Measuring Success of Electronic Customer Relationship Management System Using Updated DeLone and McLean Model: An Empirical Study of Thai Hotel Industry

[1]Wasin Liampreecha, [2]Sasinipa Srikanlayaniwart

[1,] *Naresuan University, Faculty of Business, Economics and Communications, Phitsanulok, Thailand, wasinl@nu.ac.th*

[2,]*Narasuan University, Faculty of Medicine, Phitsanulok, Thailand, ssnp.twl@gmail.com*

Abstract

Information technology integration into business systems is now almost essential to business survival. Systems must be able to adapt and manage the technology properly. Because of the rapid changes in technology, it is necessary to study the effectiveness of information technology at all times to meet the response of service users appropriately. This paper proposes and empirically assesses Electronic Customer Relationship Management (eCRM) systems in the hotel sector of Thailand using the updated DeLone and McLean IS Success model. This is derived through an analysis of current practices of eCRM and review of IS success literature. The samples include 241 users who used eCRM systems in hotels in five provinces in the northern Thailand. This research is an integrated analysis using online questionnaires for collecting data. Results show strongly direct associations among system quality, information quality, service quality, user satisfaction and service performance which are the variables in the updated DeLone and McLean IS success model. Additionally, over and beyond the effects of dependability on success of the hotel sector, this research also helps practitioners and managers gain deep insights into how to implement eCRM successfully.

Keywords: *e-CRM, DeLone and McLean IS Success Model, Hotel*.

1. Introduction

Evaluating the success of information systems (IS) is one of the critical issues in IS literature [1]. It is argued "if IS research is to make a contribution to the world of practice, a well-defined outcome measure (or measures) is essential" [2]. DeLone and McLean's (1992) model is considered the most comprehensive IS assessment model available in the IS literature [3]. As such, DeLone and McLean's model has gained wide acceptance among IS researchers who attempted to test and validate the usefulness of different parts of this model [4-6]. Recently, this model was reaffirmed by DeLone and McLean again as "a sound basis for IS success measurement" [7].

DeLone and McLean's model has gained strong theoretical and empirical support and it can be a useful model for assessing IS success globally if it is applied in other societies and cultures. Several studies have examined IS globally. For example, the organisational impact, system quality, information quality, and service quality were studied in organisations from information technology (IT) [8] and E-commerce websites are the best means of magnetizing the international and domestic tourists in any part of the world [9]. Similarly, the relationship between individuals' personality differences and their web design preferences was studied in [10]. To that end, the researchers evaluate empirically for the first time the application of DeLone and McLean's model in an electronic customer relationship management (eCRM) in Thai hotel sector organisations.

This study is being conducted to answer the following questions: To what extent is DeLone and McLean's (2003) model applicable in eCRM in Thai hotel industry? Can the model help us understand the relationships between the model variables as it exists in eCRM in Thai hotel sector? In order to answer these research questions, an empirical study was conducted to analyse the relationships among the variables in DeLone and McLean's model using an online survey of using eCRM in hotels in five provinces in northern part of Thailand.

The aim of this study is to apply the DeLone and McLean model in eCRM in Thai hotel sector and report the results of the relationship among the variables. The intent of this research is not a formal test of the DeLone and McLean model. Consequently, this research is an applied analysis of this model and not a theoretical model/instrument evaluation exercise.

This paper presents a brief literature review and the research methodology. It is followed by data analysis and the results found followed by the conclusion. A brief literature review would be sufficient as this research is applied in nature and the interested reader can find a detailed review of the literature on IS evaluation by DeLone and McLean in [7].

2. Literature review

2.1. Electronic customer relationship management (eCRM)

Electronic customer relationship management (eCRM) is the latest technique adopted by companies to increase and enhance their marketing skills and capabilities. Integrating both technological and marketing elements together, eCRM covers all aspects of customer's online experience throughout the entire transaction cycle (Pre-purchase, At-purchase and Post-purchase).

The emergence of e-commerce has changed many aspects of existing businesses and generated new companies with new business models, business opportunities, and processes. Existing companies are being challenged to rethink the most basic business relationship between an organisation and its customers [11]. Despite media propagation about the Internet changing the rules of engagement with customers, it hasn't changed the underlying fact that addressing customers' needs leads to sustainable profit [12]. Specifically, e-commerce practice has not replaced the need for human contact at key points in sales, marketing, and customer support.

Kennedy [13] stated that eCRM is to 1) create long-term relationships with customers with minimum cost, 2) reduce the customer defection rate, 3) increase the profitability from low-profit customers, 4) focus on high-value customers and specific benefits of e-CRM. According to [11], definite opportunities of e-CRM include 1) enhanced customer interaction and relationships, 2) managed customer touch points - the personalisation and E-Loyalty, 3) established competitive advantage.

Limayem, Hillier, and Vogel [14] studied the evaluation of hotel websites' quality, usability and benefits. In this study, the website evaluation is helpful in determining ways in which, and the extent to which, the website design and content achieve the aims of promoting the organisation; adding value to the customers and creating customers' satisfaction. Evaluating websites' quality and functionality is helpful in this context.

Sawhney and Zabin [15] suggested that for customers, technology-enabled selling opens other doors for productivity. First, web-based search engines have significantly enabled customers to find new suppliers and easily view the range of their product and service offerings. Additionally, Internet applications have dramatically simplified the ordering process and streamlined open-order inquiry. Web-enabled communication tools have made it easy for customers and suppliers to engage in bidirectional communication, a feature that increases one-to-one personalisation of the transaction experience.

Therefore, after reviewing the literature in relation to website quality, usability, IS success and user satisfaction in the context of specific hotel website features, a hotel website evaluation model was generated. eCRM concept and practice provides the ability to capture, integrate, and distribute data gained at the organisation's web site throughout the enterprise. In spite of the growing popularity, very little is known about this concept as a strategy as well as an enterprisewide application. Our goal is to enhance the existing knowledge of eCRM by providing useful guidelines for efficient integration of eCRM. We depart from the point of view that the key to successfully managing customer relationships lies in the ability to integrate existing CRM processes with e-CRM applications.

2.2. DeLone and McLean IS success model

The DeLone and McLean IS success model was developed by DeLone and McLean (1992) to evaluate IS success and provides a basis for future research. DeLone & McLean (2003) have since

updated this model to include research conducted between 1992 and 2003 (Figure 1). The primary differences between the original and updated models included:

(1) The service quality variable is added to show the importance of service and support in successful e-Commerce systems.
(2) Adding a measurement for user attitude, i.e. intention to use, and
(3) Organisational and individual impact flops lead to greater ungenerous final performance construct.
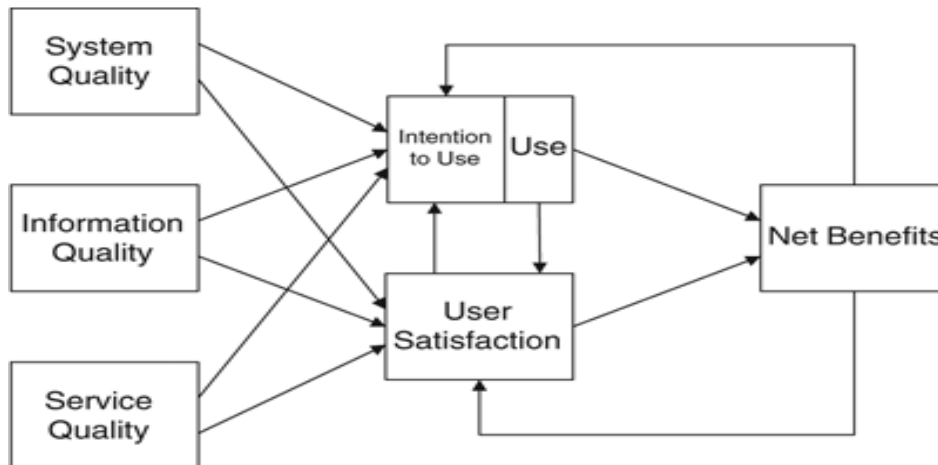

Figure 1. DeLone and McLean's IS Success Model from [7]

The DeLone and McLean (2003) model includes six types of factors; system quality, information quality, service quality, intention to use/ use, user satisfaction, and net benefits. This research work is to study these six factors of the model: system quality, information quality, service quality, user satisfactions (repeat purchases and repeat visits), and Service performance (Figure 1).

3. Research model and hypotheses

In accordance with DeLone and McLean (2003), this study proposes a comprehensive, multidimensional model of eCRM systems success (Figure 2), which suggests that system quality, information quality, service quality, user satisfactions included repeat purchases and repeat visits, and service performance are success variables in eCRM systems.
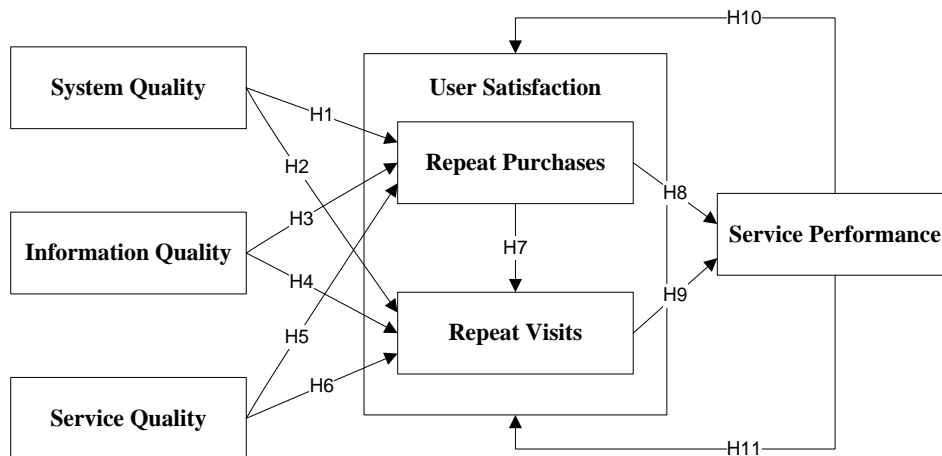
Figure 2 Research Model (Adopted from D&M IS Success Model [7])

Thus, the following hypotheses are proposed:

H1: There is a significant, positive relationship between system quality and repeat purchases.
H2: There is a significant, positive relationship between system quality and repeat visits.
H3: There is a significant, positive relationship between Information quality and repeat purchases.
H4: There is a significant, positive relationship between information quality and repeat visits.
H5: There is a significant, positive relationship between service quality and repeat purchases.
H6: There is a significant, positive relationship between service quality and repeat visits.
H7: There is a significant, positive relationship between repeat purchases and repeat visits.
H8: There is a significant, positive relationship between repeat purchases and service performance.
H9: There is a significant, positive relationship between repeat visits and service performance.
H10: There is a significant, positive relationship between service performance and repeat purchases.
H11: There is a significant, positive relationship between service performance and repeat visits.

4. Research methodology

Literature reviews provide insights in assessing the results of empirical studies; however, they alone are unable to determine the strength of the relationship among the variables in the model. DeLone and McLean IS success model is a quantitative approach that aggregates research studies and takes into account the error inherent in all quantitative studies. It is a useful technique to reconcile conflicting results among research studies and to conclude about the data that have been the measurements in information systems in the hotel success.

4.1. Population and sample

The unit of analysis is the information systems function in a Thai hotel sector organisation. The study was conducted in five provinces in the northern part of Thailand. The sample was comprised of users who used eCRM Systems in the hotel sector of Thailand. The sample included 400 users who used eCRM systems in hotels. A total number of 241 completions were obtained to represent a response rate of 60.25 percent (241 out of 400 samples of population). Response rate based on the click through may represent a better measure for email surveys, because many bulk emails send out in this style end up as spam in the respondents email and may never be retrieved or viewed by the target respondent.

4.2. Analysing data

This research was survey based, used online questionnaires that were developed from previous empirical studies for collecting data. The end user survey collected data of the system quality, information quality, service quality, repeat purchases, repeat visits and service performance variables. The data was analysed by using a statistical analysis software package. The statistics were used for percentage, mean, standard deviation, and simple regressions. The measures for eCRM characteristics and relevant literature are reviewed to generate items for the eCRM characteristics scale.

4.3. Reliability of measurement instrument

In this research, several steps were taken to maximise the reliability of the data. First, the returned questionnaires were checked for completeness. All acceptable questionnaires were assigned with an identification number. The reliability of instrument is within the range of previous studies. Table 1 shows the Cronbach's Alpha coefficients for the measurement instruments. The reliability of all instruments is within .90, which indicates that all items are excellent. Consequently, descriptive statistics and simple regression were analysed.

Table 1. Validity and reliability analysis

Constructs	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
System quality	29.000	0.914	0.961
Information quality	29.724	0.876	0.965
Service quality	28.449	0.940	0.958
Repeat purchases	28.156	0.895	0.963
Repeat visits	28.473	0.866	0.966
Service performance	28.601	0.903	0.962

5. Data analysis and results

Table 2 presents descriptive statistics of the study's sample. The gender of the majority of the respondents is female, comprising 66.4% (160 persons) with the remaining 33.6% (81 persons) being male. The highest percentage of 52.7% or 127 persons is the participant's age group of eCRM users between 21 -30 years. 50.6% or 122 of the participants indicated they earned a bachelor degree. 192 or 79.7% of participants knew eCRM from search engine. The largest group of respondents used eCRM for viewing or searching a hotel (149 or 61.8%), while the second largest group (64 or 26.6%) used eCRM for checking rates.

Table 2. Personal information results

Category	Range	Number of Respondent	Percent of Respondent
Gender	Male	81	33.6
	Female	160	66.4
Age	15-20 years	3	1.2
	21-30 years	127	52.7
	31-40 years	79	32.8
	41-50 years	24	10
	Above 50 years	8	3.3
Education	High school	5	2.1
	Diploma	10	4.1
	Bachelor degree	122	50.6
	Master	87	36.1
	PhD	16	6.6
	Other	1	0.4
eCRM known	Websites with hotel business	153	63.5
	Magazines, books	113	46.9
	TV, radio	35	14.5
	Search Engine	192	79.7
	Ask friends or acquaintances	97	40.2
eCRM Goods/Services	Check rates	64	26.6
	Reservation	13	5.4
	Payment	1	0.4
	To view or search the hotel	149	61.8
	The location of the hotel	11	4.6
	To communicate with the hotel	4	1.7
Total		**100**	**100**

Table 3 illustrates the descriptive statistics of system quality, information quality, service quality, repeat purchases, repeat visits and service performance with standard deviation. The results of the study show that usability in system quality was the most influential tools to IS success. In analysing the information quality, completeness was outstanding in eCRM system. Moreover, the most important forms of service quality was assurance, where repeat purchases and repeat visits were the

most important tools for user satisfaction. To a considerable extent, service performance was also the most effective tools in eCRM. However, the difference among these parameters was quite small, and the standard deviation ranging from 1.155 to 1.220.

Table 3. Descriptive statistics

IS success constructs	Mean	S.D.
• **System quality**		
Availability	4.783	1.165
Reliability	4.767	1.207
Response Time	4.765	1.172
Usability	4.879	1.180
• **Information quality**		
Completeness	4.801	1.183
Ease of understanding	4.791	1.174
Security	4.681	1.196
• **Service quality**		
Assurance	4.811	1.155
Empathy	4.742	1.183
Responsiveness	4.733	1.220
• **User satisfaction**		
Repeat purchases	4.794	1.210
Repeat visits	4.853	1.210
• **Service performance**	4.816	1.158

6. Hypothesis testing results

Simple regression analysis was used in this study. Table 4 shows the hypothesis testing results of the simple regression analysis. The results of the entry of system quality affect positively and significantly ($p < .001$) repeat purchases. It contributes positively and significantly to repeat purchases and explains 76% of the variance (R^2) in the repeat purchases by the F Change test, $F(1, 239) = 737.079$, $p < .001$. As a result, the greater system quality, greater will be their repeat purchases ($\beta = 0.869$, $t = 27.149$, $p < .001$). The results of simple regression on system quality show the same correlation.

The result of the entry of information quality affects positively and significantly ($p < .001$) repeat purchases. It contributes positively and significantly to repeat purchases and explains 68% of the variance (R^2) in the repeat purchases by the F Change test, $F(1, 239) = 504.715$, $p < .001$. As a result, the greater information quality, greater will be their repeat purchases ($\beta = 0.824$, $t = 22.466$, $p < .001$). Information quality significantly ($p < 0.001$) impacts repeat visits. The simple regression reveals the same trend.

Service quality significantly ($p < .001$) affects repeat purchases. It contributes positively and significantly to repeat purchases and explains 61% of the variance (R^2) in the Repeat purchases by the F Change test, $F(1, 239) = 372.409$, $p < .001$. Therefore, the greater service quality, greater will be their repeat purchases ($\beta = 0.780$, $t = 19.298$, $p < .001$). The results of simple regression tell the same story.

Table 4 also shows the results of the entry of repeat purchases affect positively and significantly ($p < .001$) repeat visits. It contributes positively and significantly to repeat purchases and explains 68% of the variance (R^2) in the repeat purchases by the F Change test, $F(1,239) = 513.562$, $p < .001$. Hence, the greater repeat purchases, greater will be their repeat visits ($\beta = 0.826$, $t = 22.662$, $p < .001$).

Table 4 shows the results of the entry of repeat purchases affect positively and significantly ($p < .001$) service performance. It contributes positively and significantly to repeat purchases and explains 68% of the variance (R^2) in the repeat purchases by the F Change test, $F(1, 239) = 510.037$, $p < .001$. Thus, the more repeat purchases greater will be their service performance ($\beta = 0.825$, $t = 22.584$, $p < .001$). Tis correlation is also confirmed by the simple regression.

From the above discussion, it can be concluded that system quality, information quality, and service quality affect user satisfaction in terms of repeat purchases and repeat visits. Repeat purchases and repeat visits (user satisfaction) affect service performance, thus the 11 hypotheses are supported.

Table 4. Hypotheses Testing Results

Hypothesis	N = 241, df = 1				
	R^2	F-value	β	t-value	Result
H1: System Quality and Repeat Purchases	0.755	737.079	0.869*	27.149	Supported
H2: System Quality and Repeat Visits	0.552	294.695	0.743*	17.167	Supported
H3: Information Quality and Repeat Purchases	0.679	504.715	0.824*	22.466	Supported
H4: Information Quality and Repeat Visits	0.701	559.273	0.837*	23.649	Supported
H5: Service Quality and Repeat Purchases	0.609	372.409	0.780*	19.298	Supported
H6: Service Quality and Repeat Visits	0.711	587.135	0.843*	24.231	Supported
H7: Repeat Purchases and Repeat Visits	0.682	513.562	0.826*	22.662	Supported
H8: Repeat Purchases and Service Performance	0.681	510.037	0.825*	22.584	Supported
H9: Repeat Visits and Service Performance	0.753	729.836	0.868*	27.015	Supported
H10: Service Performance and Repeat Purchases	0.681	510.037	0.825*	22.584	Supported
H11: Service Performance and Repeat Visits	0.753	729.836	0.868*	27.015	Supported

Notes: Supported hypothesis at *$p < 0.001$

7. Conclusion and future work

Of the theoretical models, DeLone and McLean's (2003) model is one of the most comprehensive models as it received the most support from subsequent empirical studies. As a result, the current study used this model as the conceptual foundation for this research. The study's research question was: to what extent is DeLone and McLean IS success model applicable in eCRM of Thai hotel sector where 400 eCRM users in five provinces in the north part of Thailand were selected as the study's sample. An online survey questionnaire was chosen to collect data. A total of 241 usable questionnaires were obtained. Correlation analysis and regression analysis were used to analyse the study's model due to the applied nature of the research.

The correlation analysis was first used to analyse Delone and McLean IS success model. Findings indicated that there were significant direct associations among system quality, information quality, service quality, repeat purchases, repeat visits, and service performance.

Contribution of this study is analysing and applying a model, a set of instruments, and a research process from the United States in an Eastern country (Thailand). This study arrived at the applicability of the use of the DeLone and McLean IS success model in Thai hotel sector.

This study has several implications for future research suggested by the findings. First, future research may analyse the applicability of the DeLone and McLean IS success model in different types of organisations and other societies. Second, the sample in this study was small. The data analysis was based on a total of 241 usable questionnaires. Organisation impact had to be dropped due to the small sample in this study. Confirmatory factor analysis and structural equation modeling cannot be used due to the small sample size and we could attempt only an application of the model using correlation and regression analyses. Finally, future research could employ qualitative methods to obtain the benefits of triangulation. For example, actual observation of the use of eCRM or interviewing eCRM users may give valuable insights regarding their satisfactions with eCRM systems.

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