The Prediction Model for Average Daily Rate (ADR) For a Sample of Three-Star Hotels in Bangkok

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Abstract

The main objective of this research was to propose an Average Daily Rate (ADR) prediction model for three-star hotels in Bangkok using Hedonic Price Model. The variables in the model were derived from literature review and suggested by an expert panel. Factor Analysis was adopted to merge the highly correlated variables. The data from two hundred and twenty three hotels in Bangkok were collected, after removing outlier data. The results showed that there are eight variables affecting ADR and the five variables that have the highest regression coefficients were: 1) score of location overview, 2) swimming pool availability (has or has not), 3) score of room comfort, 4) score of staff performance and 5) hotel located in CBD (yes or no). After testing for the best fit model, the log-linear model was selected because of its highest Adjusted R^2 (AdjustedR^2 = 0.548). The verification of the model was conducted by pair sample t-tests method. The results showed that the observed ADRs and the predicted ADRs from the proposed model were not significantly different, as shown from the p-value of 0.306 at 0.05 significance level. Furthermore, Theil's U statistic was 0.516. This showed that the proposed model can be used in order to provide useful information for investors or developers regarding hotel value appraisal, or pricing hotel's room rates. Finally, it should be noted that the ADR of three-star hotels used in this research were between 700 and 4,983 Baht/room/night with average ADR of 1,445 Baht/room/nigh and the room areas were between 15 and 97 square meters with average area of 30 square meters.

Keywords: Average Daily Rate (ADR), three-star hotels, Bangkok, Hedonic Price Model, Multiple Regression Analysis.

1. Introduction

Information from Annual Registration Statement (56-1 Form) from 2012 to 2014 of five Thai listed hospitality companies in Stock Exchange of Thailand presented that room revenue is the major revenue of this business, as detailed in Table 1.

Room revenue directly affects to hotel's value when it is appraised by income approach technique. This technique is widely adopted because the value is reflected from its future net cash flow (Raleigh and Roginsky, 1999). In addition, an important indicator for evaluating sales performance in hotel business is Average Daily Rate (ADR). In Thailand, it is

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calculated in a specific time frame such as monthly, quarter, yearly. The unit of ADR is Baht (Thailand's currency) /room/ night. ADR can be calculated as presented below: (Raleigh and Roginsky, 1999).

$$ADR = \frac{Room\ Revenue}{Number\ of\ Room\ Sold} \qquad (1)$$

Comparing the size of hotel business by province from survey report of Thailand's National Statistical Office on 2011 (National Statistical Office, 2012), the famous travel destination city is Bangkok. Revenue of hotel in Bangkok is about 22.02% of Thailand's hotel revenue, as detailed in Table 2.

Correspondingly, the information from National Statistical Office (2012) identified that room revenue of hotel in Bangkok was about 62.79% of total revenue of hotels in Bangkok, as detailed in Table 3.

Table 1: Room Revenue of Five Hospitality Listed Companies

Company	Ratio of Room Revenue		
	Year 2012	Year 2013	Year 2014
CENTEL (2015)	62.00%	56.00%	53.00%
DTC (2015)	54.32%	55.00%	52.16%
GRAND (2015)	66.43%	66.43%	64.47%
ROH (2015)	59.67%	60.09%	57.12%
SHANG (2015)	55.41%	55.05%	52.67%

Table 2: Thailand's Hotel Revenue by Region

Region	Revenue (MB)	Ratio
Bangkok	33,147	22.02%
Middle	33,844	22.48%
North	17,091	11.35%
North East	8,578	5.70%
South	57,871	38.45%
Total	150,534	100.00%

Table 3: Bangkok Hotel's Revenue Structure

Location	Room Revenue (MB)	Other Revenue (MB)	Total Revenue (MB)
Bangkok	20,813	12,334	33,147
	62.79%	37.21%	100.00%

The data from www.agoda.com on December 2014 informed that there are 901 hotels in Bangkok which consisted of 558 three-star hotels, 259 four-star hotels and 84 five-star hotels. The data showed that more than 50% of hotels in Bangkok are three-star hotels. Therefore, this research focused on three-star hotels in Bangkok.

Reviewing several former ADR prediction model research works, it was found that the independent variables affecting ADR in each research was different. For example, the research of Chen and Rothschild (2010) in Taipei found hotel's brand affected ADR but this variable did not affect ADR in the research of Zhang, Ye, and Law (2011), which was done

in New York, USA. Therefore, the aim of this research was to propose an Average Daily Rate (ADR) prediction model for three-star hotels in Bangkok.

2. RESEARCH OBJECTIVES

There were two main objectives of this research:

1. To propose ADR prediction model for three-star Bangkok hotels using Hedonic Price Model.
2. To test the accuracy of the acquired model.

3. LITERATURE REVIEW

3.1 Hedonic Price Model

Hedonic Price Model is the implicit price prediction model of each goods attribute by Multiple Regression Analysis. The dependent variable is the price of goods and the independent variables are the physical attributes of goods (Rosen, 1974).

There are four model types that have been normally used in the former research works, as listed below: (Israeli, 2002; White and Mulligan, 2002; Chen and Rothschild, 2010; Zhang, Ye, and Law, 2011; Abrate, Capriello and Fraquelli, 2011).

1. linear–linear form.
2. log-linear form transforming dependent variable by taking logarithm.
3. linear-log form transforming independent variables by taking logarithm
4. log-log form that transformed both of variables by taking logarithm.

3.2 Multicollinearity Problem

Multicollinearity problem can occur when the correlation of any pair of the independent variables is more than 0.750 (Prasith-rathsint and Sukkasem, 1993). Moreover, Variance Inflation Factor (VIF) is another multicollinearity investigative tool, where VIF value should not be more than 10. The VIF value can be calculated as presented below: (Panichwong, 2002).

$$VIF(X_h) = \frac{1}{1-R_h^2} \qquad (2)$$

where, R_h^2 is the R^2 value of the equation and X_h is dependent variable.

3.3 The Best Fit Model Selection

There are four statistical criteria for evaluating the Multiple Regression Analysis models in this research. The criteria were summarized in Prasith-rathsint and Sukkasem (1993), Wanitbancha (2003), and Panichwong (2002):

1) The Sig. value of each independent variable should not less than 0.05. The value is used for screening insignificance variables departed from model.

2) The Adjusted R^2 value, which can be used in measuring how the data fit in regression model, should high as much as possible.

3) The VIF value of each independent variable, which is used for testing multicollinearity problem, should not more than 10.

4) The residual value from Multiple Regression Analysis should comply with the following criteria:

4.1) The residual values of all data are normally distributed.

4.2) The mean of residual value is zero.

4.3) Each residual value and prediction value is independent, which can be observed from their scatter plot. This criteria check can confirm that heteroscedasticity problem does not occur.

4.4) The relationship of each residual value is independent. It can be observed from the Durbin-Watson statistic value between 1.50 and 2.50.

3.4 Summary of Former ADR Research Works

Hedonic Price Model is the famous method adopted to analyze ADR for hotel business. Extensive models are log-linear and Linear Regression, as summarized in Table 4.

From literature review, there were seven independent variables affecting ADR (Average Daily Rate), which can be categorized into 3 constructs: 1) Rating 2) Physical Attributes and 3) Locations Attributes, as presented in Table 5.

Table 4: Summary of ADR Previous Researches

Authors	Research's Area	Sample Size	The Best Model	Adjusted R^2 orR^2
[1] Israeli (2002)	Israel	215 hotels	Linear	0.620-0.820
[2] White and Mulligan (2002)	Arizona, Colorado, New Mexico and Utah (USA)	584 hotels	Linear	0.570-0.583
[3] Chen and Rothschild (2010)	Taipei	73 hotels	log-linear	0.681-0.703
[4] Zhang, Ye, and Law (2011)	New York, USA	243 hotels	log –linear	0.311-0.686
[5] Abrate, Capriello and Fraquelli (2011)	Turin, Italy	140 hotels	log –linear	0.7804

Table 5: Variables Affecting ADR from Former Research Works

Group	Independent Variables	Sources				
		[1]	[2]	[3]	[4]	[5]
Rating	1. Star Rating	X				X
	2. Brand	X	X	X		
Physical Attributes	1. Amount of Rooms	X				
	2. Average Room Size		X	X		
	3. Hotel's Facilities			X	X	X
Location Attributes	1. Located in CBD		X	X		
	2. Closed to Travel Destination		X			

4. Methodology

This research analyzed and proposed an ADR prediction model by Hedonic Price Model approach. An ADR is the dependent variable while the independent variables are hotel's rating, physical attributes, and location attributes derived from literature review and screened by thirteen experts in hotel business. The research framework is presented in Figure 1 and the details of each step are presented as follows.

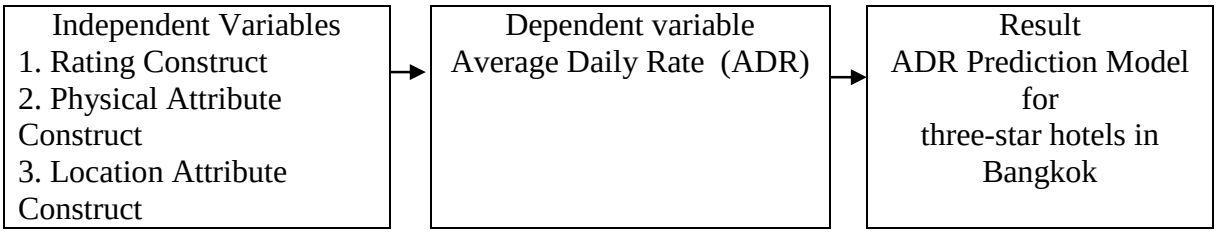

Figure 1: Proposed Research's Framework of Independent and Dependent variables influencing ADR Prediction models for a sample of three Star Hotels in Bangkok.

4.1 Independent Variables

Twenty-one independent variables derived from literature review were arranged into three constructs, i.e. 1) Rating, which the authors put "R" in front of the variables' names, 2) Physical Attributes, which authors put "P" in front of the variables' names, and 3) Location Attributes, which authors put "L" in front of the variables' names. All variables were verified by thirteen experts, who were high-level managers in the hotel business not less than five years working experience. The experts' details are presented in Table 6.

After variables were verified by the experts, four variables were removed from the analysis, as emphasized in Table 7. Most of the experts agreed that these variables do not directly affect to ADR of the hotels in Bangkok.

Table 6: **Hotel Management Experts' Details**

No.	Role	Organization	Number of Hotels in Responsible
1	Management in Sale and Marketing	Listed Company in Hotel Business	5
2	Management in Finance	Listed Company in Hotel Business	26
3	Management in Business Development	Listed Company in Hotel Business	16
4	President	Sale and Marketing Consultant	4
5	Management in Finance	Listed Company in Hotel Business	5
6	Management in Operation	Company in Hotel Business	5
7	Management in Finance	Listed Company in Hotel Business	11
8	Management in Marketing	Listed Company in Hotel Business	4
9	Hotel's Owner	Stand Alone Hotel	2
10	Hotel's Owner	Stand Alone Hotel	1
11	Hotel's Owner	Stand Alone Hotel	1
12	General Manager	Stand Alone Hotel	1
13	Hotel's Owner	Stand Alone Hotel	1

Table 7: Independent Variables for ADR Prediction Model

No.	Construct	Variable Name	Description	Experts' Suggestion	
				Included	Ratio
1	Rating	R_Brand	Hotel's International Brand (Has or Has Not)	11/13	84.62%
2	Physical Attributes	P_NoRm	Number of rooms	9/13	69.23%
3		P_Rmsize	Average Room Size (Square Meter)	13/13	100.00%
4		P_Outlet	Number of Outlet in Hotel	10/13	76.92%
5		P_Pool	Swimming Pool (Has or Has Not)	10/13	76.92%
6		P_Fitness	Fitness (Has or Has Not)	9/13	69.23%
7		P_Kid	Kid Club (Has or Has Not)	6/13	46.15%
8		P_Spa	Spa (Has or Has Not)	9/13	69.23%
9		P_Recrea	Other Recreations such as Tennis, Squad etc. (Has or Has Not)	7/13	53.85%
10		P_Rs	Room Service (Has or Has Not)	11/13	84.62%
11		P_Rs24	Room Service for 24 Hrs(Has or Has Not)	5/13	38.46%
12		P_Meet	Meeting Room (Has or Has Not)	11/13	84.62%
13		P_Bns	Business Center (Has or Has Not)	5/13	38.46%
14		P_Internet	Free Internet in Room (Has or Has Not)	10/13	76.92%
15	Location Attributes	L_CBD	Located in CBD (Yes or No)	13/13	100.00%
16		L_BMRT	Distance from Hotel to Bangkok Mass Rapid Transit (Kilometers)	11/13	84.62%
17		L_Airport	Distance from Hotel to Airport (Kilometers)	10/13	76.92%
18	Add by Experts	P_Lms	Limousine Service (Has or Has Not)	2/13	15.38%
19		P_Staff	Staff Performance Score from Agoda Review	11/13	84.62%
20		P_Room	Room Standard Score from Agoda Review	12/13	92.31%
21		L_Ovw	Location Score from Agoda Review	11/13	84.62%

Note: Shaded items were removed from this study.

It also should be noted that the distance variables, i.e. L_BMRT and L_Airport were measured by Google Map and other dummy variables would be "0" if the hotel does not have the computing attribute and be "1" if hotel has it. In addition, all dummy variables were standardized for regression analysis.

4.2 Source of Data

Thai Hotel Association rated hotels in 2012 using Ministry of Tourism and Sports' criteria, as mentioned above (Thai Hotel Association, 2012). A sample of Fifty-six hotels in Bangkok were rated, consisting of twenty-one five-star hotels, twenty-four four-star hotels, eight three-star hotels and three two-star hotels. However, the number of hotels from this source was insufficient for performing Multiple Regression Analysis, which requires at least five samples per one independent variable, as suggested by Bartlett, Kotrlik, and Higgins (2001).

For this reason, the hotel rating stars acquired from Agoda (www.agoda.com) were selected to be used in this research. From the comparison between hotel ratings from Thai Hotel Association and Agoda, it was found that fifty-four hotels from fifty-six hotels (or 96.42%) were rated in the same level, showing the validity of this source of data.

The variables in the physical and location attribute constructs were collected from the hotels' public information and ADR was also calculated by the average twelve month room rate of all room types in each hotel from Agoda. All data were collected in September to December 2014.

After collecting data, it was found that R_Brand (hotel's international brand (has or has not)) and P_Recrea (others recreation such as tennis, squad etc. (has or has not)) should be removed from the analysis because 94.30% of samples has not international brand and 97.34% of samples does not have other recreations). The list of all independent variables is presented in Table 8.

Table 8: Independent Variables for Prediction Model

Construct	No.	Variables	Description	Measure
Physical Attributes	1	P_NoRm	Number of rooms	Scale
	2	P_Rmsize	Average Room Size (Square Meter)	Scale
	3	P_Staff	Staff Performance Score from Agoda Review	Scale
	4	P_Room	Room Standard Score from Agoda Review	Scale
	5	P_Outlet	Number of Outlet in Hotel	Scale
	6	P_Pool	Swimming Pool (Has or Has Not)	Dummy
	7	P_Fitness	Fitness (Has or Has Not)	Dummy
	8	P_Spa	Spa (Has or Has Not)	Dummy
	9	P_Rs	Room Service (Has or Has Not)	Dummy
	10	P_Meet	Meeting Room (Has or Has Noy)	Dummy
	11	P_Internet	Free Internet in Room (Has or Has Not)	Dummy
Location Attributes	12	L_CBD	Located in CBD	Dummy
	13	L_Ovw	Location Score from Agoda Review	Scale
	14	L_BMRT	Distance from Hotel to Bangkok Mass Rapid Transit (Kilometers)	Scale
	15	L_Airport	Distance from Hotel to Airport (Kilometers)	Scale

4.3 Sample Size

The number of three-star hotels in Bangkok presented in Agoda during the data collecting period was 558 hotels. The minimum sample size was calculated by Yamane's formula (Yamane, 1973), as shown in the equation below. Where "n" is the sample size, "N" is the number of population that is replaced by the number of each star hotel, and "e" is the acceptable error that was replaced with 0.05. The number of samples from the calculation was equal to 233 hotels.

$$n = \frac{N}{1+ Ne^2} \qquad (3)$$

4.4 Independents Variables' Correlation

There is a pair of variables that has correlation value of 0.902, more than 0.750. These variables are P_Staff (staff performance score from Agoda review) and P_Room (room standard score from Agoda review). The correlation values of all independent variables are presented in Table 9 and Table 9a.These two variables have to be merged into one variable

by Factor Analysis. The component score of P_Staff and P_Room is 0.513, new variable name is P_StfRm.

Table 9: Correlation Values of All Independent Variables

Independent Variable	P_NoRm	P_Rm size	P_Staff	P_Room	P_Outlet	P_Pool	P_Fitness	P_Spa
P_NoRm	1.000							
P_Rmsize	0.062	1.000						
P_Staff	-0.223	0.027	1.000					
P_Room	-0.223	0.014	0.902	1.000				
P_Outlet	0.263	0.011	-0.080	-0.095	1.000			
P_Pool	0.293	0.257	-0.097	-0.071	0.113	1.000		
P_Fitness	0.224	0.356	-0.036	-0.013	0.198	0.478	1.000	
P_Spa	0.243	0.039	-0.119	-0.103	0.213	0.261	0.168	1.000
P_Rs	0.067	0.059	0.048	0.039	0.124	0.141	0.002	0.195
P_Meet	0.379	0.150	-0.134	-0.149	0.487	0.209	0.234	0.252
P_Internet	-0.285	-0.160	0.189	0.193	-0.084	-0.099	-0.153	0.005
L_CBD	-0.176	-0.117	0.101	0.113	-0.180	-0.090	-0.095	-0.209
L_Ovw	-0.101	-0.162	0.324	0.387	-0.110	-0.134	-0.222	-0.127
L_BTS	0.079	-0.057	-0.080	-0.070	0.032	-0.054	0.089	0.053
L_Airport	-0.064	-0.049	0.092	0.069	-0.091	-0.027	-0.017	-0.146

Table 9a: Correlation Values of All Independent Variables (Continue)

Independent Variable	P_Rs	P_Meet	P_Internet	L_CBD	L_Ovw	L_BTS	L_Airport
P_Rs	1.000						
P_Meet	0.101	1.000					
P_Internet	0.029	-0.167	1.000				
L_CBD	-0.042	-0.272	0.118	1.000			
L_Ovw	0.076	-0.160	0.087	0.425	1.000		
L_BTS	0.025	0.068	-0.112	-0.436	-0.299	1.000	
L_Airport	-0.046	-0.175	0.107	0.561	0.259	-0.293	1.000

After merging the correlate variables, the final numbers of independent variables were fourteen. The ratio between the sample sizes to the number of independent variables is 233 to 14 or 16.643, more than the minimum ratio mentioned above.

4.5 Independents Variables Selection

The independent variables were selected to be included into the model by Stepwise Regression Method. This method analyzed the previously inserted variables and new variable inserted in the last time together when there is a new variable inserted into the model.

4.6 Prediction Model Test Method

Two methods were adopted in order to measure the accuracy of the model. Both were tested by 30 random hotels which were not analyzed in the Multiple Regression Analysis process.

The first was a pair samples t-tests. This method compares the mean of the observed ADRs and the mean of the predicted ADRs from models at 0.05 significance levels in order to verify the accuracy of the model.

The second one was Theil's U Test. This method was proposed by Makridakis, Wheelright and McGee (1983). Theil's U statistic value always more than 0 and the value less than 1 will

show that the testing model is accurate. On the other hand, if the value is more than 1, the model is inaccurate. The less value the test shows, the more accuracy the model can predict the dependent variable. Theil's U statistic value can be calculated by the following formula:

$$Theil'sU = \sqrt{\frac{\sum_{i=1}^{n-1}(\frac{F_{i+1}-X_{i+1}}{X_i})^2}{\sum_{i=1}^{n-1}(\frac{X_{i+1}-X_i}{X_i})^2}} \qquad (4)$$

Where, F is predicted value from model
X is observed value
i is data number
n is number of total data

5. Results

From the analysis, log-linear model had the highest Adjusted R^2 value of 0.459 and the Adjusted R^2 values of all models are presented in Table 11 and the details of Descriptive Statistics are in Table 12.

Moreover, the other statistical values for Multiple Regression Analysis are conformed to the mentioned criteria. The summaries of statistic test are presented in Table 13.

Table 11: Adjusted R^2 Values of Each Model

Model Form	log-linear	log-log	linear form	linear-log
Adjusted R^2	0.484	0.476	0.459	0.444

Table 12: Descriptive Statistic of log-linear Model

Variables	Coefficient	Std. Error	t-Statistic	Sig.	Collinearity Statistic: VIF
Constant	2.190	0.078	28.008	0.000	
P_Rmsize	0.004	0.001	6.426	0.000	1.210
L_Ovw	0.054	0.008	6.508	0.000	1.300
P_Fitness	0.026	0.008	3.411	0.001	1.424
P_StfRoom	0.043	0.009	4.737	0.000	1.148
L_Airport	0.005	0.001	3.731	0.000	1.083
P_Pool	0.022	0.007	2.988	0.003	1.298

Table 13: Statistic Test for log-linear Model

Statistic Test	Value
Adjusted R^2	0.484
VIF of all variables are less than 10	Yes
Residual Analysis	
1. Normal distribution	Yes
2. Mean is equal to zero.	Yes
3. Do not have heteroscedasticity problem.	Yes
4. No relationship between each residual.(Durbin-Watson statistic between 1.50 to 2.50)	1.773

The scatter plot between residuals and predicted ADRs, as shown in Figure 2, informed that the predicted ADRs were not depended on residuals. It means the model do not have heteroscedasticity problem.

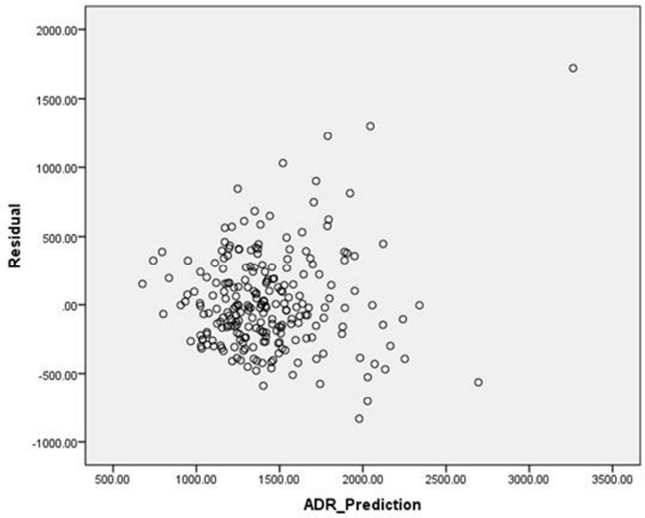

Figure 2: Scatter Plot between Residuals and Predicted ADRs of the log-linear Model

5.1 Results after Outlier Removal

The Adjusted R^2 value from the multiple regression analysis is presented above. It is lower than 0.500. It means the prediction model can match with prediction results lower than 50%. Therefore, outlier data were removed from the analysis, for which Z-score of residual values on observed ADR are between 1.960 and -1.960. Their mean areas under the distribution graph are about 95%. The number of hotel after outlier removal was 223 hotels, of which the ADR were between 700 and 4,983 Baht/room/night with average ADR of 1,445 Baht/rom/night and the room areas were between 15 and 97 square meters with average area of 30 square meters. The ratio between the sample sizes to the number of independent variables is 223 to 14 or 15.928, more than the minimum ratio mentioned above.

The results found that the Adjusted R^2 of log-linear model increase from 0.484 to 0.548 while the other statistic values for Multiple Regression Analysis are still conformed to the criteria. The summary of statistical tests is presented in Table 14 and Table 15.

Table 14: Descriptive Statistic of log-linear Model after Outlier Removal

Variables	Coefficient	Std.Error	t-Statistic	Sig.	Collinearity Statistic: VIF
Constant	2.224	0.078	28.520	0.000	
P_StfRoom	0.045	0.009	5.234	0.000	1.161
P_Rmsize	0.004	0.001	6.903	0.000	1.190
L_Ovw	0.052	0.008	6.361	0.000	1.448
P_Pool	0.027	0.007	3.917	0.000	1.272
L_Airport	0.003	0.001	2.132	0.034	1.468
P_Fitness	0.025	0.007	3.540	0.000	1.402
L_CBD	0.016	0.008	2.117	0.035	1.668

Table 15: Statistical Test for log-linear Model after Outlier Removal

Statistical Test	Value
Adjusted R^2	0.548
VIF of all variables are less than 10	Yes
Residual Analysis 1. Normal distribution 2. Mean is equal to zero. 3. Do not have heteroscedasticity problem. 4. No relationship between each residual.(Durbin-Watson statistic between 1.50 to 2.50)	 Yes Yes Yes 1.818

The scatter plot between residuals and predicted ADRs, as shown in Figure 3, informed that the predicted ADRs were not depended on residuals. It means the model do not have heteroscedasticity problem.

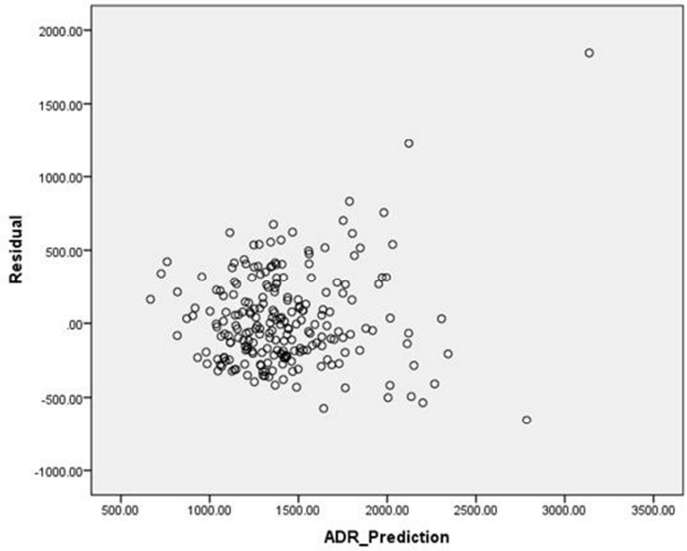

Figure 3: Scatter Plot between Residuals and Predicted ADRs of the log-linear Model after Outlier Removal.

There are eight significant independent variables at 95% confidence level. The acquired equation is shown below. The values of dummy variables, after standardization, for input into the model are presented in Table 16.

$$\log(ADR) = 0.052(L\_Ovw) + 0.027(P\_Pool) + 0.025(P\_Fitness) + 0.045(P\_StfRoom) + 0.016(L\_CBD) + 0.004(P\_Rmsize) + 0.003(L\_Airport) + 2.224 \quad (5)$$

Whereas, $P\_StfRoom = 0.513(P\_Room) + 0.513(P\_Staff)$

Table 16: Dummy Variables' Value for Model

Variables	Has	Has Not
P_Pool	1.354	-0.735
P_Fitness	1.587	-0.627
L_CBD	0.968	-1.028

5.2 Model Accuracy Test

Paired samples t-test between the observed ADRs and the predicted ADRs from log-linear model of 30 random hotels, which were not used in Multiple Regression Analysis process, gained 0.306 p-value at 0.05 significance level. The result showed that the observed ADRs and the predicted ADRs from the proposed model are not significantly different.

In addition, the result from Theil's U Test between observed ADR and predicted ADR from log-linear model of 30 randomly selected hotels, which are the same hotels of pair sample t-test, gained 0.516 Theil's U, which less than 1.00. The result showed the proposed model is acceptably accurate.

6. Conclusion & Discussion

The best fit model for ADR prediction from this research is log-linear model with 0.548 Adjusted R^2 value and perfectly conforms to the residual analysis criteria. The model is acceptably accurate after being tested with pair sample t-test, which the p-value is 0.306 at 0.05 significance levels, and Theil's U statistic value is 0.516.

There are eight significant variables at 95% confidence level and the five variables that have the highest factor loadings: 1) score of location overview, 2) swimming pool availability (has or has not), 3) score of room comfort, 4) score of staff performance, and 5) hotel located in CBD (yes or no). This finding indicates the important five success factors of the three-star hotels in Bangkok, which hotel developers and investors should realize in hotel appraisal or pricing hotels' room rates.

The acquired hotel room rate prediction model for three-stars hotels in Bangkok is shown in equation 5 mentioned above. In addition, the authors illustrate how to apply the model in the form of calculation table, which is convenience to be used, in Table 17.

Table 17: Example of Calculation Table

Variables	Hotel Attributes				Factor Loading	Value for Model [A]	Regression Coefficient [B]	Result [A] x [B]
	Input Value	For Dummy Variables		Final Value				
		Has	Has Not					
L_Ovw	7.40	NA	NA	7.400		7.400	0.052	0.385
P_Pool	0	1.354	-0.735	-0.735		-0.735	0.027	-0.020
P_Fitness	0	1.587	-0.627	-0.627		-0.627	0.025	-0.016
P_Room	8.20	NA	NA	8.200	0.513	8.510	0.045	0.383
P_Staff	8.40	NA	NA	8.400	0.513			
L_CBD	1	0.968	-1.028	0.968		0.968	0.016	0.015
P_Rmsize	19.60	NA	NA	19.600		19.600	0.004	0.078
L_Airport	19.30	NA	NA	19.300		19.300	0.003	0.058
Constant								2.224
log(ADR)								3.108
ADR(Baht/night)								1,282

The research results were presented to hotel's business experts to verify and for them to give some advantageous comments. Moreover, there were some interest topics found from comparison with the results of the former research works, as discussed below.

1. The effect of location on ADR is higher than the effects from room facilities or staff performance. The experts' opinions are that, according to their experiences, the customers who book hotels via online travel agency (OTA), such as www.agoda.com, tend to give priority to location more than facilities and services.

2. The hotel's international brand (R_Brand) does not have effect on ADR for three-star hotels in Bangkok, differing from the former research results of Israeli (2002), White and Mulligan (2002), Chen and Rothschild (2010). Experts' opinion for this issue is that the customers who book hotels via online travel agency (OTA) also tend to give priority to location facilities more than hotel's brand. It means that the majority of the customers will select hotels with more facilities but without international brand more than the hotel with international brand but less facilities, if necessary.

3. The best fit model was log-linear form that is conformed to several former research works. However, this form of model is difficult to analyze the change in ADR when some independent variables are changed because the ADR will be changed in non-linear form. Therefore, sensitivity analysis table is necessary to analyze the effect of independent variable change, as the example in Table 18 which derived from assumptions in Table 17. The predicted ADR of three stars hotel of which room standard score from Agoda review is 8.20, staff performance score from Agoda review is 8.40, location score from Agoda review is 7.40, has not swimming pool, has not fitness room, located in CBD, 19.30 kilometers from airport is in range between 1,236 and 1,331 Baht/night/room, depending on its room size within the range between 15.60 and 23.60 square meters.

Finally, it should be noted that this research focused mainly on a revenue perspective. However, several variables which causing ADR changes also lead to the changes in investment cost. Therefore, the research user should also consider about the increased of investment cost, in order to acquire the comprehensive perspective.

Table 18: Sensitivity Analysis Table

Predicted ADR		Location Score from Agoda Review				
1,282 Baht/Room/Night		7.00	7.20	7.40	7.60	7.80
Room Size (sq.m.)	15.60	1,178	1,207	1,236	1,266	1,297
	16.60	1,189	1,218	1,247	1,278	1,309
	17.60	1,200	1,229	1,259	1,290	1,321
	18.60	1,211	1,241	1,271	1,301	1,333
	19.60	1,222	1,252	1,282	1,313	1,345
	20.60	1,234	1,264	1,294	1,326	1,358
	21.60	1,245	1,275	1,306	1,338	1,370
	22.60	1,257	1,287	1,318	1,350	1,383
	23.60	1,268	1,299	1,331	1,363	1,396

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