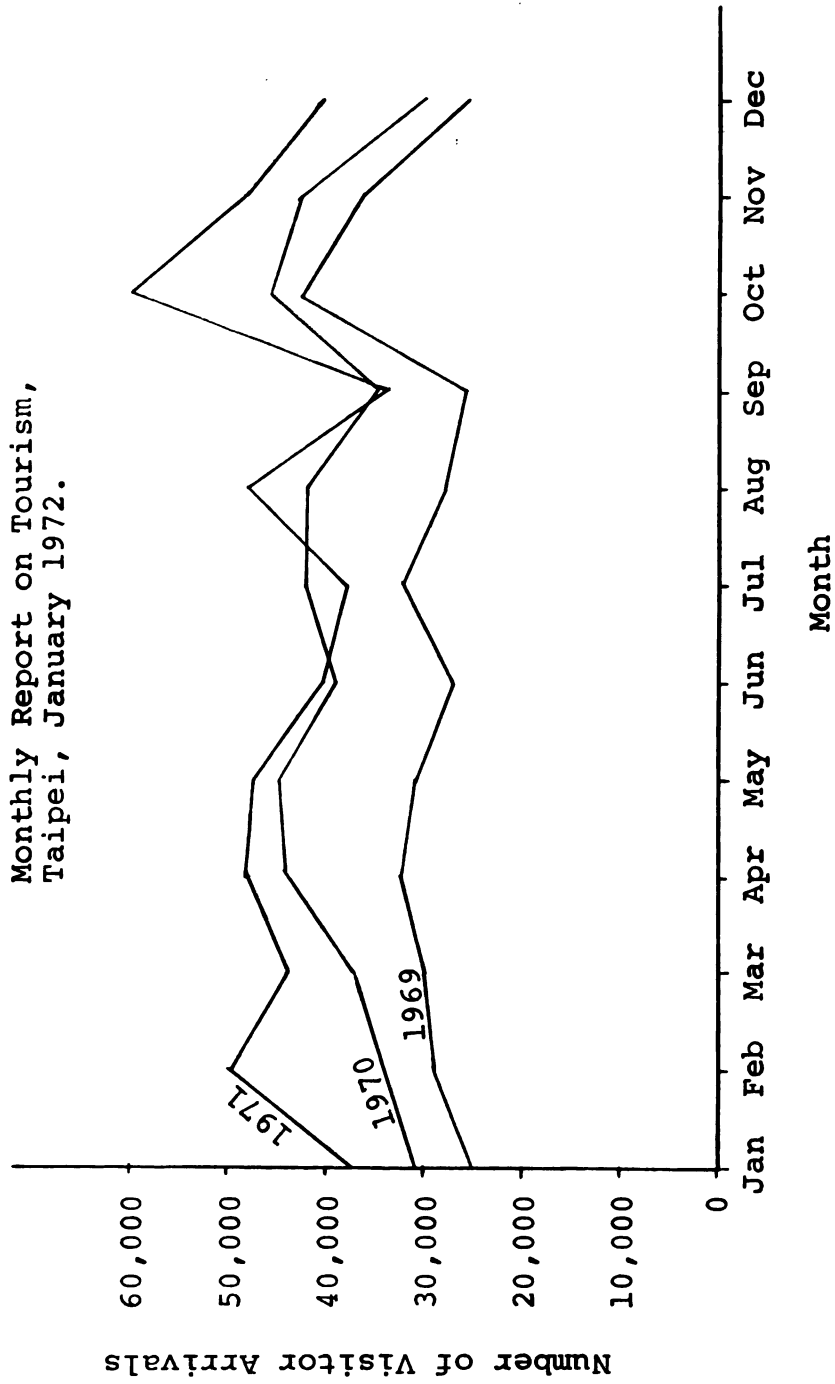


Figure 8.--Seasonal Fluctuations of Visitor Arrivals in Taiwan,
1969-1971.

Table 4. Hotel Requirements by Foreign Visitors in Taiwan, 1968

Market Groups*	% Yes**	% No***
Japan	96	4
U. S.	92	8
Asia (excluding Japan)	90	10
Europe	95	5
Canada, Australia & New Zealand	100	0
All Others	92	8

Source: Survey of Tourism in Taiwan, 1968, Tourism Council, Taiwan.

*Calculated into market groups as defined in this study.

**Including hotels and other paid accommodations

***Including on board ships, friends, relatives, etc.

Table 5. Average Length of Stay by Foreign Visitors in Taiwan, 1968

Market Groups*	Length of Stay (days)
Japan	4.93
U. S.	4.82
Asia	8.00
Europe	4.75
Canada, Australia & New Zealand	3.60
All Others	8.00

Source: Survey of Tourism in Taiwan, 1968, Tourism Council, Taiwan.

*Calculated into market groups as defined in this study.

These lengths of stay are expected to be shortened.³ Therefore, slight adjustment downward are made (Table 6).

Table 6. Estimated Length of Stay by Foreign Visitors in Taiwan, 1972-1976*

Market Groups	Length of Stay (days)
Japan	4.5
U. S.	4.5
Asia	7.5
Europe	4.5
Canada, Australia, New Zealand	3.5
All Others	7.5

*Derived from Table 5.

R - the number of persons per occupied room

Unfortunately, no survey of this type has been made. However, examining the visitor arrivals by party size (Table 7), grounds are found for estimation.

Assuming those who travel alone stay in one room alone, those who travel with a spouse are expected to stay in one room together. Family travel usually involves younger children, there might be more than two persons in one room. Group travel could contain singles, doubles, and

³L. J. Lickorish, "What Will be the Shape of Future Markets", International Travel and Tourism, (Washington, D. C.: Institute of Certified Travel Agents, 1967), p. 221.

families. Based on Table 7, approximately 60 to 70 rooms are needed for every 100 visitors. Therefore, R is assumed to be 1.5 for all markets.

Table 7. Foreign Visitor Arrivals in Taiwan by Party Size, 1968

Size	Alone	Spouse	Family	Group	Unreported
Percent	37.84	10.82	12.55	35.25	3.54

Source: Annual Report on Tourism Statistics, 1968,
Tourism Council, Taiwan.

P = the occupancy rate for the month. The room requirements at the occupancy rate of 70 percent are calculated.⁴

Values for N, Q, L, S, M, R and P are summarized in Table 8. Applying these values into Formula 1, the estimated demand for hotel rooms by foreign visitors are obtained (Table 9).

⁴According to: Survey of Hotels in Taiwan, Breakeven occupancy rate for average hotels is 55%, and a 70% occupancy rate will bring reasonable profit to hotels.

Table 8. Summary of N.Q.L.S.M.R.P. Values for Predictions of Visitor Arrivals in Taiwan, 1972-1976

Markets	Japan		U.S.		Asia		Europe		C.A. & N.Z.		All Others							
	N*	(000)	Q	L	N	(000)	Q	L	N	(000)	Q	L	N	(000)	Q	L		
Year	(000)	Q	L	(000)	Q	L	(000)	Q	L	(000)	Q	L	(000)	Q	L	(000)	Q	L
1972	300	.96	4.5	157	.92	4.5	50	.90	7.5	27	.95	4.5	26	1	3.5	113	.92	7.5
1973	365	.96	4.5	187	.92	4.5	54	.90	7.5	34	.95	4.5	33	1	3.5	131	.92	7.5
1974	436	.96	4.5	222	.92	4.5	57	.90	7.5	41	.95	4.5	42	1	3.5	149	.92	7.5
1975	513	.96	4.5	264	.92	4.5	60	.90	7.5	50	.95	4.5	53	1	3.5	168	.92	7.5
1976	597	.96	4.5	313	.92	4.5	62	.90	7.5	62	.95	4.5	67	1	3.5	189	.92	7.5
All Markets																		
1972-76																		
S = .10																		
M = 31																		
R = 1.5																		
P = .7																		

*Values for N's are rounded off to the nearest thousand.

Table 9. Estimated Demand for Hotel Rooms by Foreign Visitors in Taiwan,
1972-1976, Allowing Occupancy Rate of 70 Percent

Markets Year	Japan	U. S.	Asia	Europe	C. A. & N. Z.	All Others	Total
1972	3981	1995	1037	355	280	2394	10,042
1973	4844	2377	1119	446	355	2776	11,917
1974	5786	2822	1181	538	452	3157	13,936
1975	6808	3355	1244	656	570	3560	16,193
1976	7922	3978	1285	814	720	4005	18,724

*Derived from applying data in Table 8 into Formula 1.

By examining occupancy rates by regions⁵ (Table 10), occupancy rates by class⁶ (Table 11), and the length of stay and tourist regions visited by foreign visitors (Table 12), it is obvious to see that International Tourist Hotels located at Taipei region were more in demand. These

Table 10. Average Hotel Occupancy rate in Taiwan by Tourist Regions, 1968-1970

Year	Taipei	Central	Southern
1968	79.85	64	53
1969	72.57	60	58
1970	86.06	55	49

Source: Taiwan Tourism Council, Survey of Hotels in Taiwan, 1971.

Note: Data for Eastern Region not available.

⁵For purpose of this study, the island of Taiwan is divided into four tourist regions, namely, Taipei (Northern), Central, Southern and Eastern Regions. (See Appendix 4).

⁶There is no official classification of hotels in Taiwan. However, according to: Questions and Answers About the Tourist Hotel Construction of the Republic of China, International Tourist Hotels have a minimum of 40 rooms, (Usually they have 200 rooms or more.) Room rate averages about US\$18.00 per person per night. Tourist Hotels have a minimum of 20 rooms. Room rate ranges about \$8-15 per person per night.

trends are expected to continue as the Charter Inclusive Tours develop and the length of stay shortens.⁷ These group tours usually prefer to stay in large International Tourist Hotels.⁸

Unfortunately, no data on the locations of visitor stay is available, therefore, regional breakdown of demand for hotel rooms is not possible.

Table 11. Average Occupancy Rate by Class of Hotels in Taiwan, 1968-1970

Year	International Tourist Hotels	Tourist Hotels
1968	74.73	56.29
1969	73.40	54.02
1970	76.40	57.99

Source: Taiwan Tourism Council, Survey of Hotels in Taiwan, February, 1971.

⁷Taiwan Tourism Bureau, Survey of Hotels in Taiwan, (Taipei, 1971), p. 29.

⁸Ibid. p. 29.

Table 12. Length of Stay by Foreign Visitors in Taiwan and Regions Visited, May-September, 1968

Length of Stay in Country (days)	Percent Visitors Visited Taipei Region	Percent Visitors Visited Central Region	Percent Visitors Visited Southern Region	Percent Visitors Visited Eastern Region
1	94.20	1.45	0.72	0
2	93.63	2.25	4.12	0.75
3	93.33	4.44	17.78	7.14
4	96.15	2.56	19.23	3.85
5 - 6	100.00	4.88	30.49	13.41
7 - 9	89.61	5.19	32.47	24.68
10 - 15	98.21	7.14	33.93	14.29
16 - 30	100.00	20.00	56.00	30.00

Source: Taiwan Tourism Council, Survey of Tourism in Taiwan, 1968, Taipei, 1969.

II. Supply of Hotel Rooms

This section will estimate the supply of hotel rooms in Taiwan.

As of January 1, 1972, there were 120 licensed hotels with a total of 11,523 rooms in operation, among which 74 hotels with 7862 rooms were located in the Taipei region (Table 13).

Table 13. Supply of Hotel Rooms in Taiwan, As Of January 1, 1972

Regions	International Tourist Hotels		Tourist Hotels		Total	
	Hotels	Rooms	Hotels	Rooms	Hotels	Rooms
Taipei	10	3152	64	4710	74	7862
Central	2	119	16	1074	18	1193
Southern	4	697	20	1562	24	2259
Eastern	1	87	3	122	4	209
Total	17	4055	103	7468	120	11,523

Source: 1. Monthly Report on Tourism, January 25, 1972, Tourism Bureau, Taiwan.
2. Monthly Bulletin, May 1, 1971, Taiwan Visitor Association, Taiwan.

In addition, four new hotels have been approved for development and four other hotels (existing) are being extended.⁹

⁹Taiwan Tourism Bureau, Monthly Report on Tourism, January 25, 1972, Taipei.

By the end of 1972, there will be 122 hotels with 12,499 rooms in operation (Table 14). By the end of 1973, 124 hotels with 14,549 rooms will be available (Table 15). Estimated supply of hotel rooms for the period 1972-1976 are summarized in Table 16.

Table 14. Estimated Supply of Hotel Rooms in Taiwan, 1973

Regions	International Tourist Hotels		Tourist Hotels		Total	
	Hotels	Rooms	Hotels	Rooms	Hotels	Rooms
Taipei	12	4128	64	4710	76	8838
Central	2	119	16	1074	18	1193
Southern	4	697	20	1562	24	2259
Eastern	1	87	3	122	4	209
Total	19	5031	103	7468	122	12499

Source: See Table 13.

Table 15. Estimated Supply of Hotel Rooms in Taiwan, 1974

Regions	International Tourist Hotels		Tourist Hotels		Total	
	Hotels	Rooms	Hotels	Rooms	Hotels	Rooms
Taipei	14	6178	64	4710	78	10888
Central	2	119	16	1074	18	1193
Southern	4	697	20	1562	24	2259
Eastern	1	87	3	122	4	209
Total	21	7081	103	7468	124	14549

Source: See Table 13.

Table 16. Estimated Supply of Hotel Rooms in Taiwan,
1972-1976*

Year	Number of Hotels	Number of Rooms
1972	120	11,523
1973	122	12,499
1974	124	14,549
1975	124	14,549
1976	124	14,549

Source: Table 13, 14, 15.

*Assuming no more construction after 1974.

III. Comparison Between Demand and Supply

This section will compare the estimated demand and supply of hotel rooms in Taiwan to see if there are shortages or excesses of supply.

From the estimates made in Sections I and II of this Chapter (Table 9 and Table 16), there appears to be an oversupply of hotel rooms in 1972. This excess supply may be reduced by an increase in demand in 1973 and 1974. New constructions or expansions appear to be needed after 1974. The analysis suggests an additional 1600 and 4200 rooms will be needed for the years 1975 and 1976, respectively (Table 17).

The possible oversupply of about 600 rooms in the years 1973 and 1974 may be eliminated by increasing occupancy

rate by 3%. This may be achieved through additional international promotions and marketing aiming at bringing conferences, seminars and meetings of various nature in Taiwan.

The estimated shortage of 1600 rooms in the year 1975 suggests an additional three 500-room or eight 200-room hotels might be needed in the year 1975. The possible shortage of 4200 rooms in the year 1976 suggests that additional eight 500-room or twenty-one 200-room hotels might be needed in the year 1976 if the assumptions hold.

Table 17. Estimated Excesses/Shortages of Hotel Rooms in Taiwan, 1972-1976*

Year	Supply	Demand	Excess(+)/Shortage(-)
1972	11523	10042	+1481
1973	12499	11917	+ 582
1974	14549	13936	+ 613
1975	14549	16193	-1644
1976	14549	18724	-4172

*Derived from Table 9 and Table 16.

CHAPTER 5

SUMMARY AND CONCLUSIONS

The demand for tourism is quite elastic, and the supply of tourist facilities is somewhat inelastic. This difference in the nature of demand and supply in the tourist industry will always be one of its crucial problems. Therefore, forecast of tourist demand should help improve decision making. Decisions have to be taken now about hotel constructions costing millions of dollars which will not be usable for some years ahead.

This study attempts to estimate future demand and supply of hotel rooms in Taiwan to provide knowledge for policy making so as to obviate over- or under-construction of hotel rooms.

Taiwan's geographical location is one of its major assets. Taiwan lies in the direct line between Japan and Hong Kong, Asia's most active tourist playground. Taiwan presently has an improving internal transportation structure consisting of domestic air travel, railways and highways. Taiwan offers a multitude of attractions and activities for visitors of many diversified interests.

In order to estimate the demand for hotel rooms, it is necessary first to project the visitor arrivals. There are a number of techniques to make this projection, such as: 1) Gravitation Model, 2) Computer Systems Simulation, 3) Correlation and Regression Analysis, and 4) Time Series Analysis -- Secular Trend. The secular trend analysis is used in this study because of its simplicity, objectivity and the limitation of data which makes other techniques not applicable.

In order to make projections more accurate, improved techniques are needed. The computer systems simulation seems to be most promising. Once the model is set up, each year's visitor arrivals from each market can be easily estimated. However, this model requires a large amount of specific data -- through collections of visitor entry/exit data and a variety of detailed surveys. Therefore, research of this type should be carried out by government or other large organizations.

The projections show that the total visitor arrivals in Taiwan may reach 1.3 million in 1976. By then, Japanese might form the bulk of the arrivals -- 46%.

Based on the estimates of demand and supply of hotel rooms in Taiwan, there appears to be an oversupply of hotel rooms in 1972. This excess supply may be reduced by an increase in demand in 1973 and 1974.

The possible oversupply of about 600 rooms in the years 1973 and 1974 may be eliminated by increasing occupancy

rate by 3%. This may be achieved through additional international promotions and marketing aiming at bringing conferences, seminars and meetings of various nature in Taiwan.

The estimated shortage of 1600 rooms in the year 1975 suggests that additional three 500-room or eight 200-room hotels might be needed in the year 1975. The possible shortage of 4200 rooms in the year 1976 suggests an additional eight 500-room or twenty-one 200-room hotels might be needed in the year 1976 if the assumptions hold.

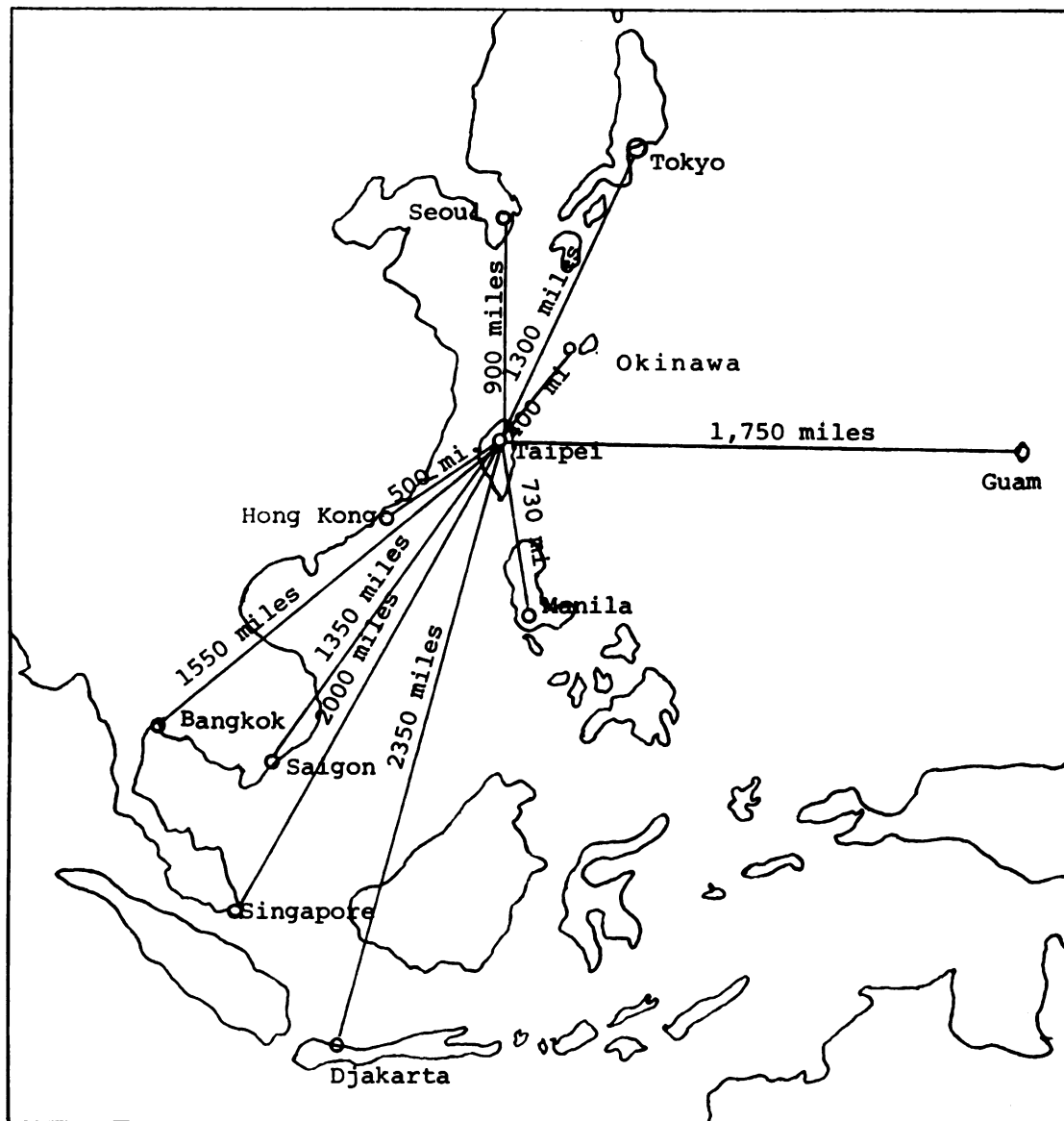
Unfortunately, no survey of visitor locations of regional stay is available. Therefore, regional demand for hotel rooms can not be reasonably estimated. The high occupancy rates for Taipei region and high occupancy rates for International Tourist Hotels suggest that International Tourist Hotels in Taipei region were more in demand.

Large group tours are indicated as the trend for the future; these large groups usually prefer to stay in large International Tourist Hotels. As the length of stay shortens, these visitor regional stays might even center more in the Taipei region. All these points suggest that International Tourist Hotels in the Taipei region may be more in demand in the future.

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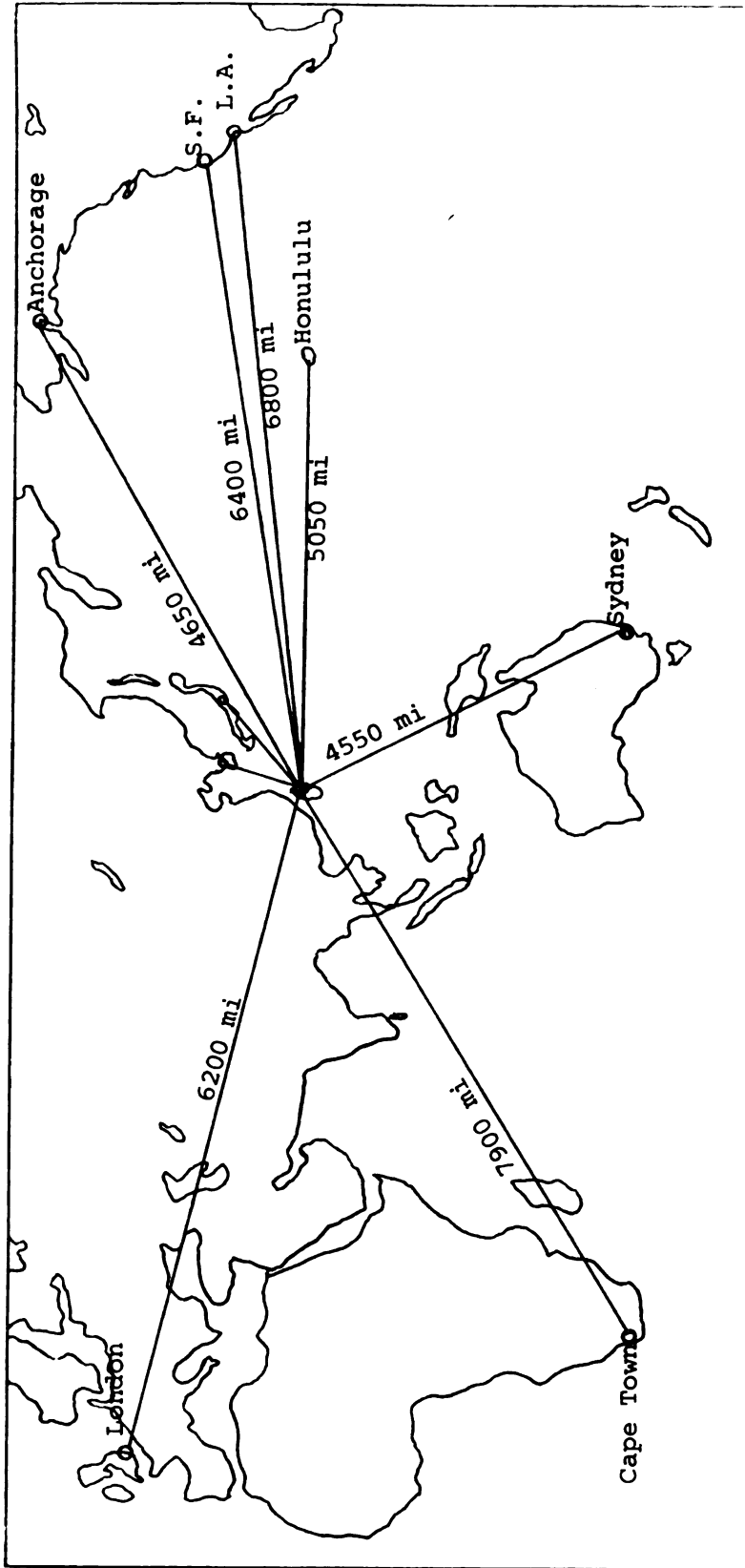
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APPENDIX



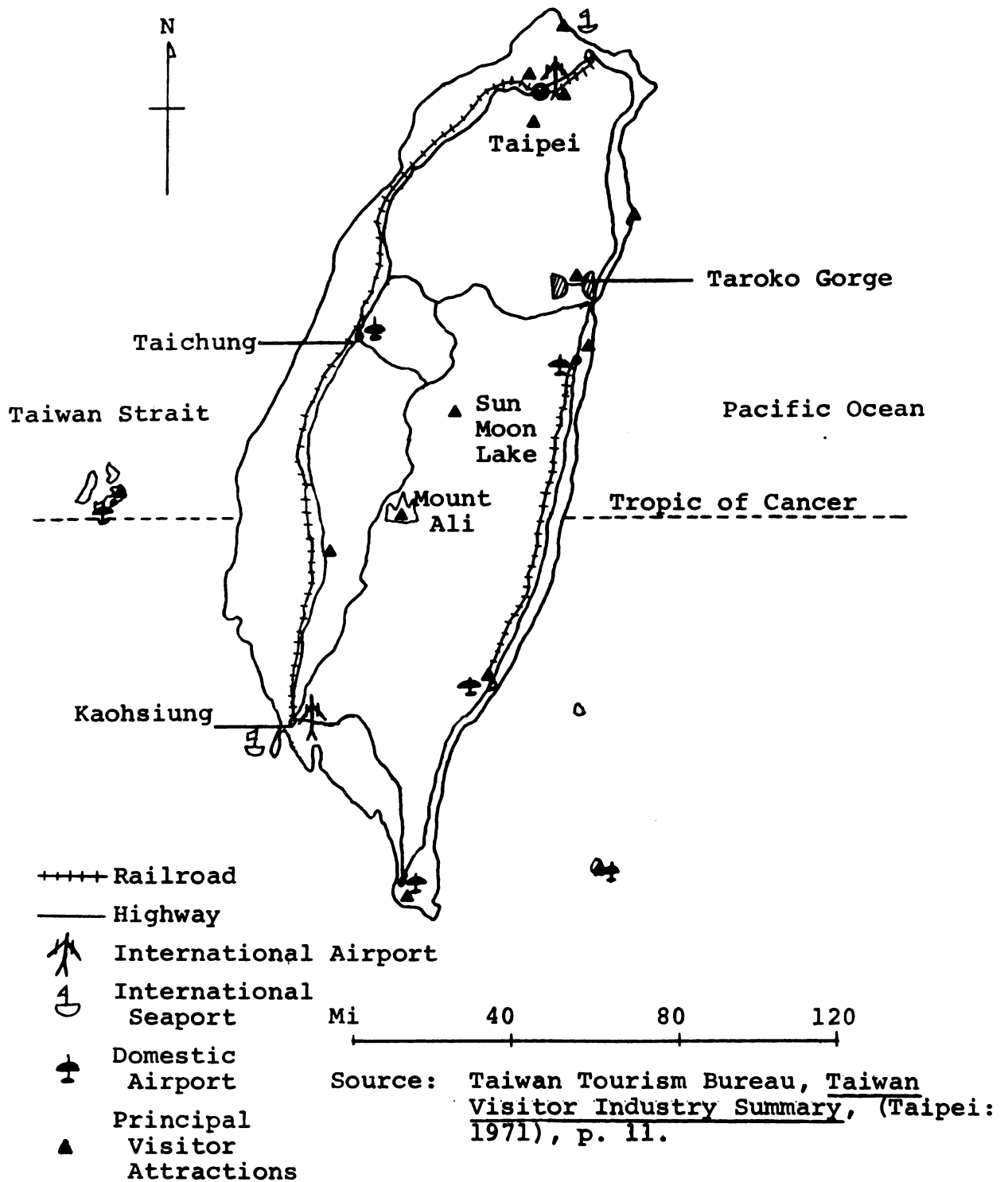
Source: Taiwan Tourism Bureau, Taiwan Visitor Industry Summary, (Taipei: 1971) p. 9.

Appendix 1.--Taiwan's Geographical Relationship (1).

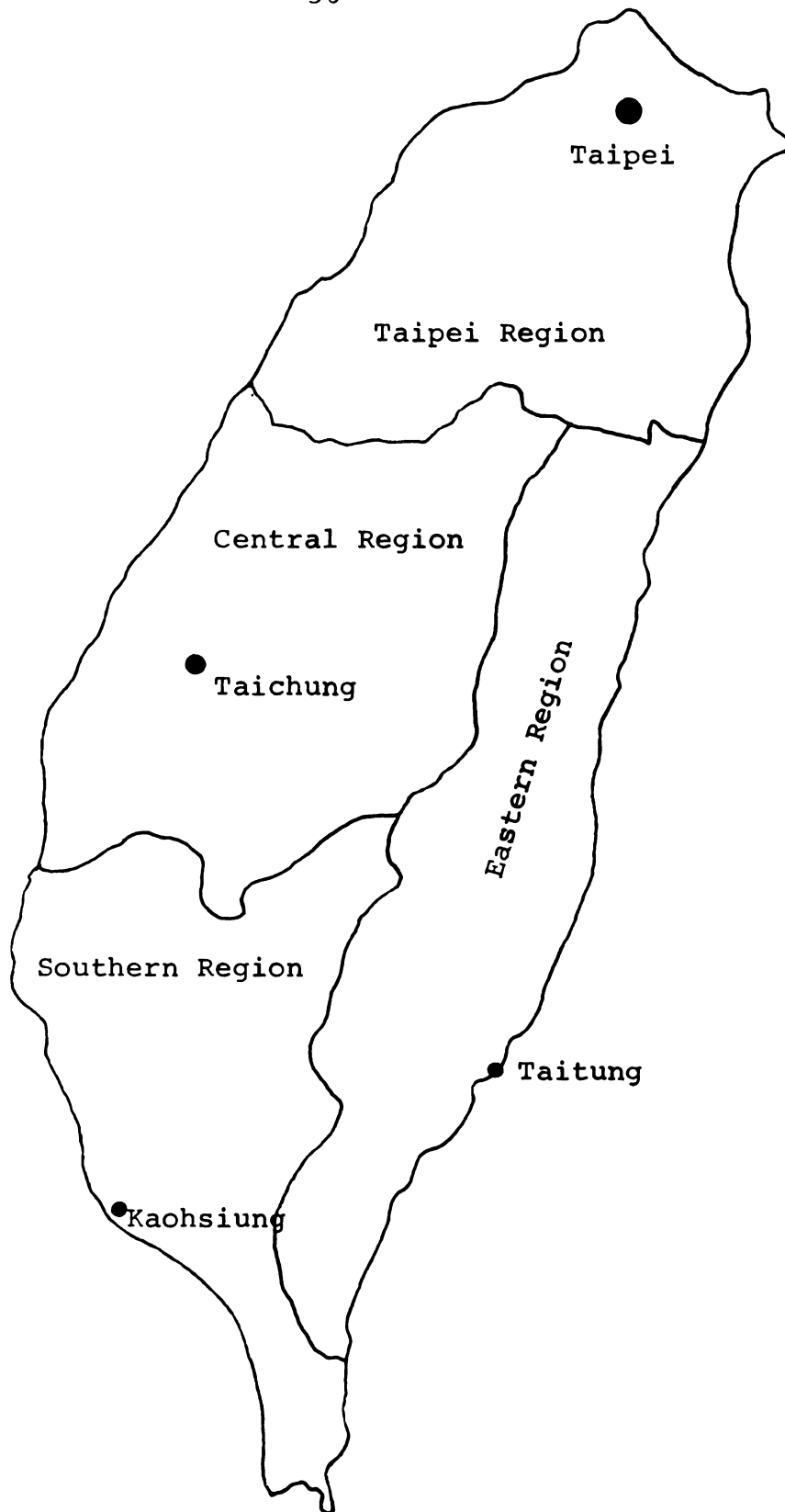


Source: Taiwan Tourism Bureau, Taiwan Visitor Industry Summary, (Taipei: 1971) p.9.

Appendix 2.--Taiwan's Geographical Relationship (2).



Appendix 3.--Taiwan's Principal Travel Corridors and Visitor Attractions.



Appendix 4.--Map of Taiwan by Tourist Regions.

Appendix 5. Prediction Equations for Visitor Arrivals in Taiwan from Six Sub-Markets, 1972-1976*

Japan: $\hat{Y}_1 = 18102.91 - 9806.35X + 3224.99X^2, R^2 = .9913$
 (10174.44) (4249.27) (376.46)

U.S.: $\log \hat{Y}_2 = 4.3748 + 0.0747X, R^2 = .9737$
 (0.0269) (0.0043)

Asia: $\hat{Y}_3 = -2937.21 + 6216.90X - 124.26X^2, R^2 = .9784$
 (2915.31) (1217.55) (107.87)

Europe: $\log \hat{Y}_4 = 3.4692 + 0.0881X, R^2 = .9980$
 (0.0213) (0.0034)

Canada, Australia and New Zealand:

$\log \hat{Y}_5 = 3.2881 + 0.1023X, R^2 = .9161$
 (0.0679) (0.0109)

All Others: $\hat{Y}_6 = 586.71 + 3970.36X + 572.05X^2, R^2 = .9501$
 (9594.28) (4006.97) (355.00)

*Result of Computer Run

Source: Taiwan Tourism Bureau, R.O.C.

Appendix 6. Japanese Visitor Arrivals in Taiwan, Actual and Estimated to 1976

Year	X Time	Y_1^* No. of Visitors	$\hat{Y}_1^{**}$ Estimated No. of Visitors
1962	1	6,070	11,521
1963	2	10,848	11,390
1964	3	21,519	17,708
1965	4	38,499	30,477
1966	5	54,306	49,696
1967	6	72,063	75,364
1968	7	103,229	107,483
1969	8	143,624	146,051
1970	9	177,446	191,070
1971	10	255,699	242,538
1972	11	-	300,457
1973	12	-	364,826
1974	13	-	435,644
1975	14	-	512,913
1976	15	-	596,631

*Source: Taiwan Tourism Bureau, R.O.C.

$$^{**}\hat{Y}_1 = \begin{matrix} 18102.91 \\ (10174.44) \end{matrix} - \begin{matrix} 9806.35X \\ (4249.27) \end{matrix} + \begin{matrix} 3224.99X^2 \\ (376.46) \end{matrix}, R^2 = 0.9913$$

Appendix 7. U.S. Visitor Arrivals in Taiwan, Actual
and Estimated to 1976

Year	X Time	Y ₂ No. of Visitors*	$\hat{Y}_2$ Estimated No. of Visitors**
1962	1	25,954	28,155
1963	2	33,085	33,441
1964	3	38,754	39,719
1965	4	47,843	47,175
1966	5	62,963	56,031
1967	6	71,044	66,550
1968	7	76,188	79,043
1969	8	97,932	93,881
1970	9	121,745	111,505
1971	10	111,444	132,437
1972	11	-	157,299
1973	12	-	186,828
1974	13	-	221,900
1975	14	-	263,556
1976	15	-	313,032

*Source: Taiwan Tourism Bureau, R.O.C.

$$**\log \hat{Y}_2 = 4.3748 + 0.0747X, R^2 = 0.9737$$

(0.0269) (0.0043)

Appendix 8. Asian Visitor Arrivals in Taiwan, Actual and Estimated to 1976

Year	X Time	Y ₃ No. of Visitors*	$\hat{Y}_3$ Estimated No. of Visitors**
1962	1	5,310	3,155
1963	2	8,066	8,999
1964	3	13,031	14,595
1965	4	17,858	19,942
1966	5	23,982	25,040
1967	6	33,808	29,890
1968	7	34,865	34,492
1969	8	37,497	38,845
1970	9	45,685	42,949
1971	10	45,615	46,805
1972	11	-	50,413
1973	12	-	53,772
1974	13	-	56,882
1975	14	-	59,744
1976	15	-	62,357

*Source: Taiwan Tourism Bureau, R.O.C.

$$**\hat{Y}_3 = \frac{-2937.21}{(2915.31)} + \frac{6216.90X}{(1217.55)} - \frac{124.26X^2}{(107.87)}, R^2 = .9784$$

Appendix 9. European Visitor Arrivals in Taiwan, Actual and Estimated to 1976

Year	X Time	Y_4 No. of Visitors*	$\hat{Y}_4$ Estimated No. of Visitors**
1962	1	3,398	3,609
1963	2	4,645	4,421
1964	3	5,114	5,416
1965	4	6,715	6,634
1966	5	8,310	8,127
1967	6	10,012	9,956
1968	7	13,286	12,196
1969	8	15,050	14,941
1970	9	19,684	18,303
1971	10	19,552	22,422
1972	11	-	27,467
1973	12	-	33,648
1974	13	-	41,219
1975	14	-	50,494
1976	15	-	61,856

*Source: Taiwan Tourism Bureau, R.O.C.

$$**\log \hat{Y}_4 = 3.4692 + 0.0881X, R^2 = 0.9880$$

(0.0213) (0.0034)

Appendix 10. Canadian, Australian and New Zealand Visitor Arrivals in Taiwan, Actual and Estimated to 1976

Year	X Time	Y_5 No. of Visitors*	$\hat{Y}_5$ Estimated No. of Visitors
1962	1	2,602	2,457
1963	2	3,148	3,110
1964	3	3,077	3,936
1965	4	5,304	4,982
1966	5	7,253	6,306
1967	6	6,351	7,982
1968	7	11,969	10,103
1969	8	13,471	12,787
1970	9	22,810	16,185
1971	10	14,279	20,485
1972	11	-	25,928
1973	12	-	32,817
1974	13	-	41,536
1975	14	-	52,573
1976	15	-	66,541

*Source: Taiwan Tourism Bureau, R.O.C.

$$**\log \hat{Y}_5 = 3.2881 + 0.1023X, R^2 = 0.9161$$

(0.0679) (0.0109)

Appendix 11. All Other Visitor Arrivals in Taiwan,
Actual and Estimated to 1976

Year	X Time	Y ₆ No. of Visitors*	$\hat{Y}_6$ Estimated No. of Visitors**
1962	1	8,970	5,129
1963	2	12,232	10,815
1964	3	13,986	17,646
1965	4	17,807	25,621
1966	5	26,134	34,739
1967	6	59,970	45,002
1968	7	62,233	56,410
1969	8	63,899	68,961
1970	9	85,082	82,656
1971	10	94,166	97,496
1972	11	-	113,479
1973	12	-	130,607
1974	13	-	148,879
1975	14	-	168,294
1976	15	-	188,854

*Source: Taiwan Tourism Bureau, R.O.C.

$$**\hat{Y}_6 = 586.71 + 3970.36X + 572.05X^2, R^2 = 0.9501$$

(9594.28) (4006.97) (355.00)

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