Evaluation of Efficiency and Ranking of Countries Based on the Performance in the Tourism area (Middle East)

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ABSTRACT

This study was conducted with the main aim to identify and rank the selected countries of Middle East in tourism area. Input variables including the input costs of tourist and the output costs of tourist, and the output variables including the number of tourists and the amount of revenue from the tourism are determined for the studied countries during the years 2008 to 2010. Since the results of this study have not been observed in other scientific articles, it is not possible to compare and analyze its results with other scientific papers. It should be noted that a logical method for ranking the countries in the studied selected portfolio has been provided in this paper by using the mathematical modeling. The results of calculation indicate that the first five countries of ranking include Kuwait, Lebanon, Saudi Arabia, Yemen, and Syria, respectively.

KEYWORDS: Performance of tourism area, ranking the tourism of countries, Evaluation of Tourism industry efficiency

1 - INTRODUCTION

The system-oriented view and thought and the systematic sect is one of the sects which are now accepted in most of the scientific disciplines and the scientific research and analyses have been done based on it. The positive feature of this view is the priority due to the one-sided and one-dimensional thinking. Accordingly, a person, whom has the worldview and thinking way based on the systematic approach, not only needs no one-dimensional and superficial thinking, but also seeks to achieve a more complete understanding of this matter, continue this own existence in a more well known position, and do the assigned tasks and duties in order to improve the existing system by investigating the whole of subject and taking into account all possible connections. Like any other systems, the tourism industry consists of components which are interacting with each other in order to achieve a certain goal. In this industry, they are the inputs which are entered the system and are put in the process of conversion and leave the system as the output. Systematic concept can easily be extended to the tourism industry. In Tourism system, the feedback, as a communicational circuit, specifies the way a system works and reflects the deviations. According to the information, which is received from the feedback circuit, the system creates the necessary modifications proportional to the circumstances of time and place and required position within itself. Tourists are among the major inputs in the tourism industry. Our attitudes and behavior may lead to their satisfaction or dissatisfaction. Their perceptions of our behavior will be reflected in their own environment. Their satisfaction will be as the factor for positive publicity about the features of our system and lead to the higher attraction of tourists, but their dissatisfaction will lead to a negative publicity and disposal of possible tourists. The satisfied tourists will be itself as an effective propagandist for attracting the new tourists. The proportionality among the components of system is essential. If the proportionality of components is lost, the performance of system will be impaired. The Equifinality is among the systematic concepts which can be generalized to the tourism industry. The system can reach a unit goal through a variety of ways and methods. The Equifinality feature creates the flexibility in terms of time and place conditions and the environmental changes. Investigating the system issue in the tourism industry is an approach to develop a method for evaluating the effectiveness of countries in this regard. Therefore, the advantages of tourism industry performance evaluation method, which is established in any country and the strength and weakness of each variable related to its performance in the tourism area, can be used for understanding the variables in developing this method. Some of these advantages, which can be as the calculation variables, are mentioned as follows (Wals, A. E., 2007).

In most of the countries, Tourism has been as a key sector in line with the economic development. However, the impact of tourism on the society has a direct correlation with the governmental system and their orientation. The tourism has multiple economic effects. The important effect of development of the industry is to create the job and income. Tourism development has a direct impact on the increased tax revenues. A part of tax revenues is obtained from the corporate income tax and sales tax (World Bank, 2009).

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Tourism plays the important role in providing the foreign exchange and improving the balance of payments. The barriers to access the foreign markets such as the trade quotas, taxes and etc. are moderated through attracting the tourists. Tourists' entry into the country can be considered as a kind of increase in exports and in contrast when the people in our country go to other countries, the imports of country will be increased. Thus the tourism industry affects the positive balance of country. Tourism is an applied industry, creates jobs for a large number of semi-professional workers, can mitigate the problem of unemployment and reduce the risk of political upheaval. If the tourism development policies are well planned and organized, they can be as the good ways to make the people familiar with the way of life in other nations, beliefs, customs, habits, and summary of traditions and cultures and subcultures of other countries. By creating the possibility of cultural exchange and social interaction in this process, the fields are created which lead to the public extended vision and enriches the cultural experiences (World Bank, 2010).

Given the advantages of this industry and investigating the economic statistics of countries which have invested a part of their own economic and infrastructural development on this industry, the need for creating a systematic method for comparing and ranking the countries in tourism industry can be easily understood. Given the variables, which can be defined in the advantages or disadvantages of tourism industry, evaluating the efficiency and ranking the countries based on the performance in tourism area will lead to a proper modeling in order to overcome the shortcomings and barriers to the growth of this industry in the country.

2 - LITERATURE REVIEW

International tourism on a global scale was first introduced and its definition was provided in "United Nations Economic Commission" in 1937. In 1950, the "International Union of Official Travel Agencies" provided a new definition of (tourism). The definition, accepted by the UN member, is the one which was presented by this organization in 1954; it has been approved according to the following descriptions. Tourist is a person who enters a country due to the legal reasons (except of the immigration) and stays there for at least more than 24 hours and maximum a year". Obviously, this definition is true for the domestic tourism of each country. Here, we should note that the Tourism refers to a travel "Tourist journey" which is first temporary, arbitrary, and ultimately not for earning the wage. Thus, when a group of people in a country leaves their usual place of residence temporarily for leisure and vacation, to see the historical architectures, attend to the communities and competitions, pilgrimage, recreation or to see the family and friends or any other intention and travel to elsewhere, they have done the tourism activities. According to the latest statistics published by the relevant agencies (UNWTO, 2011), the total 983 million people around the world have been as the international tourists in 2011. This rate has had the growth equal to 4.6% than the previous year (940 million people). According to this report, among them more than 55.45 million people have visited the Middle East and this has an 8-percent growth than the year 2010. According to the mentioned report, the top 10 countries as the tourism destination in the Middle East during 2011 are described in the following table.

Table (1) List of top 10 countries of tourism destination in the Middle East in 2011

| Rank	Country	International tourist arrivals (2011)
1	Saudi Arabia	17.34 million
2	Egypt	9.50 million
3	United Arab Emirates	8.13 million
4	Syria	5.07 million
5	Bahrain	4.94 million
6	Jordan	3.98 million
8	Qatar	1.87 million
9	Lebanon	1.66 million
10	Oman	1.52 million

Some of the conducted studies in the field of ranking the countries in tourism industry are presented as follows. (Joseph, F., 2012) In his article, entitled as "the price competitive position of Mediterranean countries in tourism", he has criticized the quantitative and qualitative assessment of Mediterranean countries in this industry and has done a kind of comparison and ranking. Assaf, A. G. (2012) has conducted an article entitled as "Benchmarking the Asia Pacific tourism industry" and has done a comparative ranking for these countries. Bob, Mc K. (2005) has conducted a case study for ranking the tourism journals. His model can also be used in the tourism industry. The variables, applied in these publications in the field of information, can be used in ranking these countries in terms of tourism attraction potential. Wei-Wen Wu (2011) has called his research as "Beyond Travel & Tourism competitiveness ranking using the non-parametric methods of DEA, GST, ANN and Borda count". In his research, he has done the methods for ranking by using the expert systems and their applications

based on the mathematical models. Jen-Hung H. (2012) has provided his research entitled as "A new approach for generating fuzzy numbers to assess the competitiveness of the tourism industries in Asian countries" by using the Fuzzy Rasch model in TOPSIS. Wurzburger, R. et al (2009) have published their points of view in the field of creative tourism in a book entitled as "How to Provide Unique Creative Experiences for Travelers Worldwide". Cooper, Ch., et al (2005) have provided a book entitled in the field of tourism entitled as "Principles and Practice". Lan, L., Wu et al (2012) have provided their article entitled as "Exploring an Objective Weighting System for Travel & Tourism Pillars". Investigated studies have indicated that a few works have been done for evaluating the efficiency of countries in the field of tourism by using the mathematical models. Therefore, this paper seeks to provide a model for calculating and determining the rank of countries in this regard by determining the effective variables in evaluating the efficiency of countries in the tourism area.

Mathematics and related sciences create accurate and verifiable approaches for understanding the world and complicated relations governing its different sectors. Research on operation is one of the branches of mathematics which models the industrial and social structures, measures their operational potential, and provides the measures for improving the methods. Data Envelopment Analysis is also a branch of in-operation research which evaluates and study the performance of similar units. High power of Data Envelopment Analysis in assessing the specific efficiency and features of this branch has caused it to be used in several areas from the oil and gas industries to hospital and banks. Data Envelopment Analysis is a method for assessing the efficiency of similar decision making units or DMUs which assess multiple inputs with several outputs simultaneously. In Data Envelopment Analysis models, the efficiency of a decision making unit is expressed as the ratio of total weighted output to the total weighted input with this condition that this ratio will not exceed from a fixed amount for any decision making units. The weights of input and outputs in these models have been considered - as the variable.

Farrell introduced three main concepts of efficiency, two of which can be used for evaluating the efficiency of firm and the other one for the whole industry. Both components of efficiency can be used at the firm-level; the Technical Efficiency (TE) and the Allocative Efficiency (AE). Technical Efficiency reflects the ability of firm to maximize the productivity according to the certain production factors, and the Allocative Efficiency reflects the ability of firm to use the optimal combination of production factors with respect to their price. Economic Efficiency (EE) of firm is obtained from the combination of these two components of efficiency. According to Farrell's viewpoint, the Structural Efficiency (SE) is the third concept of efficiency which can be used for measuring the industry efficiency (Hadiyan, A., et al, 2004). Farrell introduced his theory with a simple example of firms which produce the product (y) by using two production factors, x_1 and x_2 with the assumption of constant returns to the scale and minimization of factors. The information related to the Isoquant production curve (AA '), which is shown in the curve 1, can measure the technical efficiency.

Curve (1) Measuring the technical efficiency
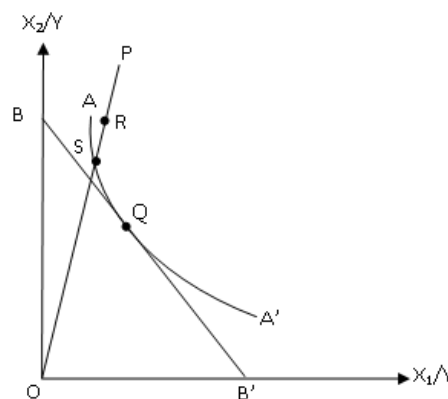
If we consider a firm is located in the point P and use the specified values, x_1 and x_2, for producing a unit Y, then the amount of technical inefficiency of this firm is shown by the distance RP. This amount represents a value of production factors which can be reduced even in constant level of product. This amount is shown by the ratio OR/OP which represents a percentage under which the production factors (or the same previous level of production) can be decreased.

(Subscript i represents the key input)

Technical efficiency= TEi = (OR/OP) $\Rightarrow$ *Technical inefficiency* = TEi = 1 - OR/OP

If the fraction (TEi) is equal to 1, it means the full technical efficiency of firm. For instance, the point, S, has the efficiency equal to unit because this point is located on the efficiency curve (Isoquant production curve). Moreover, the allocative efficiency of firm P is equal to:

Allocative efficiency = AE_i = OS/OR

The term above shows the amount which can be reduced (with the condition of constant product). This reduced cost is happened if the production is created in the point Q Place (not in the point R). Economic efficiency (EE) is also defined as follows:

Economic efficiency = EE_i = OS/OP = (OR/OP) * (OS/OR)

The distance SP also indicates the economic inefficiency.

In 1984, Banker, Charnes, and Cooper introduced a new model, called "BCC", by changing the model CCR. The model, BCC, is a model of different types of data envelopment analysis models which evaluates the relative efficiency of units with changing returns to scale. Models of constant returns to scale are more limited than the models of changing returns to scale. It is due to special model of constant returns to scale than the model of changing returns to scale. This model is shown as follows.

BCC model:

$\max E_o = \Sigma u_r y_{ro} + u_o$ (r = 1 ... s)

$\Sigma v_i x_{io} = 1$ (i = 1 ... m)

$\Sigma u_r y_{rj} - \Sigma v_i x_{ij} + u_o \leq 0$ (j = 1 ... n)

$u_r, v_j \geq 0$, (r = 1 ... s), (i = 1 ... m)

w, free.

3 - RESEARCH METHODOLOGY

This research has been conducted based on the descriptive-survey method. Since sampling is meaningless in using the Data Envelopment Analysis and also due to the necessity of homogeneous decision-making units, the expected population in this study contains the selected Middle East countries. The number of DMUs is equal to 8 decision-maker unit (DMU). Moreover, 16 experts were randomly selected and their opinions were used to design and modify the model in order to take advantage of the experts' viewpoints in the field of appropriate evaluation indicators. Data collection and the necessary information have been extracted from referring to the available sources and recorded data in the global information network.

3-1 Data Mining

Information collected from the World Tourism Organization (UNWTO) indicates that the number of entered tourists and the income obtained from this entry to the country are the criteria for the survey of Middle Eastern countries in the tourism industry (Table 2). This table is used in order to evaluate the effectiveness of Middle Eastern countries. Ranking rate is calculated and modeled for the whole 3 years, 2008, 2009 and 2010, at the end of the year 2010 based on the numerical average of 3 years. Inputs include the input and output tourist costs, and outputs include the number of tourists and the amount of income from the tourism. The main source of data collection is the annual reports of World Bank.

4 – Conducting the research

Based on the data of subject in the previous section and by using the model BCC (Output-oriented), the assessment of 8 decision-making units (DMU) has been done by the Software DEAP. Data has been calculated by the method "Input oriented" and 8 DMUs for three consecutive years (2008 to 2010), which provide us 24 data sets, have been presented in Table 2. Those countries include Egypt, Jordan, Kuwait, Lebanon, Saudi Arabia, Syria, United Arab Emirates and Yemen, respectively.

Table (2) Comparison table for the efficiency of selected countries in the Middle East in tourism area

Year	Country	Period	crste	vrste	Scale
2008	Egypt	1	0.473	0.904	0.523 drs
	Jordan	2	0.473	0.734	0.644 drs
	Kuwait	3	0.920	*1.000*	0.920 drs
	Lebanon	4	*1.000*	*1.000*	*1.000 drs*
	KSA	5	*1.000*	*1.000*	*1.000 drs*
	Syria	6	0.442	0.652	0.678 drs
	UAE	7	0.507	0.876	0.579 drs
	Yemen	8	0.924	*1.000*	0.924 drs
2009	Egypt	9	0.509	0.965	0.527 drs
	Jordan	10	0.563	0.859	0.655 drs
	Kuwait	11	0.774	*1.000*	0.774 drs
	Lebanon	12	0.811	0.866	0.936 drs
	KSA	13	0.526	0.986	0.534 drs
	Syria	14	0.648	*1.000*	0.648 drs
	UAE	15	0.460	0.826	0.556 drs
	Yemen	16	0.482	0.496	0.973 drs
2010	Egypt	17	0.514	*1.000*	0.514 drs

Jordan	18	0.530	0.822	0.644 drs
Kuwait	19	*1.000*	*1.000*	*1.000 drs*
Lebanon	20	0.785	1.000	0.785 drs
KSA	21	0.539	*1.000*	0.539 drs
Syria	22	0.482	0.795	0.605 drs
UAE	23	0.473	0.883	0.535 drs
Yemen	24	0.473	0.492	0.961 drs

crste = technical efficiency from CRS DEA
vrste = technical efficiency from VRS DEA
Scale = scale efficiency = crste / vrste

In the case of constant returns to scale, the data envelopment analysis only measures and provides the technical efficiency. The value of calculated efficiency is always between zero and one. This efficiency is presented in the above table. As it can be seen, in the case of constant returns to scale in all countries, the efficiency of countries, Lebanon and Saudi Arabia, in the year 2008, and Kuwait in the year 2010 has been estimated equal to 1 and have been considered as the quite effective DMU. In the case of changing returns to the scale, the efficiency of Kuwait, Lebanon, Saudi Arabia and Yemen in 2008, Kuwait and Syria in 2009, and Egypt, Kuwait, Lebanon and Saudi Arabia in 2010 has been estimated equal to 1 and has been considered as the quite efficient DMU. Furthermore, the scale (crste/vrste) indicates that the countries, Lebanon and Saudi Arabia in 2008 and Kuwait in 2010 have been determined efficient during these three years of assessment.

Calculations have shown that one of the reasons for inefficiency of output is due to the slacks of Egypt equal to 1209.410 in revenues from tourism in 2009, Saudi Arabia equal to 79.921 in the number of tourists, Yemen equal to 14 and 7142, respectively, in the number of tourists and revenues from tourism, and the United Arab Emirates and Yemen equal to 854.7 and 39.828, respectively, in revenues from tourism in 2010.

Moreover the reason for the inefficiency of input is due to the slacks in Egypt equal to 184.879 in 2008 and Syria equal to 6427.453 in incoming costs of tourists, in the year 2009 in Egypt equal to 1848.594 and Saudi Arabia equal to 1223.482 and Yemen equal to 8.214 in the tourist incoming costs, and Syria equal to 2872.404 in the tourist incoming costs in 2010. Arithmetic unit is based on the America millions of dollars and the number of tourists is based on ten thousands people.

Another advantage of the method DEA is that it introduces an efficient unit or combination of units as the similar pattern and reference for the ineffective units. By emulating and following the unit similar to the reference in the amount of inputs and outputs, the ineffective unit can reach the border of efficiency. The following table (Table 3) represents the reference units and their weights for all DMUs.

Table (3) Reference units (patterns) and their weight for DMUs

Period	Peers				Weights			
1	21	17	4	-	0.015	0.743	0.242	-
2	19	14	4	8	0.005	0.386	0.148	0.461
3	3	-	-	-	1.000	-	-	-
4	4	-	-	-	1.000	-	-	-
5	5	-	-	-	1.000	-	-	-
6	19	14	8	-	0.019	0.491	0.490	-
7	5	21	4	11	0.161	0.365	0.412	0.062
8	8	-	-	-	1.000	-	-	-
9	17	4	-	-	0.654	0.346	-	-
10	19	14	4	8	0.046	0.491	0.074	0.389
11	11	-	-	-	1.000	-	-	-
12	14	21	4	19	0.019	0.026	0.887	0.067
13	21	11	-	-	0.874	0.126	-	-
14	14	-	-	-	1.000	-	-	-
15	5	21	4	11	0.015	0.461	0.453	0.071
16	14	8	4	19	1.000	-	-	-
17	19	-	-	-	1.000	-	-	-
18	17	-	-	-	0.077	0.573	0.105	0.245
19	20	-	-	-	1.000	-	-	-
20	21	-	-	-	1.000	-	-	-
21	14	4	-	-	1.000	-	-	-
22	4	21	17	5	0.545	0.455	-	-
23	4	21	17	5	0.375	0.332	0.161	0.132
24	8	4	19	-	0.282	0.001	0.717	-

The following formula is used in order to rank the countries according to the performance during three consecutive years.

$\Sigma S_{ij} \div 3$ (i = 1 ... 8), (j = 1 ... 3)

Where, S is the index of Scale for target DMU of (*i*) in the target year (*j*). The results of ranking for 8 selected countries have been provided in Table 4 as follows.

Table (4) Ranking the reference units (DMU)

Country	$\Sigma S_{ij} \div 3$	Ranks
Egypt	0.499	7
Jordan	0.522	6
Kuwait	0.898	1
Lebanon	0.865	2
Saudi Arabia	0.688	3
Syria	0.524	5
United Arab Emirates	0.480	8
Yemen	0.626	4

5 - Conclusion and Suggestion

- Conclusion

This study was conducted with the main aim to identify and rank the selected countries of Middle East in tourism area. Input variables including the input costs of tourist and the output costs of tourist, and the output variables including the number of tourists and the amount of revenue from the tourism are determined for the studied countries during the years 2008 to 2010. Since the results of this study have not been observed in other scientific articles, it is not possible to compare and analyze its results with other scientific papers. It should be noted that a logical method for ranking the countries in the studied selected portfolio has been provided in this paper by using the mathematical modeling. The results of calculation indicate that the first five countries of ranking include Kuwait, Lebanon, Saudi Arabia, Yemen, and Syria, respectively.

- Suggestion

Since there is this possibility in the non-parametric methods that the necessary attention is not taken in selecting the inputs and outputs of issue for scoring the data (Cardinal, Ordinal) and the quantitative data has been converted into the qualitative data by mistake which will cause the deviation in the response of issue, thus it is suggested that:

1 – The researchers should revise the list of inputs and outputs in future research and the qualitative data, which has become numerical by a way, should be reviewed and decided by the experts or be defined quantitatively (numerically) by mathematical modeling or other numerical methods.

2- Moreover, all qualitative inputs and outputs are removed from the calculation in designing the model by the non-parametric method and the model is defined and re-evaluated based on the numerical data. Obviously, this suggestion is not true for all assessing units and the removal or add of inputs depend on the conditions of issue and the beneficiaries' decision in assessing units.

- Suggestions for other researchers

1 – Researchers can use the correlation coefficient tests in their future studies for obtaining higher accuracy and reliability in the field of other evaluation methods, define the optimized evaluation model of relevant unit with the regression function, and study and investigate the results through comparing the calculation of regression function to the optimized function.

2 - Assessment of target units should be done cyclically and the evaluation process of each decision-making unit should be studied and investigated over time in order to determine the strengths and weaknesses of each unit for defining the improvement projects.

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