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A Study of Post-Disaster Tourist Behavior and Effective Marketing Strategies: The Case of September 21st Earthquake

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摘 要

觀光業是極易受外在負面因素影響之事業，例如：天然災害、戰爭、恐怖攻擊、流行疾病等。然而，現行觀光旅遊管理文獻中，就災難事故後影響旅客旅遊行為所做的研究，與其在旅遊人數上可能改變的情形，以及相關單位在行銷策略上應如何加以因應的深入研究，仍顯不足。因此，本研究之研究目的，以二十世紀台灣最大之天然災害 -- 九二一大地震為例，透過時間數列 SARIMA 模型，研究地震一年後，整體來華旅客人數的增減趨勢，以之查驗災後旅客真實旅遊行為的變化，並根據研究發現以及在九二一大地震衝擊下，台灣政府和觀光業者所迅速採取之因應措施，建立一災後行銷模型。本研究所建構的行銷策略架構，可作為爾後遭遇重大事件有關當局在恢復自身旅遊市場，以及研擬行銷策略時之參考。

【關鍵字】觀光業、旅遊行為、時間數列、行銷策略

Abstract

The tourism industry is highly susceptible to negative situations such as natural disasters, wars, terrorist attacks and epidemics. However, studies on tourist behavior relating to the impact of disastrous events or marketing practices in response to serious consequences are still an area that has remained largely neglected and unexamined. The purpose of this study is to assess how international tourists have been affected by the September 21st Earthquake in 1999, the most serious natural disaster in Taiwan of the 20th century. This research establishes one SARIMA

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model through time series for Taiwan's inbound demand to predict the volume of visitor arrivals after the quake. Furthermore, one tourism recovery model for marketing strategies was built to cope with the consequences of a natural disaster in Taiwan, with the experiences from the September 21st Earthquake and the findings of this study as a basis. As well, it serves as a reference for tourism destinations hoping to attract tourists and thereby respond to the needs in the event of future mishaps.

【keywords】: tourism industry, tourist behavior, time series, marketing strategy

I. INTRODUCTION

The tourism industry experienced a spectacular growth since 1960s due to increases in the standard of living and in leisure time. It is also the largest industry and job generator in the world. According to the World Travel and Tourism Council (WTTC), the industry is expected to employ 338 million people by the year 2005, and to reach 1 billion international arrivals in 2010. For many countries, tourism has become an important source of business activity, income, employment, balance of payments, and foreign currency earnings. However, the tourism industry is highly susceptible to negative situations and exogenous factors (Richter, 1999; Sonmez, et al., 1999; Ioannides & Apostolopoulos, 1999; Hara & Saltzman, 2003) such as natural disasters, serious social conflicts, wars, economic crises, terrorist attacks and epidemics. Without a doubt, such adversities have had devastating effects on the tourism industry, with the tourists suffering the most serious impact because they are unfamiliar with local hazards and remedial resources that can be relied on to avoid serious consequences (Faulkner, 2001).

The results of catastrophic events on tourist destinations are both unpredictable and highly uncertain (Mansfeld, 1999). Therefore, the consequences may influence tourists' intentions to visit a destination (Dimanche & Lepetic, 1999), which no tourism official can afford to ignore. Events such as the Indian Earthquake in 2001, the September 21st Earthquake in 1999, and the Kobe Earthquake in 1995, caused severe declines in tourist arrivals in those places and had far-reaching effects on regional tourism (Bailay, 2001; Fukunaga, 1995; Huang & Min, 2002). Intentionally perpetrated disasters such as the terrorist attacks on the World Trade Center in New York and Bali Island have also had devastating effects on tourism (Goodrich, 2002; The Jakarta Post, 2002). More recently, the impact of the Severe Acute Respiratory Syndrome (SARS) outbreak on many tourism destinations hits severely global tourism activity, particularly in Asia-Pacific region that has seen strong increase in its tourist flows (8 percent in 2002) (World Tourism Organization, 2003).

By now it is evident that the incidences of natural, terrorist-generated, and epidemical hazards that occur at tourism destinations will influence travel behavior. In addition, the destinations and their tourist-related organizations are put into the particularly difficult position of meeting the challenges of declining visitation and revenues following a disastrous occurrence.

It is certain that tourist destinations will cope with such challenges if they have a guideline of appropriate actions in place. Disaster planning and response thus appear to be significant for the tourism industry. However, the body of research dealing with these aspects of the trade is still in its infancy. In particular, studies on tourist behavior relating to the impact of disastrous events or marketing practices in response to serious consequences are still an area that has remained largely neglected and unexamined.

Therefore, the objective of this study is to assess how international tourists have been affected by the September 21st Earthquake in 1999, the most serious natural disaster in Taiwan of the 20th century. The results will likely shed more light on how the tourism industry are influenced by this real-life hazard. As well, one tourism recovery model for marketing practices is built to cope with the consequences of a disaster in Taiwan. This is done by the experiences from the September 21st Earthquake and the findings of this study as a basis. Understanding tourist behaviors after a catastrophe is fundamental to developing successful managerial techniques and marketing strategies.

II. BACKGROUND

The most serious earthquake in Taiwan of the 20th century struck the central region of the island on September 21st, 1999. The so-called September 21st Earthquake, measuring 7.3 on the Richter scale, rocked Taiwan and flattened several towns. Human casualties and infrastructure damages mounted: more than 2,400 people were killed, over 13,000 people were injured, in excess of 10,000 were left homeless, many buildings were destroyed, and roadways, water, sewage, gas and power systems were cut (National Fire Administration, 1999). The detrimental effects of the 7.3-magnitude tremor sapped the island’s economy and led government officials to cut the estimated growth of the 1999 gross domestic product in the fourth quarter to 5.3% from 5.7% (Directorate-General of Budget, Accounting and Statistics, 2000).

The island’s most severe natural disaster in the 20th century dealt a sharp blow to the Taiwanese tourism industry, with the worst impact being suffered by the international tourism sector. The post-quake rescue operations diminished many individuals’ desire to travel during the initial period following the disaster. The media frenzy and misleading reports that the quake had engulfed the entire island also frightened away many potential tourists. According to the Tourism Bureau report, during the January to August period of 1999, visitor arrivals recorded a 15% growth as compared with the same period the year before, which had been reviving as Asia recovered from the financial turmoil of 1997-98. However, there was a dramatic reduction in tourist arrivals during the post-quake period. The number of visitors from abroad declined by 15% during the period from September to December when compared with the same period in 1998, and the number of visitors to 230 major scenic spots dropped by 27% (Tourism Bureau, 2000). The room occupancy rates of hotels for international tourists plummeted by an average of about 60%, and international airline reservation cancellations soared to 210,000 for the September-December period of 1999. Products in the tourism industry are quite perishable (Athiyaman & Robertson, 1992; Witt & Witt, 1995; Chu, 1998; Law, 2000), so cancellation of hotel rooms, airline seats, concert hall seats, coach seats, dining, banquet halls, etc. caused a tremendous loss in tourism revenue.

The multifaceted nature of this disaster calls for responses that extend beyond the scope of textbook marketing responses. To reverse the dramatic decline in inbound tourist flows, the government of Taiwan adopted a series of swift countermeasures. The Government Information Office (GIO) assisted to recast ‘the Big Taiwan Earthquake’ as ‘the ChiChi Earthquake’ through foreign media. In addition, the message of ‘Taiwan thanks the world.’ was disseminated by the GIO. In order to mitigate negative media coverage and understand damage restoration, more than a thousand representatives of overseas media and major foreign tour wholesalers were invited for familiarization tours of the areas affected by the earthquake during 1999-2000 (Tourism Bureau, 2001). Moreover, international promotion based on the theme of “Tour Taiwan at ease” was carried out to entice foreigners to visit the island. Besides, the Ministry of Transportation and Communications subsidized tourist operators that suffered damage from the quake in applying for secured loans from financial institutions (Tourism Bureau, 2002).

Additional promotional activities were carried out to encourage tourism such as the annual Taipei International Travel Fair and the Johnnie Walker Classic golf tournament held in November 1999. Held during the aftermath of the earthquake, the activities not only had a significant positive effect on the revitalization of domestic tourism but also immensely enhanced the overall image and position of Taiwan on the international tourism stage. The Tourism Bureau took advantage of the tournament and placed “Goodwill Taiwan” and “After the quake, Taiwan goes on.” 30-second commercials on the Cable News Network (CNN) in Asia and North America.

The Taiwanese government has made other efforts to stem the dramatic decline in inbound tourist flows. Examples include relief programs, operating capital loans, and nation-wide inspections of scenic and recreational areas. Because Japan has long been the leading generator of international tourism for Taiwan, representing approximately 40% of international tourist arrivals, no effort can be spared toward regaining the Japanese tourist market. The placement of “Peace of Mind” advertisements in major Japanese media was increased, and promotion seminars were held jointly with large Japanese air carriers in Tokyo, Fukuoka, Osaka, and Nagoya. Related posters were placed throughout Tokyo railways and bus stations. Furthermore, a marketing program of “Go, Taiwan” was carried out in cooperation with China Airlines and Japan Asia Airways. Nevertheless, to attract tourists to Taiwan, there was still a need to substantially reduce the overall prices of taking a trip to Taiwan during the early recovery stage. There were significant fare discounts for Japan-Taiwan routes. Most of the hotels in Taiwan also made many efforts in response to declining visitor numbers. Many of Taiwan’s international tourist hotels mailed promotional materials to every previous Japanese guest to try to rescue a sharply declining Japanese tourist market (Travel Trend News, 1999).

A sharp decline in visitor arrivals resulting from the September 21st Earthquake has no doubt brought an impetus to the Taiwan authorities’ measures in dealing with consequences of the disaster. The purpose of this study is to see how the Taiwanese tourism industry has rebounded from the crisis. This research establishes a model for the inbound demand of Taiwan to predict the volume of visitor arrivals after the quake (September 1999 to August 2000). The forecasts from the fitted model are then compared with the actual volume of visitor arrivals to analyze the recovery status. Based on the experiences from the crisis and the results of this study, a model of marketing strategies can be developed. With greater awareness and understanding, the tourism industry and relevant governmental agencies may tailor marketing approaches and advertising messages to attract tourists and thereby respond to the needs in the event of future mishaps.

III. METHODOLOGY

III.1.Data

The data adopted in this study is monthly aggregate visitor arrivals in Taiwan from the period January 1979 to August 2000. Among the 260 observations, the first 248 observations (January 1979 to August 1999) were utilized to establish a model to forecast the visitor arrivals in Taiwan for the following 12 months (September 1999 to August 2000). Estimated visitor arrivals were compared with actual visitor arrivals. In this study, the visitor arrivals are defined as incoming foreign visitors and overseas Chinese visitors who indicated their purpose for visiting as falling under at least one of the following headings: *business, pleasure, visiting relatives or friends, attending conferences* or *study*. This set of data is obtained from the *Monthly Report on Tourism* published by the Tourism Bureau of Taiwan.

III.2. Forecast Methods

Because of the perishable nature of the tourism industry, accurate tourism forecast is vital to the planning of government bodies and private sectors for tourism development efforts and investments (Morley, 1991; Chan, 1993; Sheldon, 1993; Burger, et al., 2001; Lim & McAleer 2002; Kulendran & Witt, 2003). Thus, the forecasting techniques have been widely adopted in international tourist arrival demand forecasting. Among many forecasting approaches, multiple regression analysis is commonly used in the tourism literature (Turner, et al., 1995), and time-series models generate relatively accurate forecasts for tourism demand (Athiyaman & Robertson, 1992). Time series analysis, also called *historical* or *chronological series*, provides modeling approach which requires a sequence of observations on a particular variable referring to different moments or periods, which are equally spaced time intervals. Univariate time series is used to build a model that describes the behavior of a time series for the past and enables one to make satisfactory forecasts for the future (Law, 2000; Huang & Min, 2002; Min, 2003). It can save the researchers the trouble of not only determining influential variables but also suggesting a form for the relation between them. Using monthly or quarterly data, rather than the more often used annual data, to forecast international tourism flows is also recommended (Coshall, 2000).

III.3. Box-Jenkins Models

Univariate Box-Jenkins Autoregressive Integrated Moving Average (ARIMA) analysis (Box & Jenkins, 1976) has been broadly used for modeling and forecasting. It has been successfully applied in economic, marketing, financial, environmental, ect. Univariate ARIMA analysis, in practice, tends to be superior to the more data-demanding multiple-series regression models in terms of forecasting accuracy (Pankratz, 1983). On tourism forecasting, previous time-series studies often applied the forecasting techniques to tourism data and sometimes also analyzed the accuracy of the forecasts. Univariate Box-Jenkins forecasting has outperformed other methods in this respect (Witt & Witt, 1995). Hence, this study is based on the seasonal autoregressive integrated moving average (SARIMA) model which are then compared with the actual volume of visitor arrivals to analyze the recovering status.

IV. RESULTS

Box and Jenkins (1976) proposed a practical four stages for finding a good model, namely, identification, estimation, diagnostic checking, and forecasting. This section presents the results following the four modeling stages.

VI.1. Identification

The research is based on data from successive months over a 20-year period (January 1979 – August 2000). The first step is to plot the data, and this has been done in Figure 1. Initial plot of the data revealed irregular variation as well as upward trend. The pattern contains the clearly observable decline from the 249th observation (September, 1999). For Box-Jenkins modeling, it requires a substantial amount of data for the identification and estimation processes, so the first 248 observations (January 1979 through August 1999) were used for the identification process. These 248 observations were utilized to predict observations at times 249 through 260 (September 1999 through August 2000). The forecasted 12 values are used to compare with the actual numbers.

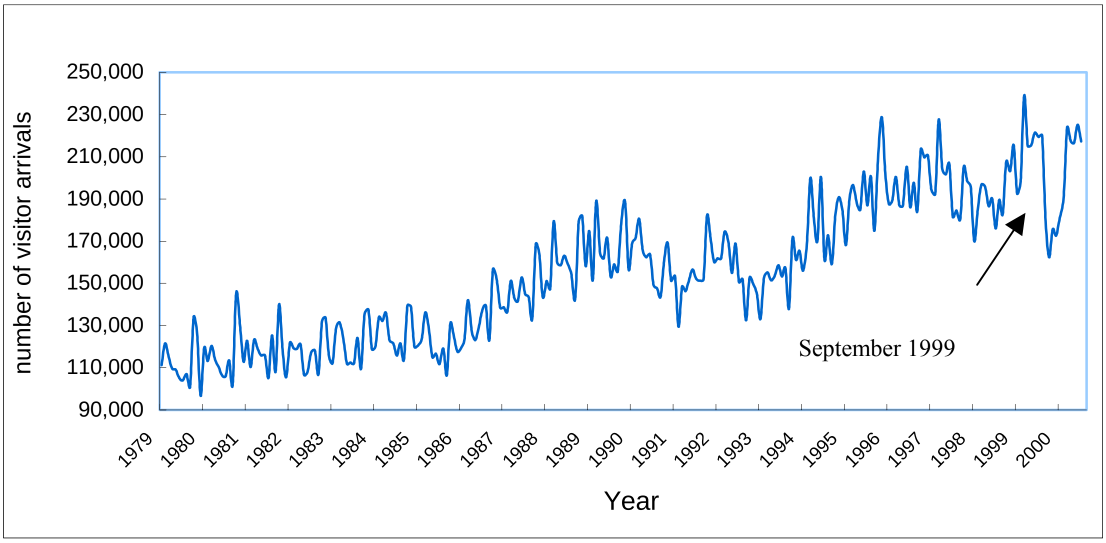

Figure 1. Time series plot of the January 1979 to August 2000

Since the time series plot of the first 248th observations is clearly nonstationary, therefore, some sort of differencing is required. To confirm this, the autocorrelation function (ACF) was calculated and, as expected, showed it to be positive and high for a number of lags; and decays fairly slowly. It indicates that the first 248th time series is nonstationary. Thus, differencing is required. The use of a first differencing alone does not remove the effects of nonstationarity from the data, since the autocorrelations at lags 12, 24, 36, 48 are still significant. The seasonally differenced, at lag 12 alone, series is also not stationary.

In view of the above indications, it becomes desirable to employ both of the nonseasonal and seasonal differencing operator in the multiplicative form $(1\text{-}B)(1\text{-}B^{12})$ to achieve stationarity. The ACF plotted in Figure 2 has significant negative values at lags 1 and 12. The pattern is indicative of a multiplicative MA(1) and MA(12) model, that is, $(1\text{-}\ \theta_1 B)(1\text{-}\ \theta_{12} B^{12})$. Therefore, the tentatively multiplicative model (0,1,1)(0,1,1)$_{12}$ for the first 248th visitor arrival is obtained:

$$(1-B)(1-B^{12})Z_t = C + (1-\theta_1 B)(1-\theta_{12} B^{12})a_t$$

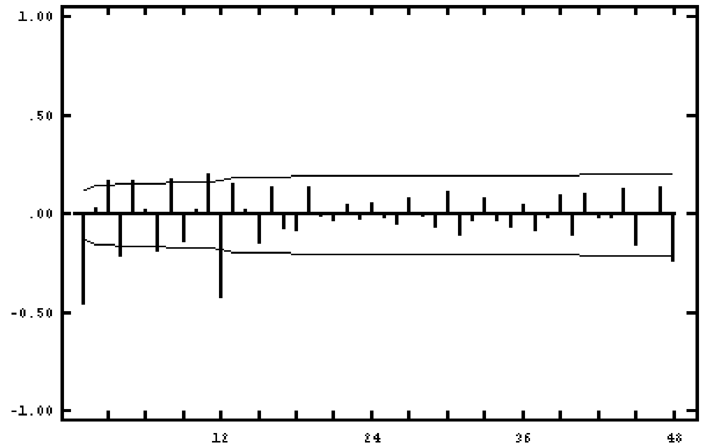

Figure 2. Nonseasonal and seasonal first differencing of total visitor arrivals or ACF

VI.2. Estimation

Initially, various models are fitted to determine the most appropriate SARIMA process to describe visitor arrivals from first 248th observations. The parameter estimates are significant based on their t-value. The conditional likelihood algorithm is used to estimate the parameters. Since the exact likelihood algorithm is for MA parameters only and the model consists entirely of MA parameters, hence, the exact likelihood algorithm is used for final estimation presented (Hillmer & Tiao, 1979). Table 1 presents the result of estimating the SARIMA for the conditional and exact likelihood algorithms.

Table 1. Estimated SARIMA(0,1,1)(0,1,1)$_{12}$ for total visitor arrivals by conditional and exact likelihood algorithms

	Parameter Label	Value	Standard Error	*T-Value*
Conditional	θ_1	0.5338	0.0554	9.63
	θ_{12}	0.6701	0.0516	12.98
R^2 =0.934	Residual Standard Error = 0.834294E+04			
Exact	θ_1	0.5308	0.0556	9.54
	θ_{12}	0.6925	0.0493	14.05
R^2 =0.937	Residual Standard Error = 0.817655E+04			

As indicated in Table 1, the exact likelihood algorithm provides the smaller residual standard error. Thus, the best fitting model for visitor arrivals from January 1979 to August 1999 was as follows:

$$(1-B)(1-B^{12})Z_t = (1-.5308B)(1-.6925B^{12})a_t \qquad (1)$$

VI.3. Diagnostic Checking

Once a SARIMA model is fitted, it is important to investigate how well the tentative model fits the given time series. This comprises the step of diagnostic checking in model building. Investigation of the behavior of residuals is a useful tool in this regard. Plot of the estimated residual ACF is showed in Figure 3, and it is evident from the figure that the residuals are not autocorrelated, and reveal no apparent patterns or aberrations. PACF is also employed to check the residuals and indicates that the residuals are approximately white noise. Moreover, a time series plot of the residual is displayed in Figure 4. The residual plot looks random, and no evidence of heteroscedasticity is present.

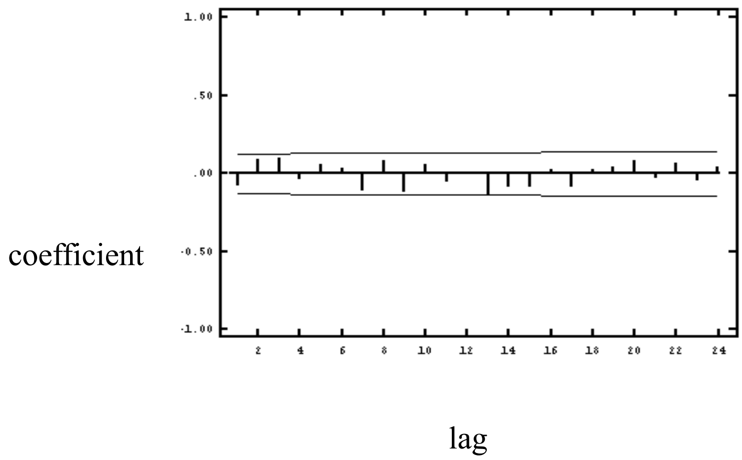

Figure 3. Estimated residual ACF on total inbound arrivals

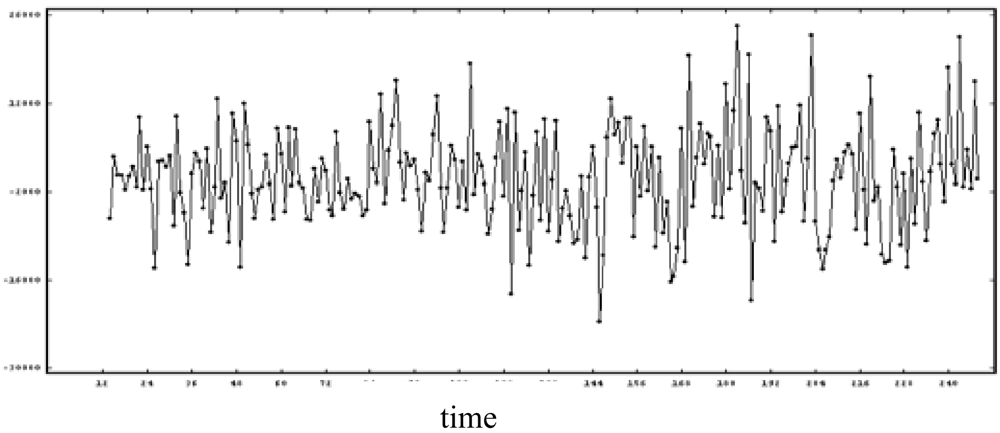

Figure 4. Plot of the residual time series on total inbound arrivals

According to Box-Jenkins modeling (1976), one technique which can be employed for diagnostic checking is overfitting. One alternative model found worth considering for fitting to time series is SARIMA(0,1,2)$(0,1,1)_{12}$. The model fitting results are presented in Table 2 which are quite similar to those presented in Table 1 except that in the above model the nonseasonal MA(2) parameter θ_2 (| *t-value* | > 2.00) has been included. After diagnostic checking for the alternative model, it indicates that the behavior of residuals in both the models is quite similar. The alternative model may be represented by the following equation:

$$(1-B)(1-B^{12})Z_t = (1-.6117B+.1573B^2)(1-.6894B^{12})a_t \quad (2)$$

Table 2. Estimated SARIMA(0,1,2)(0,1,1)$_{12}$ for total visitor arrivals by conditional and exact likelihood algorithms

	Parameter Label	Value	Standard Error	T-Value
Conditional	θ_1	0.6105	0.0647	9.44
	θ_2	-0.1432	0.0653	-2.19
	θ_{12}	0.6633	0.0516	12.85
R^2 =0.936	Residual Standard Error = 0.826639E+04			
Exact	θ_1	0.6117	0.0644	9.49
	θ_2	-0.1573	0.0648	-2.43
	θ_{12}	0.6894	0.0493	13.98
R^2 =0.938	Residual Standard Error = 0.808356E+04			

After comparing the above two models, we found that when θ_2 is added, the residual standard error shows an insignificant decrease. Furthermore, one of the basic principles of ARIMA model building (Box & Jenkins, 1976) is that the model should be parsimonious (i.e. the model which adequately describes the time series with the smallest possible number of parameters). Keeping in view the above principle, it can be concluded that the model represented by Eq.(1) is the more appropriate one for the observed time series. It is also sound practice to try SARIMA(0,1,3)(0,1,1)$_{12}$ and SARIMA(0,1,1)(0,1,2)$_{12}$. The results show that the extra parameters θ_3 and Θ_2, respectively, are not significant. Based on the above examinations, the fitted seasonal ARIMA(0,1,1)(0,1,1)$_{12}$ model is appropriate for the series.

VI.4. Forecasting

Finally, the SARIMA(0,1,1)(0,1,1)$_{12}$ model was used to forecast the 12 future values of September 1999 – August 2000, and the forecasts were compared with the known values. Table 3 shows the empirical findings of the forecasts and actual visitor arrivals, and Figure 5 provides a graphical presentation of these findings.

Table 3. Actual and predicted values of total visitor arrivals between September 1999 and August 2000

Year/Month	Predicted	Actual	Difference *(Act – Pred)*	% Diff *(Diff / Pred*100percent)*
1999/09	209,560	179,392	-30,168	-14.4%
1999/10	236,271	162,282	-73,989	-31.3%
1999/11	234,965	175,481	-59,484	-25.3%
1999/12	233,939	172,595	-61,344	-26.2%
2000/01	215,787	180,922	-34,865	-16.2%
2000/02	222,878	190,108	-32,770	-14.7%
2000/03	247,630	223,654	-23,976	-9.7%
2000/04	232,937	217,576	-15,361	-6.6%
2000/05	229,604	216,692	-12,912	-5.6%
2000/06	238,305	225,069	-13,236	-5.6%
2000/07	224,949	217,302	-7,647	-3.4%
2000/08	231,444	220,227	-11,217	-4.8%

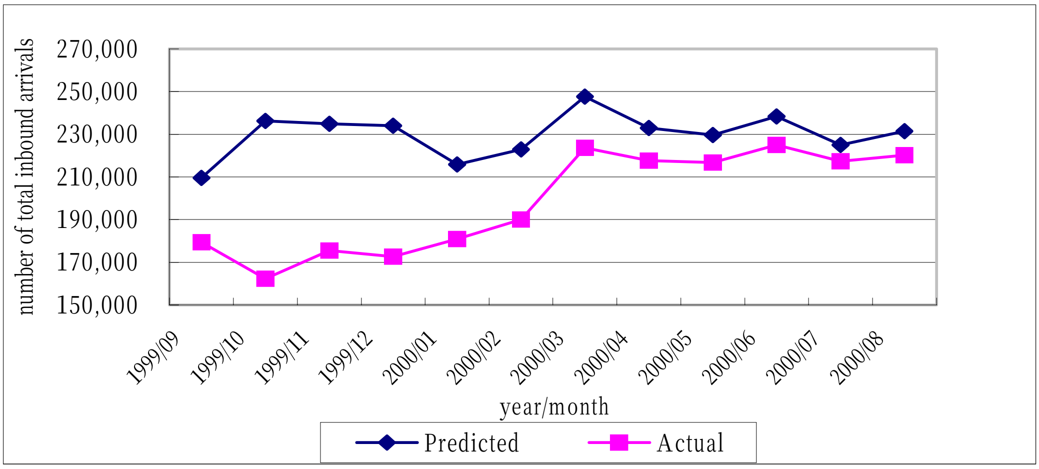

Figure 5. Graphical presentation of actual and predicted values of total visitor arrivals

According to Table 3 and Figure 5, the differences between the actual and predicted numbers of visitor arrivals for the 12 months have gradually decreased. In other words, the island visitor arrivals are bouncing back from the disaster, indicating the government's efforts have proved effective. Since September 21st Earthquake occurred in late September, the total number of visitor arrivals in September was not significantly lower. Obviously, the largest difference (73,989) throughout the entire period falls in October 1999. The difference in this month reveals the volume of consequently declined tourist arrivals as a result of September 21st Earthquake.

V. MARKETING STRATEGIES FOR TOURISM RECOVERY AT TRAVEL DESTINATIONS

This section aims to build a model of tourist recovery for marketing practices that will help tourism to recover after a crisis in Taiwan, with the experiences from the September 21st Earthquake and the results of this study. Through the development of recovery strategy, many hazards can either be mitigated, or at least the impacts can be minimized as consequence of the prompt responses facilitated by an effective plan. Moreover, efforts to convince tourists to return after a disaster require a commitment from all members of the tourism sector.

Based on the rebound status, three phases, namely, emergency response, early recovery and long-term recovery, are developed. As referred to in Table 1, tourist arrivals declined severely during the second observation after the disaster. Thus, the first phase, emergency response, should be achieved during the first one and a half months. From January 2000 onwards, the recovery status of tourism in general improved somewhat; therefore, the second phase, early recovery, can be completed in 2 months after the first phase. Within these two phases, the elements are same and the chief task of both phases is to develop the "Taiwan Back on Track" promotional tourist campaign which would help re-establish Taiwan's image as a tourist destination. For the long-term recovery phase, the chief task is to make an effort to reconstruct destroyed facilities and resume normal tourist activities, which can be achieved over the long term. Three phases involve not only rebuilding destroyed facilities but also improving on their pre-disaster conditions through re-planning and redevelopment. A generic framework for tourism recovery is derived from the findings shown in Figure 6. Figure 7 illustrates the summary of the three phases in response to a disaster. The model also provides a blueprint which promises to save valuable time, energy, and other sources for tourist destinations.

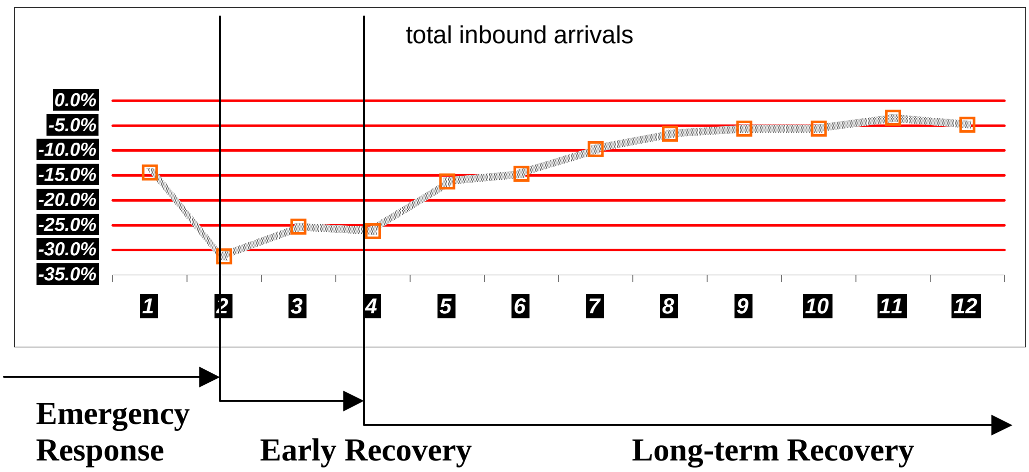

Figure 6. Phases in a response to a disaster

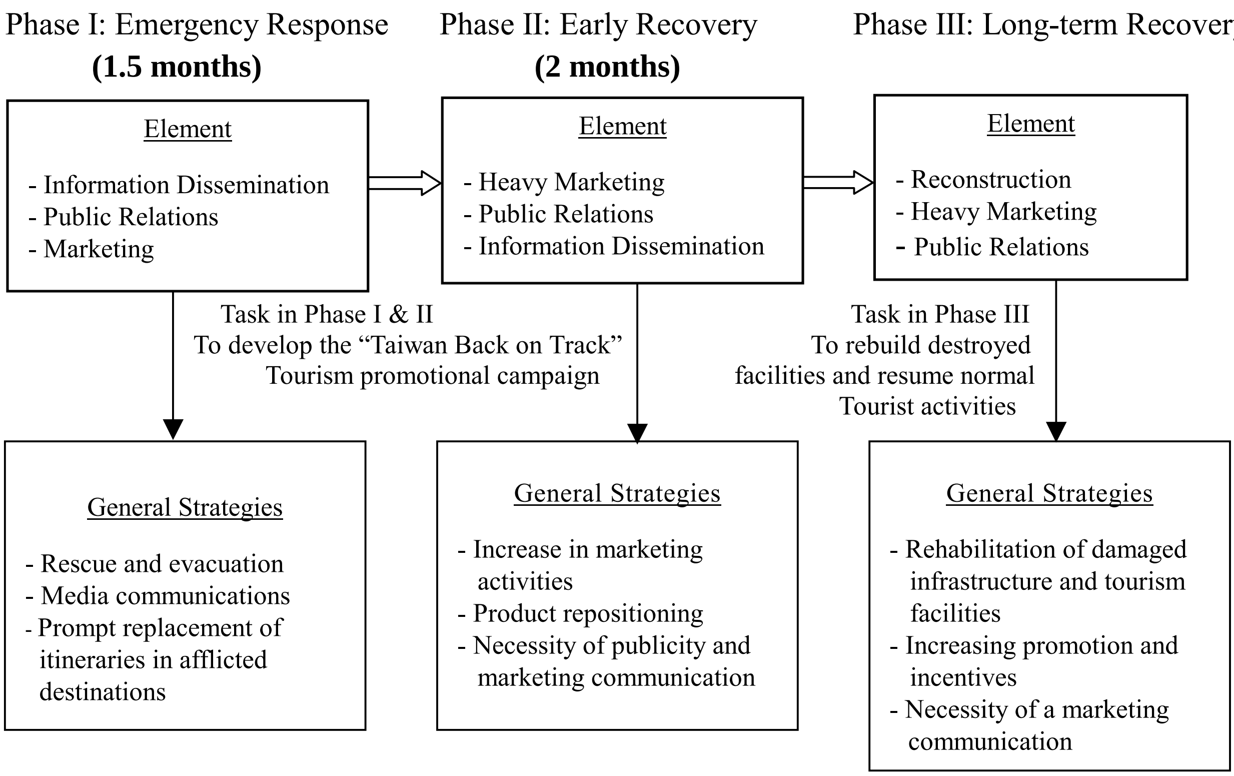

Figure 7 Summary of post-disaster tourism management

VI. CONCLUSIONS

The study has applied a forecasting model to evaluate the recovering status of visitor arrivals in Taiwan after the September 21st Earthquake. An awareness and understanding of the tourist behaviors in the face of disastrous events may facilitate ability to adjust the relative effectiveness of promotional appeals. In particular, no tourism destinations are immune to tourism crises, and are more or less prone to certain types of disasters than others. Nevertheless, very few articles in literature have been published regarding the appropriate marketing strategies to mitigate the effects of a disaster on a tourism destination. It is imperative for any tourism destination to become more aware and involved in post-disaster planning and effective response. This study thereby highlights large-scale measures which constitute the most crucial ingredient for any successful disaster recovery. These measures, adopted by the government in Taiwan, serve as a reference for other destinations in similar circumstances. Thus, insights derived of the experiences from the September 21st Earthquake provide fertile ground for further academic research on tourist behavior, and offer important market-based information for tourism marketers. This information might include strategic information implications to attract inbound market after such advisories, particularly when developing marketing practices.

Certain limitations of this study should be noted and serve as a guide for future research. The study is limited to a univariate approach which considered only visitor arrivals. Multiple time series analysis may be employed to examine the impacts of an event on tourist arrivals. In addition, it is also important to recognize the potential pitfalls inherent in generalizing the results of this study based entirely on the case of the September 21st Earthquake. In this regard, other disasters can be employed to enrich the findings and make the results more widely applicable. More importantly, the outbreak's impact of SARS in Taiwan recently has had devastating consequences on the economy in general and tourism in particular. The management approaches of post-SARS efforts in the Taiwanese tourism industry appear to be both timely and significant, thereby meriting further scrutiny.

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