Assessment of the Efficiency of Guilan Province's Hotels Using Two-Stage DEA Method

Kambiz Shahroudi and Maryam Dery
1Industrial Management Department, Islamic Azad University-Rasht Branch, Rasht, Iran.
2Young Researches Club, Rasht Branch Islamic Azad University, Rasht, Iran.

Abstract: Given the fundamental importance of hotels in the tourism industry, we intend to lay the groundwork for the optimal utilization of the available facilities by studying the possibility of increasing efficiency, and also increase the revenues of this industry by improving the services provided by the hotels both qualitatively and quantitatively. As such, answering the following questions can lead to a more precise programming in order to use the resources and access to more effective outputs: do the hotels of Guilan province function efficiently? Which are the exemplary hotels? How much is the efficiency of hotels studied? How is the ranking of efficient hotels? How is the impact of environmental factors (in terms of spatial distance) on the efficiency of hotels? For this purpose, we use the two-stage Data Envelopment Analysis. In the first stage, the output-oriented envelopment CCR model and Anderson – Peterson model were used whereas multiple regression and Durbin – Watson test were used in the second stage. 28 two-star and three-star hotels were taken as samples and the results of the first stage showed that 3 hotel out of 28 hotels were efficient while the rest were inefficient. Moreover, the average of their efficiency score was 35% while the maximum efficiency was 100% and the minimum efficiency was 11%. According to the results of the ranking among the efficient hotels, Hotel Park was the most efficient hotel with the efficiency score of 1.75. On the another hand, the results of the second stage show that three independent variables of seashore, shopping center and green space influence the dependent variable which is efficiency; however, historical buildings (monuments) do not influence efficiency.

Key words: Efficiency, Hotel, Data Envelopment Analysis, Anderson – Peterson, Output-Oriented Envelopment CCR.

INTRODUCTION

Tourism industry plays a defining role in the global economy and makes a great amount of profits. Along with the other countries of the world, Iran can also enjoy the revenues of this industry by laying the proper groundwork (Khataei, 2003). Perhaps it can be said that the tourism industry is one of the most dynamic and sustainable human industries and as a result, each country endeavors to attract more tourists (Foster, 2009). The hotel industry is experiencing a competitive environment. Compiling suitable marketing strategies, fortifying hotel procedures and improving the quality of services are not only useful for profitability but will also serve the survival of hotels (Ching, 2007). All of these factors are directly or indirectly predicated on the efficiency of the hotels (Morey and Dittman, 1995).

According to the Document of 20-year Perspective and the horizon of 2025, the tourism industry in Iran should grow by 1.5 percent in terms of the number of tourist arrivals and attract some 20 million tourists annually which needs a $30 million investment with a 16% share for the governmental sector while the rest would be undertaken by the private sector (Gholizadeh, 2010). From the other hand, accommodative facilities including hotels and guesthouses are considered to be the world's 7th largest industry which makes $36 billion per annum. Therefore it has the greatest economic impact on the tourism industry in such a way that more than 60% of the expenses of a tourist would be dedicated to hotel and accommodation (Foster, 2009).

Having in mind the fundamental importance of hotels in the tourism industry, in the present research we intend to specify the grounds of optimal use of current facilities by studying the possibility of increasing the efficiency and productivity of hotel industry and also increase the revenues of this industry by improving the services both in terms of quality and quantity.

Today's hotel industry is a developed version of the guesthouses and caravanserais of the past which were considered to be the foundations of tourism industry and make a great amount of revenue for the various services which it provides. Additionally, an increase in the efficiency of the hotels can cause the improvement of employment (temporary employment in constructional affairs and direct employment in hotel activities) and help the government raise funds through taxes and since efficiency is a function of the motives, therefore a difference in the efficiency of hotels result from various factors. So, a mere attention to efficiency is not our concern (Barros et al., 2008). Nonetheless, motives can be taken into consideration from various aspects.

Corresponding Author: Kabiz Shahroudi, Industrial Management Department, Islamic Azad University, Rasht Branch, Rasht, Iran.
Email: K_shahroodi@yahoo.com
including time, distance etc, and given the review of literature, we take into consideration the distance factor in the present research.

In the present research, we deal with the following questions:

1- Do the hotels of Guilan province function efficiently?
2- Which are the exemplary hotels?
3- How much is the efficiency of the studied hotels?
4- How is the ranking of efficient hotels?
5- How is the impact of environmental factors (in terms of distance) on the efficiency of hotels?

The present research is put forward in 6 parts. The review of literature, methodology, organization of the data, the results of methods used and general conclusion are presented in the parts 2, 3, 4, 5 and 6 respectively.

**Literature Review:**

Not so much research has been done in terms of measuring the efficiency of hotels in Iran using the DEA method but outside Iran, several research works have been carried out in this area and we allude to some examples from among them:

Baker and Raily in a 1994 article titled "New Ideas about the Efficiency of Hotels", explored the efficiency of 20 hotels in Germany and France using the output-oriented DEA technique and the inputs they used included the number of full-time workers, the price of the rooms, number of rooms and their outputs included the total sales of the hotel and the number of guests. In the subsequent stage, they used multiple regression for investigating the impact of environmental factors on efficiency.

Anderson, Fish and Michello in a 1999 article titled "Measuring Efficiency in the Hotel Industry", used a frontier method to assess the efficiency of 48 hotels in the United States and used the output-oriented DEA technique with their inputs including the number of full-time workers, the total number of rooms, the total area of the restaurant and their outputs included the revenues resulting from the rooms and the revenues of the restaurant. Then they calculated the efficiency score of each hotel and separated the efficient hotels from the inefficient ones. The average efficiency score of the hotels was 89.4% with a maximum efficiency of 92.1% and a minimum efficiency of 84.3%. The hotels could decrease their inputs by 10.6% without having their outputs reduced.

Sigala in a 2003 article titled "The Development of the Data Envelopment Analysis for Exploring the Strategies of Internet Marketing in Hotel Industry" investigated 60 hotels in Greece using the output-oriented DEA technique the inputs of which included customer-dependant variables, virtual communications and information, spatial distributions and interactions and the outputs included visiting the websites, requests, reservations and the quality of services to the customers. In the subsequent stage, Analysis of Variance (ANOVA) was used to review the difference of averages.

Hu and Kai in a 2004 article titled "Evaluating the Efficiency of Hotel Workforce" assessed the efficiency of 242 hotels in California, the United States using the input-oriented DEA technique with their inputs including the number of full-time managers, number of rooms, payment of the managers and staff and their outputs included the total sales and total reveues. In the second stage, by taking into consideration the environmental effects, they investigated their impacts on efficiency using the multiple regression analysis method.

Barros in a 2005 article titled "Evaluating Efficiency and Hotel Industry" assessed the efficiency and productivity of 42 hotels in Portugal using the output-oriented DEA method and using the Malmquist index with their inputs including the number of full-time workers, the expenses of workforce, the operational expenses and the outputs included the number of guests, the number of occupied rooms and the average duration of tourists' staying. In this stage, 16 hotels out of 42 had Malmquist index larger than 1 and the average of the index was 85 percent which indicated that the majority of hotels faced reduction in productivity. In the second stage, Tobit Regression was used to investigate the impact of environmental factors on the extent of efficiency.

Barros and Santos in a 2006 study, reviewed the efficiency of 15 hotels in Portugal over a period of 5 years (from 1998 to 2002) using the output-oriented DEA method with their inputs including the number of fulltime workers, the amount of capital and their outputs included the number of occupied rooms, the number of guests and the average duration of the entire tourists' staying. The results of this review indicated that half of the hotels studied were economically inefficient. The average technical, specialized and economic efficiency in the state of constant efficiency in relation to the scale were 79%, 92% and 73% respectively while in the state of variable efficiency in relation to the scale, the abovementioned scores were 89%, 90% and 82% respectively.

It is suggested in this research that a supervising organization be established to monitor the performance of the hotels and improve their efficiency by offering incentives. It's one of the limitations of this research that the convergence of units is not observed, meaning that the hotels studied were different with each other in terms of situation, type of guests and qualities of services; therefore, the comparison of efficiency may be challenged.
Barros Carlos Pestana in a 2008 article titled "Technical Efficiency of African Hotels" assessed the efficiency of 12 hotels in Angola's Luanda between 2000 and 2006 in order to separate the efficient and inefficient hotels and investigate and identify the factors affecting efficiency and used two-stage DEA for this purpose. In the first stage, they used the output-oriented DEA with efficiency to constant scale and in the second stage, used Truncated Regression. Their inputs included total expenses, investment expenses and their output was the total revenue of the hotel and their incentive of efficiency in the second stage included trend, trend's square, the portion of market for each hotel, belongingness to the group and their internationality. The results have shown that first of all, the efficiency of hotels over the period of study had increased; however, reducing rate and belongingness to a group increased the efficiency. Moreover, the more the portion of market for each hotel is, the more the efficiency will be. Finally, the internationality of the hotels has a direct relationship with their efficiency.

Given the high importance of tourist regions for France and in order to shed a light on the best tourist regions, Barros Carlos Pestana et al in a 2010 article titled "Reviewing the Performance of France Tourist Regions" assessed and evaluated the efficiency of these regions using two-stage DEA. For a 22-unit sample, they calculated the efficiency score for each tourist region so that the efficient regions could be separated from the inefficient regions using the output-oriented DEA model with efficiency to constant scale. The input included the capacity of the dormitory and the number of arrivals in the tourist regions and the output included the number of night stays. In the second stage, the Truncated Regression was used with the environmental factors such as distance from mountain, adjacency to the museum, adjacency to the park, adjacency to the green space to investigate the effective environmental factors. The results showed that the average efficiency scores under constant efficiency to the scale was equal to 24% and this means that the inefficient resources can improve their outputs up to 75.9% with the same level of their current input. Moreover, several efficiency incentives are effective in the tourist regions of France the most important of which include sea, sun and seashore. However, incentives such as the development of parks, monuments, museums and ski fields are also effective in increasing the duration of tourists' staying.

Methodology:

Competition in each country originates from the performance of the companies of that country and competition in national level is reflected in the economic performance. These are prominent and important concepts. (Barros, 2004) and since the survival of a company in long run is determined by its performance, the assessment of performance is a vital job for the managers. Therefore, it's no surprise that today several methods are available for the evaluation of performance (Neves, 2005). The evaluation of performance as a reference and model in the process of decision-making is the foundation of every improvement. Today, for the assessment and evaluation of the performance, one of the conventional methods is the assessment of efficiency (Prigot, 2009).

In the present research, two-stage DEA method is used for assessing the efficiency of the hotels. This two-stage method is simultaneously used for specifying and estimating the efficiency scores and identifying the efficiency incentives. In the first stage, the efficiency score for the hotels would be specified using the envelopment output-oriented CCR model. To the other words, the efficient and inefficient hotels are separated from each other in this stage. In the second stage, the a correlation analysis will be conducted between the efficiency score and environmental variable which means that we want to know that what factors affect efficiency and to what extent each factor is effective. For example, the impact of factors such as adjacency to the seashore, adjacency to historical buildings etc can be estimated through regression.

In this section, we present the methods which are used in each of the two stages of the research.

Step One:

In the first step of the present research, the output-oriented envelopment CCR model will be used to identify the efficient and inefficient hotels and Anderson – Peterson method will be used to rank the efficient units and we will be probing into each of them separately.

Output-Oriented Envelopment CCR:

There are different methods for assessing the decision-making units. One of the most prevalent methods is the Data Envelopment Analysis technique. One of the characteristics of these new methods is their flexibility and the capability of using multiple inputs and outputs (Assaf, 2010).

In the Data Envelopment Analysis, a frontier function will be resulted using a collection of observations which contains all of the data and that's why it's called envelopment analysis. From the other hand, since this method is predicated on a number of optimization issues, there's no parameter for estimation in these questions; therefore, this method is a non-parametric technique (Fazli, 2002).

Generally, DEA is a linear planning method which uses several inputs and outputs to calculate and review efficiency for every decision-making unit (Hilary, 2010).
Efficiency in the framework of DEA means the optimal allocation of resources which are used. In explaining this optimization, there are two approaches. One is the output-oriented approach which is used for the production of the maximum output for every amount of input and the other one is input-oriented approach which means the minimum use of inputs for every amount of output data (Assaf, 2010). In the literature of measuring efficiency using DEA, from the view of the nature of efficiency to the scale, several models have been developed and there are two main models in this regard. The first model is under the assumption of constant efficiency to the scale which was named CCR according to the first letter of the names of those who researched and worked on it. In 1978 it was developed and is alternatively called CRS (Constant Return to Scale) which means efficiency to constant scale. The second model is the disproportionate increase or decrease in the outputs corresponding to increase in the inputs. This model is under the assumption of variable efficiency to scale and is called BBC model according to the first letter of the names of those who worked and researched on it in 1984 and is alternatively called VRS (Variable Return to Scale) meaning efficiency to variable scale.

Moreover, the output-oriented envelopment state is used. Envelopment is secondary to the multiple model (primary) and since the Simplex method is dependant on limitations and since there should be written one limitation for each DMU, then having in mind the envelopment state, the volume of Simplex operation will decrease and since in the present research we have 28 studied units, then the envelopment state will be more suitable and lead to economization in the volume of calculations and the output will be also used using the background of articles read and studied earlier.

One of the most sensitive parts of the work is to choose an evaluation model from among the collection of DEA data and to attach the complementary properties to the model so that it can provide a more realistic evaluation. In the present research, we use the output-oriented envelopment CCR model. The output-oriented envelopment CCR model is mathematically presented as follows:

\[
\begin{align*}
\text{Max} & \quad \theta \\
\text{st} & \quad \sum_{j=1}^{n} \lambda_j y_{rj} \geq \theta y_r \quad (r=1,2,...,s) \\
& \quad \sum_{j=1}^{n} \lambda_j x_i \leq x_i \quad (i=1,2,...,m) \\
& \quad \lambda_j \geq 0 \quad (j=1,2,...,n)
\end{align*}
\]

In which the objective function is of max type and \( \theta \) stands for the optimal value of efficiency. If \( \theta=1 \) then the studied unit is efficient and if \( \theta<1 \) then the unit is inefficient. In this model, the main objective is to score the highest value of output where \( \theta \geq 1 \) and \( 1/\theta \) show the extent of efficiency. \( m \) stands for the number of inputs, \( s \) represents the number of outputs and \( n \) shows the number of hotels. \( \lambda_j \) indicates the weight of the reference collections for the inefficient branches.

**Anderson – Peterson Method:**

Data Envelopment Analysis divides the units under investigation into two groups: efficient units and inefficient units. Efficient units have an efficiency score of 1 and the inefficient units have a score less than 0. From one hand, the inefficient units are likely to be ranked while the efficient units which score 1 using the classic DEA models are not possible to rank. However, a variety of methods including the Anderson – Peterson technique are proposed for this purpose. In 1993, Anderson and Peterson suggested a method for ranking efficient units, making it possible to identify the most efficient unit. Using this technique, the score of efficient units can be more than 1 and consequently, the efficient units can be ranked like the inefficient units (Mehregan, 2008: 125).

**Second Step:**

In the second step of the present research, we use the multiple regression method in order to investigate the intensity of impact of environmental factors on the efficiency produced in the first step; however, before using the regression method, the Durbin – Watson test must be carried out to preserve the independence of environmental factors.

**Durbin – Watson Test:**

Before using the multiple regression method, it’s necessary to use Durbin – Watson test in order to investigate the lack of correlation between the independent variables. Generally, one of the assumptions which is taken into consideration in regression is the independence of errors from each other, which means the difference between real values and the values predicted by the regression equation. If the hypothesis of the independence of errors is refuted and a correlation be observed between the errors, using regression will be impossible. Therefore, Durbin – Watson is one of the most famous tests for identifying the very correlation.
If we show the correlation of errors with \( p \), then the Durbin–Watson statistic will be calculated using the following equation:

\[
DW = 2(1-P)
\]

If this statistic is placed in the 1.5 to 2.5 range, then \( H_0 \) of the test which is the lack of correlation between the errors will be accepted and we can use regression; otherwise, \( H_0 \) will be rejected and under that circumstance, there will be a correlation between the errors and we can’t use regression. In order to carry out the Durbin–Watson test, we use the SPSS software (Mo’meni, 2010: 128)

**Multiple Regression:**

The objective of using multiple regression is to extract a mathematical equation which shows the relation between a dependant variable with several independent variables. In the present research with 4 environmental factors, we will have:

\[
\theta = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4
\]

And \( \theta \) will be dependent variable which is the efficiency resulting from the performance of hotels that is produced in the first step of the research using the output-oriented DEA model and \( X_1, X_2, X_3 \) and \( X_4 \) are effective environmental variables (adjacency to the seashore, adjacency to green space, adjacency to shopping centers and adjacency to historical buildings and monuments) and based on the sign of \( \beta_1, \beta_2, \beta_3 \) and \( \beta_4 \) the direct relation and reversion of environmental factors, the inefficiency will be specified (Azar, 2005)

**Organizing The Data And Information:**

In the present research, our survey population is consisted of all the two-star and three-star hotels which are 28 units altogether. Our sample will be the considered the same 28 units given the following inequality:

\[
\text{The number of assessed units} \geq 3 \times (\text{the number of inputs + the number of outputs})
\]

(Mehregan, 2008: 74)

**Table 1: Inputs, output & model with resources.**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Author/ Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chiang&amp;Tsai&amp;Wang(2004)</td>
</tr>
<tr>
<td></td>
<td>Barros&amp;Mascarenhas(2005)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Author/ Year</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Author/ Year</th>
</tr>
</thead>
</table>

As a matter of fact, the efficiency and productivity of a unit are function of the level of inputs used and outputs produced from it. Therefore, the variables involved in the assessment of the efficiency of the hotels studied are selected with reference to the review of the literature and the easier availability according to the Table (1). Moreover, all of the data are related to the year 2010 which have been obtained by referring to the Tourism, Cultural Heritage and Handicrafts Organization of the Guilan province.
The Results of the Methods Used:
The Results of the Step One:

Given the input and output data, the result of solving the output-oriented envelopment CCR model will be demonstrated by the Table (2).

Table 2: Results of First Stage Efficacy.

<table>
<thead>
<tr>
<th>Row</th>
<th>Hotels</th>
<th>Stars</th>
<th>Efficiency</th>
<th>Row</th>
<th>Hotels</th>
<th>Stars</th>
<th>Efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kudusan</td>
<td>3</td>
<td>11%</td>
<td>15</td>
<td>livador</td>
<td>2</td>
<td>12%</td>
</tr>
<tr>
<td>2</td>
<td>Baharestan</td>
<td>3</td>
<td>53%</td>
<td>16</td>
<td>Ordibehesht</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>Sepidar</td>
<td>3</td>
<td>30%</td>
<td>17</td>
<td>Park</td>
<td>2</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Mahan</td>
<td>3</td>
<td>15%</td>
<td>18</td>
<td>Pamchal</td>
<td>2</td>
<td>21%</td>
</tr>
<tr>
<td>5</td>
<td>Arshia</td>
<td>3</td>
<td>18%</td>
<td>19</td>
<td>Pardis</td>
<td>2</td>
<td>75%</td>
</tr>
<tr>
<td>6</td>
<td>Torang</td>
<td>3</td>
<td>14%</td>
<td>20</td>
<td>Hoorian gisoom</td>
<td>2</td>
<td>45%</td>
</tr>
<tr>
<td>7</td>
<td>Balal</td>
<td>2</td>
<td>58%</td>
<td>21</td>
<td>Cyrus</td>
<td>2</td>
<td>27%</td>
</tr>
<tr>
<td>8</td>
<td>Astara Guesthouse</td>
<td>2</td>
<td>61%</td>
<td>22</td>
<td>Ghasre darya</td>
<td>2</td>
<td>14%</td>
</tr>
<tr>
<td>9</td>
<td>Sea</td>
<td>2</td>
<td>24%</td>
<td>23</td>
<td>Aria</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td>10</td>
<td>Iran</td>
<td>2</td>
<td>98%</td>
<td>24</td>
<td>Kosar</td>
<td>2</td>
<td>13%</td>
</tr>
<tr>
<td>11</td>
<td>Pasargad</td>
<td>2</td>
<td>28%</td>
<td>25</td>
<td>Monfared Masouleh</td>
<td>2</td>
<td>74%</td>
</tr>
<tr>
<td>12</td>
<td>Sabalan</td>
<td>2</td>
<td>33%</td>
<td>26</td>
<td>Varan</td>
<td>2</td>
<td>61%</td>
</tr>
<tr>
<td>13</td>
<td>Anzali Guesthouse</td>
<td>2</td>
<td>65%</td>
<td>27</td>
<td>Fajr Lahijan</td>
<td>2</td>
<td>45%</td>
</tr>
<tr>
<td>14</td>
<td>Talesh</td>
<td>2</td>
<td>37%</td>
<td>28</td>
<td>Lahijan Guesthouse</td>
<td>2</td>
<td>100%</td>
</tr>
</tbody>
</table>

For instance, for the Hotel Baharestan, the efficiency calculated is equal to:

\[
\frac{1}{\frac{1}{1.89}} = 53\%
\]

Since the amount of efficiency for the abovementioned hotel is less than 100%, then it will be considered an inefficient unit.

According to the answer produced by solving the model using the LINGO software, the only reference unit for it will be Hotel Ordibehesht; therefore, the virtual unit for this hotel will be as follows:

The output vector for the Hotel Baharestan is equal to \([\begin{bmatrix} 5932 \\ 1181 \end{bmatrix}]\). As it can be seen, both the amount of first output and second output for the Hotel Baharestan is less than the outputs of virtual unit, showing that the amount of outputs of Hotel Baharestan under actual circumstances is significantly different from that of the virtual circumstances, so in order to render Hotel Baharestan an efficient unit, we assume that the annual growth rate of this hotel will be 10% and it will become an efficient unit within a few years.

From the other hand, among the 28 hotels assessed, the units 16, 17 and 28 are efficient which are respectively Hotel Ordibehesht, Hotel Park and Lahijan Guesthouse. After implementing the steps of Anderson – Peterson method for the three hotels of Ordibehesht, Park and Lahijan Guesthouse, the extent of efficiency for each of them will be demonstrated by the Table (3).

Table 3: Efficiency scores of efficient DMUs after applying AP model.

<table>
<thead>
<tr>
<th>Hotels</th>
<th>Efficiency</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park</td>
<td>1.75</td>
<td>1</td>
</tr>
<tr>
<td>Lahijan Guesthouse</td>
<td>1.25</td>
<td>2</td>
</tr>
<tr>
<td>Ordibehesht</td>
<td>1.17</td>
<td>3</td>
</tr>
</tbody>
</table>

The Results of Step Two:

The environment variables which are taken into consideration in the present research are as follows: Seashore, Shopping center, green space, historical buildings (monuments).

Before investigating the impact of environmental variables on the extent of efficiency produced in the first step using multiple regression, it's necessary to conduct Durbin – Watson test in order to take a look at the independence of the variables from each other.

\(H_0: \) There's no correlation between the variables

\(H_1: \) There's correlation between the variables
In order to conduct Durbin – Watson test, we used SPSS software and to use this software, we first enter the data related to each of the environmental variables which are collected with the cooperation of Tourism, Cultural Heritage and Handicrafts Organization of the Guilan province and then execute the necessary commands for solving the question. The results are shown in the Table (4). Since the value of d statistic for Durbin – Watson is 1.821 which is located in the 1.5 to 2.5 range, then the H₀ assumption will be accepted. To the other words, the assumption of the lack of correlation between the errors will not be rejected and in the present research, it is possible to use regression with these environmental variables.

Table 4: Results of the Dourbin-Weston-Test.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Durbin-Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.684a</td>
<td>.469</td>
<td>0.376</td>
<td>.22378</td>
<td>1.821</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), monuments, sea, shopping, green space
b. Dependent Variable: effiency

Consequently, the results of the multiple regression will be demonstrated by the Table (5) and we will have:

Table 5: Resultsof Multiple Regression.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.618 (.096)</td>
<td></td>
<td>6.409</td>
<td>.000</td>
</tr>
<tr>
<td>sea</td>
<td>.003 (.002)</td>
<td>.310</td>
<td>2.026</td>
<td>.045</td>
</tr>
<tr>
<td>shopping</td>
<td>-.183 (.049)</td>
<td>-.708</td>
<td>-3.728</td>
<td>.001</td>
</tr>
<tr>
<td>green space</td>
<td>-.014 (.010)</td>
<td>-.336</td>
<td>-1.329</td>
<td>.037</td>
</tr>
<tr>
<td>monuments</td>
<td>.010 (.006)</td>
<td>.480</td>
<td>60</td>
<td>.111</td>
</tr>
</tbody>
</table>

a. Dependent Variable: effiency

- Three independent variables (seashore, shopping centers and green space) and the constant value will influence the dependant variable (efficiency). Seashore has a direct relationship with efficiency (because the X₁ coefficient is positive.)
- Shopping centers and green space have a reverse relationship with efficiency (because the X₂ and X₃ coefficients are negative).
- Historical buildings (monuments) do not influence efficiency (because its Sig is not smaller than 0.05)
- If we approach the seashore 1 meter, efficiency will increase by 0.003 percent
- If we get away from the shopping centers 1 meter, efficiency will decrease by 0.183 percent.
- If we get away from the green space 1 meter, efficiency will decrease by 0.014 percent.

Conclusion:
Finally, the results produced from using the two-stage DEA method in the present research is indicative of the fact that the majority of two-star and three-star hotels in the Guilan province are not on the efficiency threshold. It's intrinsic that in a province like Guilan which attracts a great number of tourists, the hotel will be more efficient than the rest of hotels which properly and adequately uses its inputs and appropriately allocates these inputs to its activities so that the optimal and efficient allocation of the resources available in accordance to the principles and standard regulations serve to improve their performance and maximize their outputs. Unquestionably, any shortcoming in these areas will cause decline in efficiency. Having in mind the relevant inputs and outputs, the average efficiency score will be 35% and the maximum and minimum efficiency will be 100% and 11% respectively, meaning that the inefficient hotels can improve their outputs to 65% with the same level of their current input. Efficient hotels are Ordibehscht, Park and Lahijan Guesthouse and with the Anderson – Peterson ranking, the most efficient hotel was Hotel Park which has been used as a reference 21 times. From among the environmental factors, seashore has the greatest impact for the hotels of Guilan province while the historical buildings and monuments don't have any impact.

REFERENCES


