Determining the Optimal Capacity for the MICE Industry in Las Vegas

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ABSTRACT

The meetings, incentive travel, conventions, and exhibitions (MICE) industry is a comparatively young industry and there has been limited research conducted in this field, especially from the financial performance and capacity management perspective. The purpose of this study is to fill the gap by identifying its optimal capacity based on an analysis of financial benefits and costs of the Las Vegas MICE industry in the years to come. The findings and results of this study should help researchers and practitioners determine the current status of the Las Vegas MICE industry in terms of operational efficiency and profitability. The findings will also reveal whether the MICE development in Las Vegas is heading for over- or under-capacity and, if so, provide a gauge for the magnitude of over- or under-capacity. Academically, this study should make a good contribution to capacity optimization literature by applying the theoretical model to the MICE industry.

Keywords: *the MICE industry, capacity optimization, single-period inventory model, cost of over-capacity, cost of under-capacity*

INTRODUCTION

The meetings, incentive travel, conventions, and exhibitions (MICE) industry has been recognized as a significant market segment over the past decades (Astroff & Abbey, 2006; Kim, Chon, & Chung, 2003; World Tourism Organization, 2006). According to the International Meeting Statistics by the Union of International Associations (UIA), 11,423 international meetings were held in 2008 worldwide (UIA, 2009). The industry consists of multi-sectors of hospitality service including lodging, food and beverage, catering, convention service, convention facility supply, transportation, tourism, retail, and entertainment (Astroff & Abbey, 2006; Fenich, 2008). The MICE industry shares several common characteristics with hospitality service sectors, such as inseparability of production and consumption, perishability, and seasonality. Moreover, the MICE industry of a destination always faces uncertain markets due to fluctuations in the economy and competitions from rivaling destinations (Astroff & Abbey, 2006; Fenich, 2008; Isler, 2008). Therefore, the demand for a MICE destination is typically probabilistic rather than deterministic. The uncertain demand for the industry makes its financial performance unstable and its capacity management challenging.

The MICE industry is an important contributor to regional and national economies (Spiller, 2002; Dwyer, 2002; UNWTO, 2006). According to a recent study by the U.S. Travel Association (2009), the MICE industry contributes $101 billion in annual spending to the U.S. economy, provides $16 billion in tax revenue at the federal, state and local levels, and creates one million jobs for the American workforce in local communities across the U.S. (U.S. Travel Association, 2009). For Singapore, which relies on MICE heavily for its tourism industry, the MICE business contributes even more to the nation's economy. According to the International Enterprise Singapore (2001), every dollar generated by the MICE industry adds another 12 dollars to the national GDP. According to the Las Vegas Convention and Visitor Authority (LVCVA), since 1962, Las Vegas has hosted over 94 million convention attendees who have brought over $101.2 billion to the Las Vegas economy (LVCVA, 2009). In 2008, Las Vegas hosted 22,454 conventions with 5,899,725 attendees. The 5.9 million attendees, which were 15.74% of the total visitors to Las Vegas, brought over $7.8 billion to the Las Vegas economy (LVCVA, 2009). The contribution made by the MICE industry to the Las Vegas tourism economy is significant. Under-capacity could imply great opportunity costs for Las Vegas, the top convention city in the U.S. (CEIR, 2005).

Since the 1980's, the MICE facility development has aggressively expanded in North America. According to a HVS report, MICE facility development in the U.S. and Canada has been continuously underway at an average rate of 3.4% annually (Detlefsen & Vetter, 2008). The *EXPO Magazine* 2008 reveals that there are 40 convention and exhibition facilities currently under construction and they will add 7,226,500 square feet of convention space to the North American market by the end of 2011 (Gamble, 2008). Expansion projects and new convention investments have been overwhelming in Las Vegas. According to the Hotel/ Casino Development – Construction Report of November 4, 2009 (LVCVA, 2009), the total convention facilities in the Las Vegas area were 9,889,171 square feet in 2008. Compared to the convention facilities in 1997, the overall citywide convention capacity has grown from 4.16 million square feet to 9.89 million square feet in 2008. According to the Las Vegas Convention and Visitor Authority (2009), the future projects of an additional 209,644 square feet would be completed in 2009, and 557,622 square feet in 2010. Moreover, several new projects of a total 5.1 million square feet were proposed. In total, there will be approximately an additional 6.65 million square feet for the Las Vegas MICE facilities by 2014 (LVCVA, 2009; Zind, 2009). The aggressive expansions in Las Vegas and the U.S. increase competition among the MICE destinations. Over-capacity could result in great economic loss due to the enormous capital investment of the MICE facilities, especially in the economic downturn.

However, while Las Vegas aggressively expands its MICE capacity, the demand for the MICE capacity has not increased as it would be expected. Table 1 shows the utilization of the MICE facilities in Las Vegas from 1997 to 2008 (CIER, 2008; LVCVA, 2009). The average utilization rates were 45% from 2000 to 2004 and 36% from 2005 to 2008, respectively. The low utilization of the MICE facilities would imply that aggressive expansions of MICE facilities do not significantly attract additional conventions and convention visitors to Las Vegas.

Table 1
Utilization of the MICE Capacity in Las Vegas, 1997-2008

Year	Square Feet Available	Square Foot Days Available	Square Foot Days Used	Utilization Rate
1997	4,161,547	1,518,964,655	1,050,593,517	69%
1998	4,846,316	1,768,905,340	1,120,651,767	63%
1999	5,960,987	2,175,760,255	1,078,056,351	50%
2000	6,097,939	2,231,845,674	1,043,027,226	47%
2001	7,609,826	2,777,586,490	1,254,356,536	45%
2002	8,891,035	3,245,227,775	1,419,890,169	44%
2003	8,928,173	3,258,783,145	1,508,174,773	46%
2004	9,252,026	3,386,241,516	1,373,959,980	41%
2005	9,622,282	3,512,132,930	1,224,461,328	35%
2006	9,455,928	3,451,413,720	1,316,818,233	38%
2007	9,679,527	3,533,027,355	1,318,034,183	37%
2008	9,889,171	3,619,436,586	1,241,042,460	34%

source: LVCVA. Hotel/ Casino Development- Construction Bulletin, 1997~2009; CIER, 2009.

To grow healthfully and profitably, the MICE industry in Las Vegas needs to evaluate its current capacity efficiency and carefully plan its future capacity. While an analysis of the MICE financial performance in Las Vegas would help determine the industry's current capacity efficiency, an estimate of the MICE industry's future optimal capacity based on capacity cost, opportunity cost, and future demand should help the Las Vegas MICE industry avoid under- or over-capacity. Capacity optimization should provide useful guidance for Las Vegas to develop its MICE industry in the years to come.

The purpose of this research is to estimate the optimal MICE capacity for Las Vegas over the next five years. The magnitude of under- or over-capacity of the industry is identified based on the estimated optimal capacity and solutions are recommended.

The findings and results of this study will shed light on whether the MICE development in Las Vegas is heading for under- or over-capacity, the magnitude of over- or under-capacity, if any, and how the capacity problems may be corrected. Academically, this study should make a good contribution to capacity optimization literature by applying the theoretical model to the MICE industry.

LITERATURE REVIEW

The literature review section contains two major theories applied in this research, namely capacity management in the service industry and the single-period inventory model. This section reviews the challenges of capacity management resulted from the characteristics of the service industry, and the theory and application of the single-period inventory model in the service and the MICE industries.

Capacity management in the service industry

Capacity management, one of the most important aspects of operating an organization, refers to managing the amount of what an organization has and uses to perform work effectively and efficiently. Yu-Lee (2002) explains that capacity management is important because it is a significant component of a firm's costs, represents a large amount of a firm's assets, and impacts a firm's ability to manage cash flow, the overall ability to operate and perform, and the organization's brand and brand image. Capacity can significantly influence the quality of products and services and, therefore, influence customer satisfaction. Customer satisfaction can ultimately affect the organization's brand image and reputation.

Capacity of the service industry is "the highest quantity of output possible in a given time period with a predefined level of staffing, facilities and equipment" (Lovelock, 1992). When service matches demand and capacity well, profitability is usually increased. However, due to the uncertainty of demand and perishability of capacity, service managers continue to struggle with the challenge of managing capacity and demand (Klassen & Rohleder, 2001). The perishability of capacity implies that there is a need for careful planning and management, as idle and insufficient capacity can seriously impact the success of the service industry (Gu, 2003; Kotler, Bowen, & Makens, 2006).

Kotler et al. (2006) indicate that every major sector of the hospitality and tourism industries has suffered from over-capacity. The major reasons are (1) owners are proud of having the largest capacity, (2) practitioners tend to believe that economies of scale will occur as size increases, (3) governments encourage investors to build a larger tourism or hospitality infrastructure to create economic growth, (4) feasibility studies and industry forecast data are inaccurate or overly optimistic, (5) the hospitality and tourism industries believe that the future demand is almost unlimited, (6) the industry believes that a growing population, a breakdown of international barriers, and increasing disposable income will correct temporary over-capacity problems, (7) tax laws encourage investors to overbuild properties, and (8) the industry does not merge revenues management with sales and marketing management. In summary, since there are limited accurate forecasts of tourism demand and feasibility studies, government officials, stakeholders, investors, and practitioners believe that the demand for the hospitality and tourism industries is unlimited and that the hospitality and tourism developments generate a great economic impact on destinations and regions. As a result, the hospitality and tourism industries have suffered from over-capacity.

The MICE industry has made a significant contribution to regional and national economies. Many studies have been done on the economic impact of the MICE industry on host destinations and proven that host destinations benefit significantly from the MICE industry (Dwyer & Forsyth, 1996; Dwyer & Forsyth, 1997; Grado, Strauss & Load, 1998; Kim, Chon &Chung, 2003; Lee, 2006; World Tourism Organization, 2006). Because of the belief in the great economic impact of the MICE industry, government officials, investors, and practitioners have aggressively developed MICE facilities (Sanders, 2002). Although challenging, it is critical for the capital-intensive MICE industry to balance capacity and demand. Thus, the industry needs an accurate forecast of demand for capacity and a financial performance analysis in order to plan and manage capacity effectively and efficiently.

Single-period inventory model

Anderson et al. (2001) indicate that the single period inventory model is applicable to operations that involve seasonal or perishable products or services that can't be carried in inventory and sold in future period; and the demand of seasonal or perishable products is uncertain, but with a probability distribution.

In the single period inventory model with probabilistic demand, incremental analysis is used to determine the optimal order quantity. There are two important variables in incremental analysis, the cost or loss of supplying one additional unit that is not demanded or the unit cost of oversupply (Co) and the opportunity cost of not supplying one additional unit that is demanded or the unit cost of undersupply (Cu). By comparing the unit cost of oversupply with the unit cost of undersupply, the incremental analysis indicates that the optimal quantity of supply (Q*) is at the level when the expected loss (EL) of supplying one incremental unit is equal to the EL of not supplying one incremental unit, or EL(Q*+1)=EL(Q*). Further, the expected loss of oversupply and undersupply can be defined as the probability of the ordering status multiplied by its unit cost (see Equation 1).

$$Co \times P(\text{demand} \leqq Q^*) = Cu \times [1 - P(\text{demand} \leqq Q^*)] \qquad \text{(Equation 1)}$$

The solution for P(demand $\leqq$Q*) can be defined as the cost of undersupply divided by the sum of the undersupply cost and the oversupply cost (see Equation 2).

$$P(\text{demand} \leqq Q^*) = Cu/(Cu + Co) \qquad \text{(Equation 2)}$$

In the single-period inventory model, the ratio of Cu/(Cu + Co) plays a critical role in selecting the order quantity. When Cu=Co, the optimal order quantity Q* should correspond to the median demand; when Cu>Co, a larger order quantity, which provides a lower probability of a stock-out in an attempt to avoid the more expensive cost of undersupply, will be recommended. Contrarily, when Cu<Co, a smaller order quantity, which provides a higher probability of a stock-out in an attempt to avoid the more expensive cost of oversupply, will be recommended. In summary, the single-period inventory model tends to warrant the ordering status with lower costs.

Gu (2003) applied the single-period inventory model to estimate the optimal room capacity for Las Vegas Strip casino hotels form 2001 to 2004. In his study, Cu was defined as income before corporate taxes per room night sold; and Co was fixed cost per room night available. From a trend regression model for demand forecasting, the future mean demand for each year and the standard deviation were obtained. This information was combined with the Cu/(Cu+Co) ratio to estimate the optimal room nights available for each year. Gu (2003) found that the Las Vegas Strip casino hotels would experience over-capacity from 2001 to 2003, and under-capacity in 2004.

Similar to the operation of the hotel industry, the demand for MICE capacity is uncertain and highly seasonal and convention and exhibition facilities, like hotel rooms, are perishable.

According to the Meetings and Convention report (2008) and CEIR report (2009), the demand of the MICE industry is usually affected by seasons, holidays, and weather conditions. Further, fluctuations in the economy and competition from rivaling destinations always cause uncertain markets to a MICE destination (Astroff & Abbey, 2006; Fenich, 2008; Isler, 2008). According to a recent study by the Professional Convention Management Association (PCMA, 2009), over 60% of meeting planners indicated that the number of events and the number of attendees would decline and the budget of an event would also decrease during the recession. Meeting planners are more conservative in booking convention facilities during the recession (PCMA, 2009).

In summary, the MICE industry carries similar features of the hotel industry, namely perishable products and highly seasonal and uncertain demand. Therefore, while the single-period inventory model can be applied to the hotel industry such as in Gu's (2003) study, it is also appropriate for capacity management in the MICE industry.

METHODOLOGY AND DATA

The single-period inventory model proposed by Anderson et al. (2001) is to deal with probabilistic demand by optimizing inventory level. The assumptions of this model are (1) the operation involves highly seasonal or perishable items, such as newspaper sales, seasonal clothing, and restaurant operation; (2) the demand of the inventory item is uncertain, but has a probability distribution; (3) only one order is placed for the item and demand is probabilistic.

Considering the implication of the single-period room inventory model developed by Gu (2003) for Las Vegas casino hotels, this study is to develop a capacity inventory model in terms of square foot days available for the MICE industry in Las Vegas. The future annual demand was predicted by using a trend regression analysis based on annual number of square foot days used (dependent variable) and time sequence (independent variable). The cost ratio of Cu/ (Cu+Co) was identified to estimate the optimal quantity of square foot days available, which is optimal capacity or Q^* as defined in Equation (2). In this study, Cu is defined as income before corporate taxes per square foot day sold; and Co as fixed cost per square foot day available. The fixed costs include depreciation, amortization, lease, rent, property tax, and interests. The Cu/(Cu + Co) ratio indicates the level at which the optimal capacity of square foot days available or Q^* should be within a normal probability distribution. After the ratio's value is determined, Q^* was derived by using the equation: Z score = $(Q^*-Y)/\sigma$, where Y represents the forecasted future annual demand and σ represents the standard deviation of the demand. Both Y and σ were derived from the trend regression model for predicting future demand.

For forecasting purposes, regression analysis can use historical data to identify patterns and extrapolate these patterns into the future (Dielman, 2005). An extrapolative regression model requires past demand value as the dependent variable. In this study, future MICE demand for Las Vegas was estimated by extrapolating a trend regression line with annual square foot days used as the dependant variable and time sequence as the independent variable. Here, the dependent variable or annual square foot days used was the product of the annual number of conventions and exhibitions, reported by the Las Vegas Convention and Visitor Authority (LVCVA), and the annual average square foot days used per convention, as reported by the Professional Convention Management Association (PCMA). The independent variable was the time sequence of the years.

The SPSS regression curve estimation procedure was used to identify the trend regression line that best fits the data set. One assumption for regression models is that the dependant variable is normally distributed with constant variance (Zikmund, 2003). When employing a regression model to predict future demand *Y*, the estimated *Y* is essentially the mean of future demand; the standard error of the predicted *Y* is the estimated standard deviation from the mean (Zikmund, 2003). Therefore, in this research, the estimated regression model predicts not only the mean of the future MICE demand, but also provides the probability distribution around the mean.

In this study, the cost of undersupply (Cu) or the income before income taxes includes not only income generated from meeting and exhibition space, but also incomes from hotel rooms, food and beverage, meeting equipment, parking, and retail, etc. related to or induced by the convention and exhibition operations. The data of the income before income tax was derived from the Annual Las Vegas Market Bulletin (2009), the Annual Las Vegas Visitor Profile: Market Segment (2009), the Las Vegas Convention and Visitor Authority Comprehensive Annual Financial Report (2009), and the Annual Nevada Gaming abstract (2009). To determine income before tax per square foot day sold (Cu), the aggregate income before tax for the MICE industry in Las Vegas 2008, the most recently available MICE operating statistics, was divided by total square foot days sold during the year. The cost of over-ordering or oversupply (Co) is defined as the fixed cost per unit of the capacity, or per square foot day available. The 2008 data of fixed cost was derived from the Las Vegas Convention and Visitor Authority Comprehensive Annual Financial Report (2009) and the Annual Nevada Gaming abstract (2009). The ratio of Cu/ (Cu +Co) is the ratio of fixed cost per square foot day available to the combined fixed cost per square foot day available and the income before tax per square foot day sold. Combining the derived cost ratio with future demand and probability distribution estimated from the regression model, the study is able to determine the optimal MICE capacity Q^* for Las Vegas for each year from 2010 through 2014. Over-capacity was then indentified by comparing Q^* with the expected MICE capacity for 2010 through 2014.

FINDINGS

In 2008, the income before taxes per square foot day sold or the cost of under-capacity (Cu) was calculated at \$0.40. On the other hand, the fixed charge per square foot day available was estimated at \$3.74. The fixed component of the mixed cost per square foot day available was found to be \$1.24. Therefore, the fixed cost per square foot day available or the cost of over-capacity (Co) was the sum of the two or \$4.98. The cost ratio of Cu/ (Cu + Co) for the Las Vegas MICE industry in 2008 was thus estimated at 0.0743. The ratio means that the optimal capacity of square foot days available or Q^* should be at the level where the probability for demand less than Q^* should be 7.43% and the probability for demand exceed Q^* should be 92.57%. In a standard normal distribution, Q^* should be located at the left-hand side of the mean with a *Z* value of -1.45. Therefore, if the predicted mean demand *Y* and the standard deviation σ of the demand are known, the optimal capacity Q^* can be estimated by solving the equation:

$$-1.45 = (Q^* - Y) / \sigma \qquad \text{(Equation 3)}$$

Table 2 shows the different regression curve estimates for predicting square foot days demand for Las Vegas. Among the 11 regression models, the cubic curve regression model had the highest adjusted *R* square value, 0.780, but none of its predicting independent variables was significant (p>0.05) (See Table 3). On the other hand, the quadratic curve regression model had the next highest adjusted R square, 0.748 (see Table 2), and both its predicting variables were significant at the 0.05 level (See Table 4). Therefore, the quadratic model was selected to forecast Las Vegas MICE demand for the five years. The model can be written as:

Y = 297,300,000+322,400,000X-12,950,000X^2.

The predicated mean square foot days demanded for 2010, the 14th year in the data series, was calculated at 2,272,700,000. Accordingly, the model predicts mean square foot days demanded at 2,219,550,000 in 2011; 2,140,500,000 in 2012; 2,035,550,000 in 2013; and 1,904,700,000 in 2014, respectively. The standard error of the *Y* estimate is 322,800,000 square foot days (see Table 4).

Table 2
Regression Curve Estimation for the Demand Prediction Model (1997-2008)

Regression Method	R^2	Adjusted R^2	*F* Statistics	*P*-value
Linear	0.745	0.719	29.177	0.000
Logarithm	0.727	0.700	26.678	0.000
Inverse	0.502	0.452	10.074	0.010
Quadratic	0.794	0.748	17.340	0.001
Cubic	0.840	0.780	14.017	0.001
Compound	0.747	0.722	29.548	0.000
Power	0.754	0.729	30.589	0.000
S-Curve	0.535	0.488	11.494	0.007
Growth	0.747	0.722	29.548	0.000
Exponential	0.747	0.722	29.548	0.000
Logistic	0.747	0.722	29.548	0.000

Table 3
Cubic Regression Forecasting Model for MICE Capacity

	Coefficient	*T* Stat.	*P* -value
Constant	878,900,000	1.781	0.113
X variable	-127,200,000	-0.403	0.697
X^2	70,140,000	1.269	0.240
X^3	-4,261,191	-1.521	0.167

Note: n=12, df=11, standard error of *Y*=301,600,000, model *F* stat.=14.017, *P*-value=0.001, adjusted R^2=0.78.

Table 4
Quadratic Regression Forecasting Model for MICE Capacity

	Coefficient	*T* Stat.	*P* -value
Constant	297300000	0.891	0.396
X variable	322400000	2.732	0.023
X^2	-12950000	-1.466	0.017

Note: n=12, df=11, standard error of *Y*=322,800,000, model *F* stat.=17.340, *P*-value=0.001, adjusted R^2=0.748.

For 2010, the predicted mean demand is 2,272,700,000 square foot days with a standard error of 322,800,000 square foot days. Based on Equation 3, the optimal capacity for 2010 should be 1,804,640,000 square foot days. The optimal capacity for 2011-2014 was calculated in the same manner. Table 5 lists the model calculated optimal capacity in comparison to the expected available capacity for 2010 -2014 to determine over- or under-capacity. The expected square foot days available from 2010 through 2014 were derived based on the Hotel/Casino Development-Construction Report for 2010 through 2014 (LVCVA, 2009). The difference between the expected available capacity and the model determined optimal capacity represents the magnitude of over-capacity. The over-capacity as a percentage of the optimal capacity is also presented in the table. The difference in number of square feet for the year, which is square foot days divided by 365, is shown in the last column of the table.

Table 5
MICE Capacity 2010-2014: Optimal versus Expected

	Optimal Square foot days (Q^*)	Expected Square foot days available	Difference in Square foot days	Difference in Percentage	Difference In Square feet
2010	1,804,640,000	3,888,739,930	2,084,099,930	115%	5,709,863
2011	1,751,490,000	3,894,709,870	2,143,219,870	122%	5,871,835
2012	1,672,440,000	3,905,380,308	2,232,940,308	134%	6,117,645
2013	1,567,490,000	4,343,154,710	2,775,664,710	177%	7,604,561
2014	1,436,640,000	5,758,661,210	4,322,021,210	301%	11,841,154

DISCUSSIONS

According to the regression analysis of the MICE capacity demand in Las Vegas over the past 12 years, the projected demand for the MICE capacity over the next five years will not significantly increase, especially during the economic recession. Indeed, Las Vegas is in a highly saturated market and the destination is facing a very serious over-capacity situation in its MICE industry (Detlefsen & Vetter, 2008).

The analysis of financial benefits and costs of the Las Vegas MICE industry shows imbalanced. The unit oversupply cost (Co) was found to be $4.98 while the unit undersupply cost (Cu) was only $0.40, or 8% of Co. The tremendous gap between the two costs suggests that the cost of providing one additional square foot day of MICE space in Las Vegas has far exceeded the benefit associated with one additional square foot day sold or the unit opportunity cost. The tiny Cu/(Cu+Co) cost ratio at 0.0743 shows that given the present condition, the possibility for under-capacity should be given much greater than that of under-capacity because of the highly imbalanced costs ratio.

This study uses the single-period inventory model to estimate the optimal MICE capacity based on capacity efficiency, opportunity cost, and the predicted future demand. The results of this study point out that the MICE industry in Las Vegas has experienced severe over-capacity. Aggressive expansions of MICE capacity could result in over 115% in excess of the optimal level of square foot days available. The most severe over-capacity would occur in 2014 when the Las Vegas expected capacity could be 301% in excess of the optimal level of square foot days available. The severe over-capacity of the Las Vegas MICE industry identified in this study would strongly weaken the belief in "build it and they will come" (Sanders, 2002). From 1997 to 2008, many expansions and new MICE development projects, such as the Las Vegas Convention Center, Mandalay Bay, the Venetian, the Bellagio, and the Palazzo, were launched into operation. These convention and exhibition facilities with an additional 5.7 million square feet have significantly contributed to the MICE over-capacity.

Since 208, the Las Vegas MICE industry has faced additional challenges in recent years. Despite the over-building that took place between 1997 and 2008, many hotels and resorts in Las Vegas, namely the Sands Expo and Convention Center, the Fontainebleau Las Vegas, Wynn Resorts, and the Marriott International Development, have planned to expand their convention facilities with an additional 6.65 million square feet in the next five years, (LVCVA, 2009). Fierce competition comes not only from within Las Vegas itself but also from other MICE destinations (Wimberly, 2010). The aggressive expansions in MICE facilities nationwide and the downturn in the economy have only exacerbated the over-capacity problem in Las Vegas. The aggressive expansions of MICE facilities have intensified the competition between Las Vegas and other MICE destinations, such as Orlando and Chicago, Las Vegas' major competitors. Further, the current economic downturn has made the MICE market more challenging for Las Vegas. In 2009, Las Vegas experienced more than 400 event cancellations, a 13.6 % decrease in the number of conventions and exhibitions, and a 24% decrease in convention attendance (Wimberly, 2010; LVCVA, 2010). Convention size has also decreased as a result of shrinkage in convention budgets. Las Vegas has struggled with the decrease of the utilization of square footage and the decline of the MICE revenue during the economic recession (Wimberly, 2010).

SUMMARY, SUGGESTIONS, AND FUTURE RESEARCH

Using the demand trend and aggregate operation statistics of the Las Vegas convention hotels and convention centers from 1997 through 2008, this study has developed an inventory model to estimate the optimal MICE capacity for Las Vegas and provided a gauge for the magnitude of over-capacity from 2010 through 2014. The inventory model predicts that Las Vegas will continue to experience severe over-capacity, with the worst situation occurring in 2014. Due to the existing over-capacity, some new developments in 2009, and the economic recession, this study recommends that MICE industry practitioners, investors, and government officials should carefully review and modify new MICE expansions to avoid severe over-capacity. The Las Vegas MICE industry should refrain from massive expansions for the next several years.

Over-capacity could reduce profitability of the MICE industry and place enormous economic pressure on Las Vegas. One way to improve profitability and reduce economic pressure is to maximize the utilization of the existing MICE facilities with decent profits. Both the industry and the LVCVA should aggressively promote Las Vegas as a convention destination to gain more market shares and raise the citywide utilization rate to over 70%, the industry standard booking rate (CEIR, 2009; LVCVA, 2009). In addition to getting more regional and national conventions and exhibitions, the LVCVA should help the MICE industry to extend its business to the world and gain more international conventions and exhibitions. Another way to improve profitability is to increase sale revenue through improving operating efficiency and productivity.

A major limitation of this study is that the estimates are based on the Las Vegas operation statistics up to 2008. The Las Vegas MICE industry has experienced a decrease in the number of conventions and exhibitions and a decline of sales revenue in the current economic recession. The new facilities which opened in 2009 would have a serious affect on the Las Vegas MICE industry. Therefore, the optimal capacity should be modified according to 2009 operation statistics in a future study.

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