Travel Agencies in Alicante, Spain: a productivity analysis

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Abstract: This study is a continuation of previous studies analysing the variation in the productivity of 22 travel agencies located in Alicante (Spain) over the period 2004-2007. The extension of the previous analyses is based on the calculation of non-radial and non-oriented Malmquist Productivity Indices, so that the results obtained are not influenced by the imposition of a predetermined approach (input or output) or by the fact that the type of model used may have a radial structure which, due to not including slack variables, may generate unsatisfactory estimates of the productivity levels of certain units. After calculating the Malmquist indices as described above, they are broken down into three components (Pure Efficiency Change, Scale Efficiency Change and Technological Efficiency Change) in order to obtain more information with which to design possible lines of action focused on improving future levels of productivity of the Alicante-based travel agencies. Finally, using the Mann Whitney-U Test, the existence of a relationship between the levels of productivity of these agencies and their ownership type, location and level of experience is examined.

Purpose: To provide lines of action based on the results aimed at improving the future levels of productivity of the travel agencies in Alicante.

Methodology: Estimates of non-radial and non-oriented Malmquist Productivity Indices and the values of their components will be calculated. Furthermore, in order avoid problems that may arise from these results which are based on finite samples that are sensitive to sampling variations, bootstrapping techniques (smoothed bootstrap) are used. Lastly, the Mann-Whitney-U test is used in order to accept or reject the influence that different factors have on productivity levels.

Originality: Although other studies have been previously carried out using Malmquist indices and bootstrapping techniques to analyse the productivity of travel agencies in other countries or cities, this is the first to be undertaken in Spain using the smoothed bootstrap method based on non-radial and non-oriented models, so as to examine this field of study from a new perspective.

Limitations: The impossibility of increasing the amount of data for carrying out the study, given the scarcity of statistical sources available and the reticence of the travel agencies to provide us with more information.

Keywords: Travel agencies, productivity, Malmquist Index, Data Envelopment Analysis, DEA, Smoothed bootstrap.

1. Introduction

The high level of competitiveness on a national and international scale of world economies means that the analysis of efficiency and productivity is one of the main areas chosen for many research studies today.

The service sector has also been subject to this type of an analysis, despite its unique characteristics (such as the intangibility and heterogeneity of its outputs) that could render the evaluation of its efficiency and productivity levels more difficult (McLaughlin and Coffey, 1990; Parsons, 1997), and in fact, the number of studies carried out with this objective is very high due the sheer volume of activities making up the sector.

Given that travel agencies operate within the service sector, it is in this context that the study is addressed.

However, the interest in carrying out the study is not due to the fact that travel agencies belong to the service sector. The decision to examine the economic behaviour of these units was based, firstly on the fact that they operate within the tourism sector, which is of great importance for the international economy in general (and more so in a country such as Spain where 11% of GDP is generated by the tourism industry) and, secondly, this decision was based on the large increase in the absolute and relative number of travel agencies in the city of Alicante (between 2000 and 2007 they grew by 205.26% as opposed to 67.41% in Spain as a whole, and the proportion of agencies per inhabitant stood at 0.05% per inhabitant while the national average was 0.0022% – County Council of Alicante, 2009; National Statistics Institute, 2009). This gave rise to the need to determine, on the one hand their relative level of productivity and, on the other hand, what kind of measures could be taken to increase this level. In short, within such a competitive environment, becoming more productive is a crucial strategy for survival and therefore the analysis of the evolution of productivity and the factors on which it depends is vital to be able to execute this strategy successfully.

In addition, and with the same objective, this study will determine whether a relationship exists between the levels of productivity of the agencies and three of their characteristics which have been identified in relevant literature as being potentially influential factors. These factors are: their location, their ownership type and their level of experience.

2. Literature Review

To date, only seven articles analysing the efficiency of travel agencies have been published. The first two, written by Bell and Morey (1994, 1995), did not analyse the efficiency of travel agencies as such, but that of 31 corporate travel departments. Input-oriented Data Envelopment Analysis (DEA) was used for these studies, using the level of service provided as a representative variable for output, and the levels of travel expenditure (such as car, airline and hotel bills), labour costs, other general expenditure

(space and technology costs, for example) and, finally, other environmental factors (to illustrate a company's ability to achieve travel cost discounts) as input variables.

The third article (Anderson, Lewis and Parker, 1999) used the same data as the first one to show the differences between input-oriented DEA and stochastic frontier results. However, the constructed variables used were different. The output used was the number of company trips made and the inputs used were labour costs, the sum of air, hotel and car expenses and, finally, other expenses (such as technology or occupancy costs). The authors concluded that corporate travel departments are a good investment for companies as they are highly efficient and they make it possible to control the increase in travel costs.

The fourth article was written by Barros and Matias (2006). It examines the efficiency of 25 Portuguese travel agencies using stochastic cost frontier analysis. This study includes an exhaustive review of previously-published articles which have used frontier analysis to assess levels of efficiency in the tourism sector (essentially hotels and travel agencies), showing that DEA is the most widely-used method.

The variables used by Barros and Matias (2006) were selected based on their availability and the fact that they had been used in previous works. Specifically, they used: operational costs at constant prices, price of labour, price of capital-stock (proxied by the ratio of earnings to stock), price of capital-premises (proxied by the ratio of expenses in premises divided by the value of real assets), dummy variables for Spanish companies operating in the Portuguese market (based on the idea that due to their recent entry into this market, they may have been still undergoing a convergence and consolidation process), additional dummy variables for companies which had carried out mergers and acquisitions and, finally, sales at constant prices (the output). These authors concluded that the main factors determining efficiency in the sector were capital, labour, sales and merger and acquisition activities.

Fifthly, Wöber (2006) analysed the efficiency of 80 tour operators in Austria's branch offices in 2003 using a DEA model under variable returns to scale which was firstly input-oriented and then output-oriented. He also calculated levels of super efficiency in order to rank the efficient units (branch offices). As controllable inputs he used: personnel, occupancy, marketing and other variable and fixed costs, the number of employees (weighted by the number of working days per year) and their average job experience. As non-controllable inputs he used: the number of residents in the neighbouring area of each agency, a visibility and competitiveness index (based on the size of the window display and the number of agencies in the immediate neighbourhood) and the degree of accessibility by car and public transport. Furthermore, as outputs he used: the total number of contracts, the total turnover and the contribution margin for each of the outlets. In the results of the analysis, the author included guidelines for improving the results of agency management with respect to both the use of inputs and the production of outputs. He also formulated a hierarchy of the group of agencies. Both types of information are appropriate for being used to identify practical solutions for different management objectives.

The sixth article (Köksal and Aksu, 2007) used input-oriented DEA to assess the efficiency of 24 travel agencies in the city of Antalya (Turkey). They also used the Mann Whitney-U test to analyse the relationship between the ownership type of an

agency and its level of efficiency, and concluded that there is no link between the two variables. The authors also used DEA to calculate changes in the level of inputs that inefficient agencies would have to achieve in order to become efficient. The variables used, which were obtained by carrying out surveys, were: the number of staff, the level of annual expenses, the potential level of service that they can provide (inputs) and the number of customers served (outputs).

Lastly, Barros and Dieke (2007) analysed the change in productivity of the travel agencies of a representative sample of those operating in the Portuguese market during the period 2000-2004. As a quantitative method, they used the computation of the Malmquist index and its decomposition into four factors, together with a bootstrapped Tobit model. In order to calculate the productivity values they used sales and profits as outputs and wages, capital, total costs excluding wages and the book value of premises as inputs. In the second stage of the analysis, the efficient Malmquist scores were analysed using a Tobit model in which the explanatory variables were the type of ownership of the foreign property of the company, the ratio of operational costs on sales, the market share of the agencies and whether the agency belonged to a chain of agencies or not, which could enable it to achieve economies of scale. As a result, the authors concluded that the level of capital, the market share, the control of factor costs and belonging to a Group were the main factors determining efficiency in the Portuguese sector.

To date, no further analyses of efficiency in the travel agency sector have been carried out. However, the fact that these studies are often included in hospitality research literature means that it is reasonable to include other studies that have analysed efficiency in this context in this review (other previously-published works with excellent reviews of this topic include, for example, Barros and Dieke (2007), Wöber (2006) or Sigala, Jones, Lockwood and Airey (2005)).

Table I provides a list of works published to date that analyse efficiency in the tourism and hospitality sectors. As can be seen there, DEA has been used very widely in those fields over the last few years. Furthermore, the type of DEA model applied has gradually incorporated new characteristics and/or complementary methods which have helped authors to gather more information and results. Studies such as those conducted by Sigala (2003, 2004), Wöber and Fesenmaier (2004), Sigala, Airey, Jones and Lockwood (2004), Barros and Mascarenhas (2005) or Reynolds and Thompson (2007) used stepwise DEA models and/or combined DEA with regression analysis, ANOVA and other statistical techniques in order to enrich their results.

Table I. Analysis of efficiency in the Tourism and Hospitality Sectors

Reference	Notes
Hruschka (1986)	DEA is applied to assess the efficiency of 10 Austrian restaurant companies.
Banker and Morey (1986)	This study evaluated the technical and scale efficiency of 60 fast food restaurants using exogenous variables, and provided targets for managers.
Banker and Riley (1994)	The authors discussed the idea of productivity in hotels and suggested basic aspects of a holistic model for them.

Morey and Dittman (1995)	The authors analysed 54 hotels in the USA using an input-oriented DEA model and data gathered in 1993.
Morey and Dittman (1997)	The authors developed a model for the selection of brands, sizes and strategic decisions for hotels using an output-oriented DEA model combined with regression analysis.
Johns, Howcroft and Drake (1997)	The authors analysed 15 UK hotels using input-oriented DEA and data gathered on a four-monthly basis over the course of 12 months.
Donthu and Yoo (1998)	The authors used DEA and two separate regression analyses to assess the efficiency of a fast food restaurant chain and the sensitivity of the results.
Anderson, Fish, Xia and Michello (1999)	The authors estimated cost efficiency levels for 48 hotel companies in the USA using a stochastic cost frontier approach.
Anderson, Fok and Scott (2000)	This study used data gathered from 48 hotels in the USA in 1994 and applied an input-oriented DEA model which considered constant and variable returns to scale.
Tarim, Dener and Tarim (2000)	The authors carried out research into the efficiency of the hotel industry in Antalya, by calculating DEA scores for 21 DMUs.
Wöber (2000)	The author applied DEA to 61 hotels in Austria.
Brown and Ragsdale (2002)	This article studies the efficiency of 46 hotel chains in the USA using data published by the Consumers Union, applying an input-oriented DEA model with constant returns to scale and cluster analysis.
Hwang and Chang (2003)	The authors assessed the efficiency of 45 hotels in Taiwan between 1994 and 1998, using an input-oriented DEA model assuming constant returns to scale, super-efficiency and, finally, a Malmquist index to calculate productivity changes.
Sigala (2003)	The author proposed a marketing model to develop effective Internet marketing strategies for 60 Greek hotels and benchmark their efficiency by using an output-oriented DEA model, ANOVA, Pearson correlations, Scheffé and Pearson chi-square and t-tests.
Morey and Dittman (2003)	This study extended and updated the previous work, mentioned above.
Sigala (2004)	The author benchmarked 93 three-star hotels in the UK in 1999, using a four-stage input and output-oriented robust DEA productivity model.
Reynolds (2004)	DEA assuming constant returns to scale using non-controllable inputs was used to assess the efficiency of 38 same-brand restaurants in the USA.
Sigala, Airey, Jones and Lockwood (2004)	This article developed and tested a new way to assess the information and communication technology productivity of 93 three-star hotels in the UK in 1999, using a stepwise DEA model, ANOVA, Pearson correlations and t-tests.
Hu and Cai (2004)	This work measured labour productivity of 242 Californian hotels, using DEA and a regression model to deduce the underlying causes.
Barros and Alves (2004), Barros (2004)	These authors estimated total factor productivity change of a Portuguese public hotel chain for the period 1999-2001 by using a DEA-Malmquist index and a stochastic cost frontier model in order to determine efficiency results for the year 2000.
Chiang, Tsai and Wang (2004)	The authors estimated overall, pure technical and scale efficiency scores for 25 high-end hotels in Taipei using an input-oriented DEA model.
Wöber and Fesenmaier (2004)	This article used both input/output-oriented DEA and a super-efficiency model to assess technical efficiency in 48 state tourism advertising programmes in the USA.

Donthu, Hershberger and Osmonbekov (2005)	This paper applied input-oriented DEA to 26 fast food restaurants in order to evaluate their level of efficiency based on variables chosen following consultation with the management of the chain.
Funchs (2004)	This paper analysed the efficiency of 21 Alpine tourism destinations using an output-oriented DEA model assuming variable returns to scale.
Barros and Mascarenhas (2005), Barros (2005a) and Barros (2005b)	These studies used data from 43 Portuguese hotels and an output-oriented DEA allocative model in order to calculate their levels of technical, allocative and economic efficiency in 2001. They applied an output-oriented DEA model assuming constant and variable returns to scale and evaluated their level of productivity for the period 1999-2001 by estimating the Malmquist index and a Tobit regression.
Sigala, Jones, Lockwood and Airey (2005)	These authors updated and improved the robust productivity models for developing economic strategies used by Sigala (2004).
Sigala and Mylokanis (2005)	This research article discussed managerial implications for homogeneous groups of 93 three-star hotels in the UK in 1999 by applying a three-stage DEA model and an ANOVA model with Pearson correlations and Post-Scheffe tests.
Bosetti, Casinelli and Lanza (2006)	The authors assessed the performance of environmental management and tourism services in 20 Italian regions, using DEA and Malmquist Index.
Keth, Chu and Xu (2006)	This work used a three-staged (triangular) DEA model, window analysis and a regression model to evaluate the efficiency, effectiveness and productivity of 49 units from an international chain over 2 years (1999-2000).
Barros (2006)	The author calculated the rate of technical progress of 15 Portuguese hotel companies for the period 1998-2002 using a stochastic cost frontier model.
Wang, Hung and Shang (2006)	This study used an input-oriented DEA model to assess the relative cost efficiency of 49 hotels in Taiwan, with five different units measured: overall, allocative, technical, scale and pure technical efficiency. It also used a bootstrapped Tobit regression to evaluate the factors which determine hotel efficiency.
Giménez-García, Martínez-Parra and Buffa (2007)	These authors carried out research into how to reallocate resources in a Spanish fast-food chain, using a three-stage DEA model in order to improve efficiency.
Davutyan (2007)	This author carried out research into the efficiency of 21 luxury hotels in the region of Antalya (Turkey) in 2001, using input-oriented DEA and Tobit regression.
Reynolds and Thompson (2007)	This study used an output-oriented DEA model assuming constant variable returns and a multiple regression technique to assess the technical efficiency of 60 same-brand full-service restaurants in the USA, using both controllable and non-controllable inputs.

Source: Author

The main conclusions that can be drawn from the published literature are, firstly, that DEA is the method that has been used most often to carry out efficiency analyses although to a lesser extent, other methods have also been used, such as stochastic frontier analysis. Secondly, the variables used should be selected taking three factors into account: their availability, their use in similar works published previously, and the opinion of professionals working in the sector. Finally, in terms of results, the travel agencies analysed tend to have high levels of efficiency, and the main determining factors when they come to that efficiency are levels of capital, labour and sales, while the ownership type (independent or under a chain brand) is not a relevant factor.

3. Methodology

The productivity analysis of these agencies has been undertaken using DEA and the calculation of the Malmquist Productivity Index (Malmquist, 1953). DEA allows the units analysed to be organised into a hierarchy as regards efficiency levels, whilst the Malmquist index permits changes in productivity to be estimated dynamically.

DEA is a technique based on obtaining an efficiency frontier using a set of observations considered without having to understand any kind of functional relationship between inputs and outputs (Charnes, Cooper, Lewin and Seiford, 1997).

In terms of the input-oriented evaluation process, for example, a decision-making unit (DMU) is considered to be efficient when it uses the minimum input empirically observable from any examined DMU given its output vector (Charnes, Cooper and Rhodes, 1981). In other words, a DMU is inefficient when it cannot generate maximal output levels with minimal input consumption (Cooper, Sieford and Zhu, 2004).

Following Färe, Grosskopf and Lovell (1994) a DEA-based measure of any change in the unit's productivity over time will be calculated using the Malmquist Productivity Index (M) (Malmquist, 1953). The main issue is that changes in productivity can be the result of efficiency progress, but sometimes they can be caused by technological improvements and M allows changes in productivity to be divided into two initial factors referring to technical efficiency (E) and technological change (T).

As regards the above, the Malmquist index (M) between time periods t and t+1 would be defined as:

$$M_{t,t+1}(X_{t+1}, Y_{t+1}, X_t, Y_t) = \left[\frac{D_t(X_{t+1}, Y_{t+1})}{D_t(X_t, Y_t)} \frac{D_{t+1}(X_{t+1}, Y_{t+1})}{D_{t+1}(X_t, Y_t)} \right]^{(1/2)} \qquad (1)$$

As mentioned before, this index can initially be broken down into two components: technological change (T) and technical efficiency change (E). The breakdown is as follows:

$$M_{t,t+1}(X_{t+1}, Y_{t+1}, X_t, Y_t) = \underbrace{\left[\frac{D_{t+1}(X_{t+1}, Y_{t+1})}{D_t(X_t, Y_t)} \right]}_{E} \cdot \underbrace{\left[\frac{D_t(X_{t+1}, Y_{t+1})}{D_{t+1}(X_{t+1}, Y_{t+1})} \frac{D_t(X_t, Y_t)}{D_{t+1}(X_t, Y_t)} \right]^{(1/2)}}_{T} \qquad (2)$$

where, the first ratio (E) represents changes in technical efficiency between two periods (t and t+1) and the second ratio (T) is a measure of technological progress between the same evaluated periods.

The four different elements shown in equation (2) can be achieved using mathematical programming. In particular, a non-radial and non-oriented approach is used to estimate the Malmquist Productivity Index. For this study, a non-oriented model was chosen because, although the managers of the travel agencies expressed that due to the high level of competitiveness their attention was focused on reducing costs (as capturing new

clients was highly difficult), on the other hand, there are previous studies which have used an output orientation when the units analysed were operating in competitive markets (Barros and Dieke, 2007). Simultaneously, a non-radial approach was used in order to avoid problems that may be derived from the fact that the radial models do not consider slack variables.

So,

$$\begin{aligned}\left[D_t(X_{t+1}, Y_{t+1})\right] &= \min_{S_r^-, S_s^+, \lambda} (1-(1/r)\sum_{r=1}^{R} S_r^- / X_r^{k',t+1}) / (1+(1/s)\sum_{s=1}^{S} S_s^+ / Y_s^{k',t+1}) \\ &\text{s.a.} \sum_{k=1}^{K} \lambda^{k,t} \cdot X_r^{k,t} + S_r^- = X_r^{k',t+1}, \forall r \\ &\sum_{k=1}^{K} \lambda^{k,t} \cdot Y_s^{k,t} - S_s^+ = Y_s^{k',t+1}, \forall s \\ &\lambda^{k,t} \geq 0,\ S_r^- \geq 0,\ S_s^+ \geq 0\ \forall k, r, s\end{aligned} \tag{3}$$

where S_r^- and S_s^+ denotes slack variables for inputs and outputs respectively; $X_r^{k,t}$, represents the rth input respective observed at DMUk in year t (with r:1…R); $Y_s^{k,t}$, is the sth output respective observed at DMUk in year t (with s:1…S); and $\lambda^{k,t}$, is a coefficient that shows the proportion of DMU_k used to evaluate $DMU_{k'}$ in year t (with k:1…K the number of DMUs -the sub-index k´ shall be used to name the DMU under analysis-). The rest of the elements of the expression (2) would be obtained analogously.

However, the fact that the non-parametric DEA estimators are based on a finite sample of observations, and therefore are susceptible to variations in the sample values, requires the application of a method capable of analysing the sensitivity of the productivity results in function with changes in the data. (Simar and Wilson, 1998). Furthermore, as DEA does not incorporate any randomness in the process, it cannot offer any information with respect to the uncertainty in the estimates of the efficiency of each unit (Löthgren and Tambour, 1999). The bootstrap is a statistical procedure capable of eliminating these two inconveniences of DEA.

It was introduced by Efron (1979) and is based on the idea of simulating the data-generating process (DGP) in order to obtain a new estimate of each simulated sample. In this way, the estimates obtained would mimic the distribution of the real population estimator (Simar and Wilson, 1998). In particular, for example, it is possible to obtain confidence intervals for the estimates of the efficiency parameters enabling us to determine whether the efficiency levels of the DMUs initially obtained by DEA are statistically significant (Tortosa-Ausina, Grifell-Tatjé, Armero and Conesa, 2008).

This study will follow the method described by Simar and Wilson (1999) (smoothed bootstrap). This method improves the estimates obtained when we resample directly from the original data, as this procedure (naive bootstrap) provides a poor estimate of the DGP. Furthermore, it incorporates the reflection method described by Silverman (1986)**,** which avoids estimate problems derived from the fact that in the input-oriented model, the efficiency parameters have an upper limit that is one.

For the DEA approach, the smoothed bootstrap algorithm follows the following steps (Simar and Wilson, 1999):

1. Compute the Malmquist productivity index $\widehat{M}_{t,\,t+1}(X_{t+1}, Y_{t+1}, X_t, Y_t)$ for each DMU by solving the linear programming models (3) to obtain each one of the necessary factors that are shown in (2) ($\widehat{E}$ y $\widehat{T}$)

2. Obtain a pseudo data set (X^*_t, Y^*_t) for each DMU and t to construct the reference bootstrap technology by using bivariate kernel density estimation and the reflection method

3. Compute the bootstrap estimate of the Malmquist index for each DMU $\widehat{M}^{*kb}_{t,t+1}(X_{t+1}, Y_{t+1}, X_t, Y_t)$ by using the sample obtained in step 2.

4. Repeat steps 2–3 B times to obtain a set of estimates $\widehat{M}^{*kb}_{t,t+1}(X_{t+1}, Y_{t+1}, X_t, Y_t)$. Simar and Wilson (2000) recommend a value of B = 2000.

5. Obtain confidence intervals for the Malmquist index and its components after the first 2000 estimates have been obtained from the pseudo-samples generated.

Apart from DEA and smoothed bootstrap, another method was used, (the Mann Whitney U Test) to analyse the relationship that exists between the efficiency of the travel agencies and their location, the ownership type and the level of experience in the sector.

This method is based on the idea that the relation that may exist between two variables that are organised in increasing order in function with their size, provides information regarding the relationship between their populations (Gibbons and Chakraborti, 1992).

The use of this method was considered to be appropriate, given that, as in the case of DEA, it is not parametric (as opposed to other tests that may be used for the same purpose – such as the Student's t-test), and because there are no reasons to assume the existence of any type of underlying probability distribution either in the efficiency levels or the variables whose relationship with them is intended to be analysed. In these cases, the test provides an efficient means of contrasting hypotheses (Sheskin, 2000). Furthermore, the Mann Whitney U Test is more powerful than other non-parametric alternatives, such as the Sign Test (Conover, 1999), and its use in previous studies similar to this one (Köksal and Aksu, 2007) provides an additional guarantee to take into account.

4. Data Analysed

In order to perform the efficiency analysis, a survey was conducted in travel agencies located within the Alicante city area between March and April 2008. The group of variables considered in the questionnaire were selected not just because the data were readily available, but also because similar variables have been used in previous studies which have focused on the same type of activity (Barros and Matias, 2006; Wöber,

20006; Köksal and Aksu, 2007, for example). Furthermore, the choice was also made based on the opinions of sector representatives with whom preceding interviews were held.

Unfortunately, the responses were not very numerous, despite repeated attempts and the high level of confidentiality of the study, as many agencies were reluctant to provide information about their own economic activities (e.g. about profit levels). As a result, the 22 agencies analysed finally represented 17.32% of all agencies surveyed.

Based on the results obtained through the questionnaires, information was acquired about certain aspects which can be used to determine and summarise the economic activity of travel agencies during the year 2007.

To do this, the variables chosen as activity inputs were: the number of employees (NE), annual expenditure (AE) and the potential service (PS) which the agency would be capable of providing. The outputs selected were: the number of customers (NC) and the average spend per customer (AS). A summary of the most important statistical characteristics of these variables can be found in Table II.

Table II. Input and output characteristics. 2004-2007.

	NUMBER OF EMPLOYEES (NE)	POTENTIAL SERVICE (PS)	ANNUAL EXPENDITURE (AE)	NUMBER OF CUSTOMERS (NC)	AVERAGE SPEND PER CUSTOMER (AS)
AVERAGE	2.8409	3 065.9773	6967.0568	1781.0795	968.7500
STANDARD DEVIATION	1.4052	3 177.8774	1 276.3213	2 130.3098	506.8324
MAXIMUM	7.0000	15 850.0000	10 600.0000	9 500.0000	2 200.0000
MINIMUM	1.0000	175.0000	5220.0000	124.0000	170.0000

Source: Author.

5. Results

The results obtained using the data available for the agencies studied were analysed by means of an non-radial and non-oriented Malmquist index, using the expressions described in equations (2) and (3) programmed in MATLAB 7.6.

These results are shown in Tables III-VII where M represents the value of the Malmquist index for the corresponding period. E is the efficiency change and T the technological change, as described in equation (2). Furthermore, the efficiency change index (E) can be broken down into two components: Scale Efficiency Change (SEC) and Pure Efficiency Change (PEC). The first component (SEC) represents the extent to which a DMU is close to its most productive scale size over time. The second component (PEC) measures changes in the distance of agencies to the frontier, completely lacking in scale effects (Färe, Grosskopf and Lovell , 1994). Values above unity denote progress and vice versa.

Table III. Values of the Malmquist index (M)

	M			
DMU	**2004_2005**	**2005_2006**	**2006_2007**	**2004_2007**
1	**1.1825**	**0.7012**	**1.0487**	**1.1129**
2	0.9583	1.0129	1.0316	1.0017
3	1.0133	**1.0175**	**0.9530**	**1.0082**
4	**1.2590**	**0.9185**	**1.0396**	**0.9752**
5	**1.0393**	**1.0719**	**0.9904**	**0.9156**
6	1.0335	**1.0731**	1.0012	0.9956
7	0.8735	**1.0024**	**1.0794**	**0.9359**
8	0.9921	0.9559	0.9735	0.9398
9	1.0145	0.9789	**1.0203**	1.0151
10	**1.0436**	**0.9686**	**1.0126**	**1.0382**
11	1.0116	**0.9989**	**0.9325**	**0.9944**
12	**0.9886**	**1.0164**	**1.0833**	**1.0471**
13	**1.0027**	**1.0015**	**0.9909**	**1.0458**
14	**1.0618**	**1.0177**	1.0416	0.9979
15	0.9712	0.9984	**1.0642**	0.9834
16	0.9866	1.0113	1.0210	**1.0116**
17	**1.0127**	1.0385	1.0242	**1.1376**
18	**1.0134**	1.0379	**1.0182**	1.0324
19	0.9945	1.0290	0.9869	**0.9971**
20	1.0586	**0.8411**	0.9985	**0.9991**
21	0.9694	**0.9209**	**1.0438**	1.0825
22	1.0171	1.0013	0.9438	1.0522
MEAN	**1.0201**	**0.9788**	**1.0128**	**1.0132**

The results in bold type represent values that are significantly different from one (95%).
Source: Author.

Table IV. Efficiency change (E)

	E			
DMU	**2004_2005**	**2005_2006**	**2006_2007**	**2004_2007**
1	1.1365	**0.8296**	**1.0107**	**0.9529**
2	0.9697	1.0065	0.9901	0.9664
3	**1.0798**	1.0015	0.9904	1.0711
4	0.9509	**1.1465**	1.0438	**1.1379**
5	0.9512	1.1563	0.7994	**0.8792**
6	**0.8801**	**1.0084**	**0.9839**	**0.8732**
7	0.7877	**1.0668**	0.9395	0.7895
8	1.0259	0.9500	0.9901	0.9650
9	1.0422	0.9809	1.0123	1.0349
10	1.0381	**0.9491**	**1.0342**	**1.0189**
11	**1.0027**	0.9745	1.0411	1.0173
12	**1.0159**	1.0040	1.1137	1.1359
13	**1.0037**	1.0157	0.9934	**1.0127**
14	0.9584	0.8841	**1.0564**	**0.8951**

15	**0.9694**	0.9924	**1.0049**	**0.9668**
16	1.0029	1.0262	0.9970	**1.0261**
17	0.9368	1.0418	1.0688	1.0431
18	**0.9830**	1.0160	0.9645	0.9633
19	1.0129	1.0914	**0.9955**	1.1004
20	1.0265	0.9075	0.9983	**0.9300**
21	0.8841	1.0085	1.0609	0.9459
22	**1.1924**	0.9962	0.9752	**1.1583**
MEAN	**0.9897**	**0.9997**	1.0011	**0.9905**

The results in bold type represent values that are significantly different from one (95%).
Source: Author.

Table V. Technological change (T)

	T			
DMU	**2004_2005**	**2005_2006**	**2006_2007**	**2004_2007**
1	**1.0405**	**0.8453**	**1.0376**	**1.1678**
2	0.9882	1.0063	1.0419	1.0366
3	0.9384	**1.0160**	**0.9622**	**0.9413**
4	1.3241	**0.8011**	**0.9960**	**0.8570**
5	**1.0926**	0.9271	**1.2389**	**1.0413**
6	**1.1742**	**1.0642**	**1.0176**	**1.1401**
7	1.1089	0.9397	1.1489	**1.1855**
8	0.9670	1.0062	0.9832	**0.9739**
9	0.9733	**0.9979**	**1.0079**	**0.9809**
10	**1.0053**	**1.0205**	0.9792	**1.0189**
11	1.0089	1.0250	**0.8957**	**0.9774**
12	0.9731	**1.0124**	0.9728	**0.9218**
13	**0.9991**	0.9860	0.9975	**1.0327**
14	1.1079	1.1511	0.9860	**1.1148**
15	**1.0018**	1.0061	1.0589	**1.0171**
16	0.9837	0.9854	1.0241	**0.9859**
17	**1.0811**	0.9968	0.9583	**1.0906**
18	**1.0310**	**1.0216**	**1.0556**	**1.0718**
19	0.9818	**0.9429**	0.9914	0.9061
20	1.0312	**0.9269**	**1.0002**	**1.0744**
21	**1.0965**	**0.9132**	0.9839	**1.1445**
22	**0.8530**	1.0052	**0.9678**	**0.9084**
MEAN	**1.0307**	**0.9790**	1.0117	**1.0229**

The results in bold type represent values that are significantly different from one (95%).
Source: Author.

Table VI. Scale efficiency change (SEC)

	SEC			
DMU	**2004_2005**	**2005_2006**	**2006_2007**	**2004_2007**
1	**1.1523**	0.8587	0.9758	**0.9655**
2	**1.0195**	1.0105	**0.9646**	**0.9939**
3	1.0270	**1.0106**	0.9068	0.9411
4	0.9833	1.1487	1.0207	**1.1529**

5	0.9961	1.3900	**0.5747**	0.7957
6	**0.8298**	1.0685	0.9690	**0.8592**
7	0.7720	0.9501	**1.0245**	0.7514
8	1.1014	0.9343	1.0075	1.0368
9	1.0048	0.9860	1.0022	0.9929
10	1.1010	0.9399	**0.9313**	**0.9637**
11	0.9995	0.9375	0.9063	**0.8493**
12	1.0063	**0.9376**	1.0937	1.0319
13	1.0638	1.0217	1.0089	**1.0965**
14	0.9210	0.9819	1.1022	**0.9967**
15	0.9163	1.1232	1.0218	**1.0516**
16	1.0110	1.1384	**0.9739**	1.1209
17	**0.9727**	0.9399	1.2562	1.1485
18	**0.9842**	**1.0114**	0.9347	**0.9304**
19	1.0105	1.0662	0.9208	0.9921
20	1.0690	0.8714	1.0167	**0.9471**
21	0.8201	1.2499	0.9753	**0.9998**
22	**1.2469**	1.0750	0.9369	**1.2559**
MEAN	0.9947	1.0229	0.9703	**0.9873**

The results in bold type represent values that are significantly different from one (95%).
Source: Author.

Table VII. Pure efficiency change (PEC)

	PEC			
DMU	**2004_2005**	**2005_2006**	**2006_2007**	**2004_2007**
1	0.9863	**0.9662**	1.0358	**0.9870**
2	0.9511	0.9960	1.0264	0.9724
3	1.0515	0.9910	1.0922	1.1381
4	**0.9671**	**0.9981**	1.0226	**0.9870**
5	0.9549	0.8319	1.3911	**1.1050**
6	1.0606	0.9437	**1.0153**	**1.0163**
7	1.0203	1.1228	0.9171	1.0507
8	0.9314	1.0168	0.9828	0.9307
9	1.0373	0.9949	1.0100	1.0423
10	0.9429	**1.0098**	1.1104	**1.0573**
11	**1.0032**	1.0395	1.1487	**1.1979**
12	1.0096	1.0708	**1.0183**	1.1008
13	0.9435	0.9942	0.9847	**0.9236**
14	1.0406	0.9004	0.9585	0.8980
15	**1.0580**	**0.8835**	0.9835	**0.9193**
16	0.9920	0.9015	1.0237	0.9155
17	0.9630	1.1085	**0.8508**	**0.9082**
18	0.9988	1.0045	1.0320	1.0353
19	1.0023	1.0662	1.0811	**1.1092**
20	0.9603	1.0414	0.9819	0.9820
21	1.0780	0.8068	1.0878	0.9461
22	0.9562	0.9267	1.0409	0.9224
MEAN	**0.9949**	**0.9791**	1.0317	**1.0032**

The results in bold type represent values that are significantly different from one (95%).
Source: Author

Taking into account the results that are shown in Table III, the evolution of the productivity of the travel agencies throughout the period under analysis may be observed. In function with the average annual results and the total average of the period, which are always higher than one, with the exception of the year 2005-2006, it has been concluded that the productivity of the agencies has increased each year, except for this afore-mentioned period.

It is possible to decompose the result for M into two components (E and T) so as to observe the effect of the variations in productivity due to efficiency change (E) and technological change (T).

The values of this division may be found in tables IV and V respectively. On the whole, the evolution of changes in technical efficiency (E) is negative because the average values obtained were, in general, lower than one (as opposed to the technological efficiency which had a general positive trend). This would imply that, despite the non-optimal management of resources and products (low average values of E), the improvement in productivity levels due to the positive evolution of technological progress (average values of T greater than one), moderated the final effect on productivity levels (M).

It is possible to obtain more information by breaking down the change in technical efficiency (E) into another two factors whose values may be found in tables VI and VII: scale efficiency change (SEC) and pure efficiency change (PEC). The former, (SEC), reflects the degree to which an agency operates closely to its most productive scale size over time. The PEC reflects the variations in productivity due to the changes in distance of each DMU from its efficiency frontier, completely lacking in scale effects.

From this point of view, and given that SEC obtains a total average of the period of less than one, it is possible to determine that the negative trend in productivity due to the change in technical efficiency (E) would be based on lower average values of SEC. This implies that on the whole, the agencies would not have been capable of applying more appropriate levels of economies of scale. Furthermore, the fact that the total average level of PEC for the whole period was only slightly higher than one would indicate that the agencies had not made great achievements in reaching their efficiency frontiers through a better management of their resources and products.

In conclusion, it may be observed that it was basically the technological component that gave rise to an improvement in the productivity values as the average total level of the rest of the components either gave values less than one (E and SEC) or were only slightly above one (PEC – (in fact, the yearly results obtained for PEC are not very different to those for SEC).

However, in order to eliminate the afore-mentioned limitations of DEA, the data obtained was analysed using the smoothed bootstrap method described above. This type of analysis also enables contrasts to be made of the hypotheses of the significativeness of the findings through the calculation of confidence intervals. In this way, these intervals were calculated with a confidence level of 95% so that if the value of 1 were included in them, the corresponding result would not be considered to be significantly different to 1, and therefore, the existence of any type of change in it could not be guaranteed. In tables III-VII the results that would lie within these confidence levels are represented in bold type.

With this new information it may be observed that the initial estimates derived through DEA should be considered with caution, as many of them do not accept the hypothesis of the existence of statistically significant change.

Nevertheless, given that the trend of the initial estimates was clearly defined, the conclusions that may be obtained from the values which were finally considered as significant based on the estimates of the confidence intervals did not modify the general trend described above.

Additionally, with the objective of examining the possible existence of a relationship between the productivity levels of the travel agencies and their ownership type (Köksal and Aksu, 2007), location and level of experience (Wöber, 2006), the Mann Whitney U Test will be used, taking into account only those productivity levels that may provide reliable information (that is, those which are statistically significant). Furthermore, in order to obtain conclusions for the whole sample period, the productivity values and the variables to be analysed for the whole period (2004-2007) will be considered.

The above-mentioned variables were selected because, as well as being included in previous studies as potentially influential factors on the efficiency and/or productivity levels of travel agencies, they were also identified as being significant by the managers who were interviewed for this study. The information referring to these variables was obtained from a public list of travel agencies located in Alicante published by the Regional Government of Valencia (Regional Government of Valencia, 2008).

The program used for the analysis was the SPSS 14.0 and the results are show in table VIII.

Table VIII. Comparison of the productivity (M) of travel agencies based on bootstrapped DEA results in relation to agency ownership type, location and experience.

Ownership type	N	Mid-Range	Sum of ranges
Part of a Group	6	7.33	44.00
Privately-owned	7	6.71	47.00
Total	13		
Mann whitney-U			19.00
Asymptotic significance (bilateral)			0.775

Location	N	Mid-Range	Sum of ranges
Part of a Group	9	7.00	63.00
Privately-owned	4	7.00	28.00

Total	13		
Mann whitney-U			18.00
Asymptotic significance (bilateral)			1.000

Experience	N	Mid-Range	Sum of ranges
Part of a Group	6	7.50	45.00
Privately-owned	7	6.57	46.00
Total	13		
Mann whitney-U			18.00
Asymptotic significance (bilateral)			0.668

As table VIII shows, the results of the Mann Whitney U Test suggest, with a level of significance of 0.05, that an agency's ownership type, its level of experience and its location do not affect its level of productivity.

6. Conclusions

The high level of competitiveness existing among the travel agencies in the city of Alicante in relation to the Spanish national average was the primary element which gave rise to the need to identify what type of factors could help increase the productivity of the agencies. Therefore, these factors would be crucial for designing lines of action which would help to sustain the presence of the agencies in the market as well as stimulating the level of production in tourism which is a key sector for the Spanish economy.

From this point of view the analysis of the evolution of productivity levels of these agencies based in the city of Alicante was carried out, using the information gathered from available statistical sources together with a survey of each of the agencies that were kind enough to take part in the study.

The method chosen to analyse the data was based on the use of a non-radial and non-oriented DEA model with which the corresponding Malmquist indices and their components were obtained. So, in this way, the available information was analysed from a different perspective to that used in previous studies (Fuentes, 2009a and 2009b) in order to observe whether there were differences in the conclusions obtained from the results. Furthermore, smoothed bootstrap techniques were also used in order to both eliminate any possible problems arising from that fact that the DEA estimates are sensitive to variations in sample values and to obtain confidence intervals with respect to the estimates through which their statistical significativeness could be determined.

The results obtained from applying the afore-mentioned methods, while having different values, do not provide substantially different conclusions to those obtained in previous studies, except for the fact that on this occasion the evolution of productivity levels is, in general, slightly positive rather than negative.

We can observe that the technological component (T) is the main factor which these companies use to sustain their productivity levels and, thanks to this, the negative effects of a poor application of economies of scale are neutralised. In light of this, and for the whole of the period 2004-2007, the inappropriate management of resources plays an insignificant role. Perhaps, a higher amount of information online about both economics and efficiency could be a good strategy to help these agencies to improve their results (Fuentes, Espinosa, Hernández and Lillo, 2010a; Fuentes, Espinosa, Hernández and Lillo, 2010b).

On the other hand, the results obtained in terms of the influential relationship between the group of selected variables and the productivity of the units studied give rise to the same conclusions that were obtained in the afore-mentioned previous studies. Therefore, neither the location of the agencies, their ownership type or their level of experience are variables with a statistically significant influence. So, any measure aimed at the redirecting of resources used to exploit these variables to improve the management and use of economies of scale would be positive.

More specifically, in function with the lack of this type of relationship and from observing previous results, it would be possible to conclude that, firstly, those agencies belonging to large corporate groups should review their ownership status as this either provides no advantages in terms of productivity or they are not exploiting to the full the possibilities that this type of relationship can offer. In this respect, any resource directed at exploiting this situation should try to increase or make better use of productivity levels in terms of scale and management. In the same way, as the results show that the level of experience acquired does not provide any further advantages after a certain number of years, the additional remuneration that the labour factor may be obtaining due to this reason does not make sense, and this amount should be saved or directed at obtaining better SEC and PEC results. Finally, the location of the agencies in the centre of cities is not an aspect that increases productivity. Therefore, analogically to the two previous cases, it would be appropriate to relocate agencies in other areas where leasing or purchasing prices are lower in order to save costs and improve results.

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