

# Exploring the Determinants of E-Commerce Adoption in the Hotel Industry

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## Abstract

This study investigates the determinants of e-commerce adoption in the hotel industry. In the propose model of this study, the e-commerce adoption behavior is influenced by hotel internal and external environmental characteristics. It is empirically tested using data from Taiwanese hotel industry. The analytical results indicate e-commerce adoption propensity has significant relationship with hotel's location. Older hotels and hotels with fewer employees have low willingness to adopt e-commerce. Furthermore, socio-demographic factors such as population, population density and education level remain the significant predictors of e-commerce adoption.

## INTRODUCTION

The growth of information technology has significantly changed the operating environment of the hotel industry. There is increasing reliance on the Internet for promoting and selling lodging products and services. According to a recent report produced by TravelCLICK, Internet reservations received at the central reservation offices of the major hotel brands grew 6.9 percent in the first quarter of 2007, reaching more than 21 million bookings. Based on the survey conducted by the Institute for Information Industry (III) in Taiwan, the online shopping market grew to 2.93 billion dollars in 2006. Tourism related products accounted for 63% of this market. Because of the two days off per week and the policy of opening up Taiwan to tourists from China, there will be at least 43 new international tourist hotels open

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before 2010. E-commerce has become an important role in the growing industry. Websites that serve as travel information providers are now hoping to gain from online transactions (Chen and Yung, 2004). As Van Hoof, Collins, Combrink and Verbeeten (1995, p. 65) emphasized, "the challenge for hotel managers is to identify and implement information technologies that give their organization a competitive edge".

As mentioned above, the Internet is primarily used as a sales and marketing tool in the hotel industry (Murphy, Forrest, Wotring and Brymer, 1996). Additionally, it has also been recognized as an effective training tool (Van Hoof et al., 1995), an instrument to communicate with the corporate office and with suppliers and vendors (Van Hoof and Crombink, 1998), and a means to make reservations (Van Hoof et al., 1995) The predicted benefits of the Internet are improved service quality, enhanced profitability and efficiency, integration of departments, speedier communications, and reduced costs (Reid and Sandler, 1992; Van Hoof et al., 1995).

However, hoteliers still experience difficulties in applying e-commerce. These problems concern the user friendliness of the interface, the quality and the accuracy of information, and problems of data security (Pollock, 1995; McColl-Kennedy and Kiel, 1999). Consequently, the performance of the hotel is not always increased and results in productivity paradox phenomenon (David, Grabski and Kasavana, 1996). It implies that not all hotels consider e-commerce necessary for improving hotel performance. Many hoteliers still believe that television, radio and printed materials are more effective than other virtual channels (Hill, 1996). Main (1995) found that only 50% of the independently-owned hotels introduce information technology. Wan (2002) also noted that some hotels in Taiwan do not have online reservation systems and nor do they possess websites. Thus, research needs to expand its scope to the determinants of hotel e-commerce adoption.

This study differed from previous research in three ways. First, this study is one of only a few studies that investigate the determinants of e-commerce adoption in the hotel industry. Second, instead using data from questionnaires results in pervious works, this study explores hotel e-commerce adoption behavior by applying official government statistics. Third, we examine the determinants of e-commerce adoption, especially the geographic location and socio-demographic factors and thus provide a broader view of e-commerce adoption in the lodging industry. Thus, in the propose model of this study, the e-commerce adoption behavior is simultaneously influenced by hotel internal and external environmental characteristics.

The remainder of this paper is organized as follows. Section 2 provides a brief literature review of related studies. Section 3 presents the methodology, variables and data we used. The empirical results and discussion are then presented in section 4.

The final section is the conclusion.

## **LITERATURE REVIEW**

Hotel industry products have several distinguishing features, including heterogeneity, intangibility and perishability. These characteristics provide a better chance for hoteliers to sell their products via Internet (Sheldon, 1997; Werthner and Klein, 1999). Although e-commerce has played an important role in the hotel industry, progress in related studies have been somewhat lagging (Pernsteiner and Rauseo, 2000). Numerous studies have examined the determinants of IT or e-commerce adoption behavior in other industries (Thong, 1999; Mirchandani and Motwani, 2001; Riemenschneider, Harrison and Mykytn, 2003; Hollenstein, 2004), and most of these studies are focused on firm-specific characteristics. Meanwhile, location factors and socio-demographic factors have been relatively neglected. Some studies also pointed out that the human elements of technology adoption and application in the lodging industry received considerably less attention (Van Hoof et al., 1995).

Van Hoof et al. (1995) mentioned that large hotels are more likely to utilize information technology than small hotels. Moreover, Siguaw, Enz and Namasivayam (2000) argued that luxury and upscale hotels adopted more information technology than economy and budget hotels, while chain-affiliated hotels adopted more technologies than independent hotels. Wei, Ruys, Van Hoof and Combrink (2001) used a questionnaire to examine the application of Internet in the hotel industry with different size, class, management style and geographic location. Murphy, Oлару, Schegg and Frey (2003) also indicated hotel size, class, linguistics zone and geographic area are closely related to the type and degree of information technology application. Previous studies provide overviews of e-commerce adoption in the hotel sector. However, the impact of location and socio-demographic factors on the application of e-commerce has not been fully analyzed. Thus, a further study on the determinants of e-commerce adoption in the hotel industry is required.

## **METHODOLOGY, VARIABLES AND DATA**

The research methodology used in this study is probit regression analysis since it enables a combination of continuous and categorical independent variables to predict categorical dependent variables (Amemiya, 1981). We assume hotel manager has two choices, the first is adopting e-commerce (e), while the second is not adopting e-commerce (n). Therefore, the utility of hotel manager is:

$$u_{ei} = \beta_e \varphi_i + \varepsilon_{eii}$$

$$u_{ni} = \beta_n \varphi_i + \varepsilon_{nii}$$

The preference of hotel manager cannot be directly observed, but their choice

can be verified. Assume  $y$  is a binary indicator variable, when  $y = 1$ ,  $u_{ei} > u_{ni}$ , the hotel adopts e-commerce. Meanwhile, when  $y = 0$ ,  $u_{ei} < u_{ni}$ , e-commerce is not implemented. Where  $i$  represents the  $i$ th person.  $\varphi_i$  are characteristic variables of the  $i$ th hotel (i.e. hotel size, location, socio-demographic factors, etc.).  $\beta_e$  and  $\beta_n$  are parameters to be estimated, and  $\varepsilon_{ei}$  and  $\varepsilon_{ni}$  are residual errors. Thus, the dependent variable in this study is the decision of a hotel to adopt e-commerce. ECOMMERCE=1 when the hotel adopts e-commerce, while ECOMMERCE=0 when e-commerce is not implemented.

In order to create a sustainable competitive advantage, hoteliers may consider its need for information technology. Namasivayam, Enz and Siguaw (2000) argued that customer demand and environmental changes are crucial motivating factors for technology adoption. The former are firm-specific characteristics, while the later are environmental factors that can not be entirely controlled by the hotel. Thus, the independent variables in this study are divided into two categories: namely the internal and external environmental characteristics of the hotel, respectively.

Wei et al. (2001) and Murphy et al. (2003) found geographic location of the hotel to be closely related to the type and degree of the information technology application. Therefore, one major component of the internal environmental characteristics is the location of the hotel related to competitors in the same industry. Here, we denote the distance from each hotel to the geographic center of the industry (DISTANCE) as the proxy of geographic location factor. It is based on gravity model (Anderson, 1979) used as a proxy for agglomeration effects in the hotel industry.

Firm size and firm age are two major firm-specific explanatory variables which are used in many adoption behavior studies (Hollenstein, 2004). However, their relationships are controversial. A further investigation on the relationships between firm-specific characteristics and e-commerce adoption propensity is needed. Consequently, other internal environmental characteristic factors in this study are number of employees (LABOR), hotel floor area (ARCH) and number of years since hotel establishment (AGE).

Regarding external environmental factors, socio-demographic characteristics such as income and education level are significant criteria for distinguishing between Internet users and nonusers (Bonn, Furr and Susskind, 1998). External environmental characteristic factors thus include disposable income per person per year (INCOME), ratio of population with higher education to the total population (SCHOOLING), Percentage of people between 15 and 64 years old (POP), and population density in metropolitan areas (POPDEN) and number of tourism areas within the hotel's market area (TOURISM) are included in the model since they can be regarded as indicators for size of the market at the hotel's location. Because IT-related infrastructures and

facilities are also prerequisites of e-commerce adoption, number of home computers per 100 persons (COMPUTER) is also included in the independent variables

Data for the analysis were drawn from the Taiwan Industrial and Commercial Census conducted by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taiwan. It is announced every five years. The latest data were obtained for 2003. The survey included data of 3554 hotels. E-commerce adoption in the database is primarily referred to the business information offering (i.e. Advertisement, demo), online ordering and online transaction. Only 346 hotels, or 9.5% of the sample applied e-commerce. The socio-demographic data originated from the databank "Main Indicators in Taiwan Area" conducted by the Directorate-General of Budget, Accounting and Statistics, Executive Yuan, Taiwan.

## **RESULTS AND DISCUSSIONS**

Table 1 lists the probit regression results. The empirical results show that internal environmental characteristics such as distance from each hotel to industry geographic center (DISTANCE), number of employees (LABOR), and number of years since hotel establishment (AGE) are the key determinants of e-commerce adoption.

### *Table 1 Here*

The results reveal that when a hotel is far from the geographic center of the industry, the likelihood of e-commerce adoption is increased. The reasons for adoption may partly be due to the fact industry agglomeration economies are less likely to be present and consumers face higher transportation costs in receiving the information related to the hotel. Thus, the cost of information and searching on Internet-based channels is lower than for other traditional channels. Transaction costs between customers and hoteliers can be reduced via Internet usage. The other reason may due to the fact that hotels which are distant from their main market are able to establish relationships with long-distance customers. Hotels thus have greater motivation to extend their market and attract more consumers via the Internet when they are located away from major market.

Additionally, firms applying e-commerce have to invest large amounts of capital and human resources. Most of these costs are sunk costs (Hollenstein, 2004). Our results may imply that larger hotel is able to bear the risk of investments and achieve minimum efficient scale. Hotels with more employees require Internet to facilitate communication among different departments and training activities. The analytical results thus indicate that hotels with more employees are more likely to implement e-commerce. The results of this study also indicate that older hotels are less likely to

investments in e-commerce. It may reflect that managers of older hotels that are not familiar with new technologies may not be aware of the benefits of adopting e-commerce or more concerned with the data security issues. Furthermore, information technologies that are incompatible with current systems will necessarily be adopted at a lower rate (Namasivayam et al., 2000). Thus, older hotels may incur higher costs of removing old facilities or getting along with the new technology and thus result in lock-in effects. Furthermore, older hotels have their own reputation and stable customers, and hence reduce their probability of e-commerce adoption.

The test results also indicate that hotels are more likely to implement e-commerce with more population and higher population density. It implies that when a hotel enjoys a larger market, hoteliers have higher willingness to adopt e-commerce. The results also reveal the importance of human and knowledge capital in implementing e-commerce. That is, lack of training is one of the critical barriers to adopt e-commerce. Improvement of educational level can increase employee knowledge and skills and thus remove barriers to e-commerce adoption. On the other hand, consumers become more willing to accept e-commerce when they are well-educated. This phenomenon is the same as the results several related studies have emphasized.

## **CONCLUSIONS**

It is posited that e-commerce adoption should help hotels boost their chances of success in the competitive environment. However, some hotels are still not fully embracing the Internet. This study has attempted to identify the factors that influence the decisions of e-commerce adoption in the hotel industry. In the model proposed in this study, e-commerce adoption propensity is influenced by the internal and external environmental characteristics of the hotel. Our results reveal that the diffusion process of e-commerce in the Taiwanese hotel industry is not the same everywhere. It not only depends on the firm-specific characteristics but is also related to the location, socio-demographic factors in the market. Managers should consider those factors and weigh the costs and benefits of e-commerce adoption before its utilization. This is the means through which hotel managers can achieve competitive advantages and increase the chances of e-commerce success.

As with any research, this study also has its limitations. The research is constructed in the context of the hotel industry in Taiwan, the findings should not be over-generalized. To enhance the generalizability of the results, further scrutiny through theoretical and empirical studies is required. Decisions involving e-commerce adoption may relate to other cultural, historical or psychological factors that can be incorporated into future studies. A further research on the determinants of different

types and rate of hotel e-commerce adoption is another interesting area for future study.

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**Table 1 Probit regression results**

Variables	Estimated Coefficients	z-stat
Constant	6.2823**	2.15
internal environmental characteristics		
LABOR	0.0114***	12.67
AGE	-0.0022***	-6.89
ARCH	0.0051	1.62
DISTANCE	0.0017**	2.09
external environmental characteristics		
TOURISM	0.0036	0.50
COMP	0.0041	1.10
SCHOOLING	0.0013***	2.58
POP	0.1056****	2.61
POPDEN	0.0031***	2.53
INCOME	-0.0002	-1.53
No. of samples	3554	
Log likelihood	-938.57	
Pseudo $R^2$	0.3727	

\*\*\*, \*\*, \*represents 1%, 5% and 10% level of significance