FINANCIAL EFFICIENCY TEST OF THE ISE TOURISM COMPANIES: DATA ENVELOPMENT ANALYSIS APPLICATION

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─**Abstract**─

Performance evaluation has become an important improvement tool for tourism sector to be succesful in today's highly competitive environment. Data Envelopment Analysis (DEA) is an increasingly popular management tool. It has been extensively applied in performance evaluation and benchmarking of companies. This paper implements a Data Envelopment Analysis (DEA) approach to measure the efficiency of Tourism Companies over a 3-year period (2009 to 2011). It also demonstrates DEA as an effective management tool for tourism companies.

Key Words: *Data Envelopment Analysis, Tourism Companies, Efficiency*

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1. INTRODUCTION

 Financial statement analysis (FSA) is principally based on the computation of ratios. The computerization of modern industrial systems has facilitated the collection and elaboration of data and has led to a rapid proliferation of such measures. Despite the disadvantages of ratio analysis listed in the literature it is still the major tool used in the evaluation and interpretation of the firm's behavior. The reason for this widespread use of ratio analysis dating from 19th century is not only the multiplicity of information offered, but also the lack of simple

alternative techniques (Khan et all., 2011:178). Data envelopment analysis (DEA) was originally developed to measure the relative efficiency of peer decision making units (DMUs) in multiple input-multiple output settings. DEA identifies an efficient frontier where all DMUs have a unity score (Chen, 2005: 545).

Mostly DEA is undertaken with absolute numerical data, which among other things reflect the size of the units of observation. DEA models can then be specified that reflect constant or variable returns to scale as befits the underlying technology and knowledge of the relationship between the inputs and outputs (Hollingsworth and Smith, 2003:733).

This paper aims at enhancing the ratio analysis by adding Data Envelopment Analysis (DEA) in to the process. Hence, the study investigates the relation between the results of the financial analysis and DEA by focusing on the tourism companies listed on Istanbul Stock Exchange (ISE) 100 Index for the period from 2009 to 2011.

2. FINANCIAL STATEMENT ANALYSIS: A DEA APPROACH

DEA is a non-statistical method using linear programming. It provides a measure of relative technical efficiency of different decision-making units operating and performing the same or similar tasks. The technique's main advantage is that it can deal with the case of multiple inputs and outputs as well as factors, which are not controlled by individual management (Halkos and Salamouris, 2004: 204).

The DEA approach does not require specification of any functional relationship between inputs and outputs or a priori specification of weights of inputs and outputs. DEA provides gross efficiency scores based on the effect of controllable and uncontrollable factors. DEA uses a number of financial ratios to determine how good a company's performance has been (Malhotra and Malhotra, 2008: 331). DEA has been used in many disciplines such as operations research, management control systems, organization theory, strategic management, economics, accounting and finance, human resource management, and public administration (Ozbek et all., 2009: 822).

3. EMPRICAL ANALYSIS

Our data set is compiled from Istanbul Stock Exchange (ISE) tourism companies between 2009 and 2011 period. According the availibility of data, we included 8 tourism companies. These are Altınyunus Çeşme, Marmaris Altınyunus, Martı Marmaris, Metemtur, Nettur, Petrokent, Tekart and Favori A.Ş. In our analysis,

we used two different inputs. These are sales and Market Value/ Book Value and we used market value as output. Inputs and outputs are shown in Table 1.

Table 1: Inputs and Outputs for DEA model

Inputs	Symbol
Sales	X1
Market Value/ Book Value	X2
Output	**Symbol**
Market Value	Y1

The inputs such as sales (X1), Market Value/ Book Value (X2) and the output is market value (Y1). We collected the data from Istanbul Stock Exchange (ISE) and Public Disclosure Platform (PDF).

Figure-1: Data are relative to year 2009

	DMU	Score	X1 {I}{V}	X2 {I}{V}	Y1 {O}{V}	Benchmarks		{S} X1 {I}	{S} X2 {I}	{S} Y1 {O}
1	altınyunus	176,16%	0,46	0,54	1,76		3			
2	maalt	53,15%	0,05	0,95	0,53	1 (0,37) 5 (0,04)		0,02	0,00	0,00
3	marti	118,10%	0,00	1,00	1,18		0			
4	metemtur	33,78%	1,00	0,00	0,34	7 (0,17)		0,00	0,87	0,02
5	nettur	101,65%	0,10	0,90	1,02		3			
6	petrokent	19,24%	0,07	0,93	0,19	1 (0,18) 5 (0,08)		0,49	0,00	0,01
7	tekart	102,84%	1,00	0,00	1,03		1			
8	favori	35,51%	0,08	0,92	0,36	1 (0,08) 5 (0,05)		0,23	0,00	0,01

The output-oriented static analysis performed over the data set produces a ranking of the considered companies (in Figure 1 we give the efficiency scores for the 8 companies).

Figure 1 illustrates that four out of eight companies are fully efficient. Furthermore, figure 1 presents the efficiency rankings. We find that fully efficient companies are: Altınyunus Çeşme (176,16%), Martı Marmaris (118,10%), Nettur (101,65) and Tekart (102,84%). On the other hand, inefficient companies are Marmaris Altınyunus (53,15%), Metemtur (33,78%), Petrokent (19,24%) and Favori (35,51%).

According to the results of Figure 1, companies that get the peak value are Altınyunus Çeşme, Martı Marmaris, Nettur and Tekart. On the other hand, Martı Marmaris is efficient but it does not take up references. Inefficient companies

must increase their book value and market value to be efficient. Marmaris Altınyunus may increase book value 0,95% and market value 0,53% to be efficient. Metemtur may increase 0,34% market value. Petrokent increase book value 0,93% and market value 0,19% to be efficient. Favori may increase 0,92% book value and market value 0,36% to be efficient.

Figure-2: Data are relative to year 2010

	DMU	Score	X1 {I}{V}	X2 {I}{V}	Y1 {O}{V	Benchmarks	{S} X1 {I}	{S} X2 {I}	{S} Y1 {O}
1	altınyunus	100,18%	1,00	0,00	1,00		4		
2	maalt	41,39%	1,00	0,00	0,41	1 (0,20) 7 (0,28)	0,00	0,00	0,00
3	marti	43,84%	0,00	1,00	0,44	5 (0,48)	57,18	0,00	0,08
4	metemtur	50,29%	1,00	0,00	0,50	1 (0,10)	0,00	3,60	0,01
5	nettur	138,46%	0,00	1,00	1,38		1		
6	petrokent	24,11%	1,00	0,00	0,24	1 (0,41)	0,00	0,19	0,01
7	tekart	167,39%	0,46	0,54	1,67		1		
8	favori	39,27%	1,00	0,00	0,39	1 (0,23)	0,01	0,25	0,22

Figure 2 illustrates that three out of eight companies are fully efficient. Furthermore, figure 2 presents the efficiency rankings. We find that fully efficient companies are: Altınyunus Çeşme (100,18%), Nettur (138,46) and Tekart (167,39%). On the other hand, inefficient companies are Marmaris Altınyunus (41,39%), Martı (43,84%) Metemtur (50,29%), Petrokent (24,11%) and Favori (39,27%).

According to the results of Figure 2, companies that get the peak value are Altınyunus Çeşme, Nettur and Tekart. Marmaris Altınyunus may increase market value 1,00% to be efficient. Metemtur may increase 0,50% market value. Petrokent may increase market value 0,24% to be efficient. Favori may increase market value 0,39% to be efficient.

Figure-3: Data are relative to year 2011

	DMU	Score	X1 {I}{V}	X2 {I}{V}	Y1 {O}{V}	Benchmarks	{S} X1 {I}	{S} X2 {I}	{S} Y1 {O}
1	altınyunus	68,52%	1,00	0,00	0,69	7 (1,06)	0,00	0,44	0,00
2	maalt	47,88%	1,00	0,00	0,48	7 (0,68)	0,00	0,35	0,03
3	marti	8,52%	0,98	0,02	0,09	7 (0,08) 8 (0,51)	0,00	0,00	0,06
4	metemtur	27,04%	1,00	0,00	0,27	7 (0,13)	0,01	21,48	0,37
5	nettur	27,74%	0,98	0,02	0,28	7 (0,16) 8 (1,09)	0,01	0,00	0,13
6	petrokent	21,19%	1,00	0,00	0,21	7 (0,70)	0,00	0,24	0,00
7	tekart	116,16%	1,00	0,00	1,16	6			
8	favori	big	1,00	0,00	0,00	2			

Figure 3 illustrates that two out of eight companies are fully efficient. Furthermore, figure 3 presents the efficiency rankings. We find that fully efficient companies are: Tekart (116,16%) and Favori. On the other hand, inefficient companies are Altınyunus Çeşme (68,52%), Marmaris Altınyunus (47,88%), Martı (8,52%) Metemtur (27,04%), Nettur (27,74%), Petrokent (21,19%).

According to the results of Figure 3, companies that get the peak value are Tekart and Favori. Altınyunus Çeşme may increase market value 0,69% to be efficient, Marmaris Altınyunus may increase market value 0,48% to be efficient. Martı Marmaris may increase market value 0,09% to be efficient. Metemtur may increase market value 0,27 % to be efficient. Nettur may increase market value 0,28% to be efficient. Petrokent may increase market value 0,21% to be efficient.

4. CONCLUSION

In this paper, we have developed a data envelopment analysis approach to evaluate the efficiency of the Turkish tourism sector over a three year period. Our data set is compiled from Istanbul Stock Exchange (ISE) tourism companies between 2009 and 2011 period. According the availibility of data, we included 8 tourism companies. In our analysis, we used two different inputs. These are sales and Market Value/ Book Value and we used market value as output. We find efficient and inefficient companies. DEA can be used as an management tool for tourism companies in today's competitive environment.

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