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# AN ANALYSIS OF THE EFFICIENCY OF SPANISH TRAVEL AGENCIES

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***Abstract***: *The aim of this article is to assess the relative efficiency of Spanish travel agencies. The analysis uses the non-parametric technique "Data Envelopment Analysis" (DEA) to estimate their technical efficiency and their operating scale. The article also provides possible action lines for the agencies to improve their efficiency. Finally, using a Tobit regression model, there is an analysis of the influence that the company's own variables and the integration strategy adopted have on efficiency. The empirical application carried out on a sample of 34 Spanish travel agencies shows low indexes of technical efficiency, as well as a slight influence of the integration strategy variable on efficiency.*

***Keywords***: *Travel agencies, scale efficiency, technical efficiency, DEA, Tobit.*

## 1. Introduction

The importance of tourism for the Spanish economy is in itself a sufficient motive to carry out any study about the sector. Any economic indicator reveals evidence of this affirmation. The Tourism sector was 11% of the national GDP in 2009 - three times that of the primary sector. It provided the commercial deficit of the Balance of Payments with 26,039 million euros. It also employed 2,496,501 people, equivalent to 11,3% of the country's active population according to the Institute Of Touristic Studies (IET [18]).
The business volume of the travel agencies subsector was 17,634 million euros in 2009, according to the annual survey of the service sector carried out by the National Institute of Statistics (INE [19]).
In spite of these figures, the estimates of the Spanish Tourism Satellite Account (CSTE) for the year 2008, highlight a deceleration of the final tourist demand. This is in accordance with the general evolution of the Spanish economy and moderates its contribution to the GDP to 10.5%,

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0.3% less than in 2007 (INE [19]). According to the Association for Touristic Excellence (EXCELTUR), the traditional outgoing travel agencies, car rentals, urban hotels and airlines are the subsectors most affected (INE [19]).

For decades, travel agencies have had an important mediating and assessing function in bringing various services closer to tourists. Nevertheless, a questioning of their future is widespread and this has been largely accentuated by the intermediating role played by technological development. The emergence of Internet has made it possible for clients to manage their own trips and for the end producers to integrate themselves as intermediaries. Due to this, there has been talk about, tourist desintermediation.

The industry of tourist intermediating finds itself immersed in the change of the paradigm. Yet there are many authors who, faced with the abundance of online contents and services, proclaim the necessary mediating, safety and service functions of travel agencies. Their opinion is that, in view of the scenario of market freedom and information excess, travel agencies must react by asserting their closeness to the client and their capacity of prescribing and assessing. At the same time, they must select the suppliers with whom they can maintain connections. This should be done considering factors of solvency, quality, services, profitability and reciprocity.

Hence, if we analyse the evolution of travel agencies in recent years, we can observe how their number, far from decreasing, has been increasing (Esteban and Rubio [13]). This increase is the result of the great dynamism of these Spanish companies in recent years. In general, it is possible to synthetise the changes that have been taking place in the travel agencies sector into four main aspects (Maciñeiras [24]; Del Alcázar [11]; Bérdard [3]).

a) Desintermediation. The increase in online distribution has meant that many suppliers use Internet to offer their products without the need of intermediaries. The sale of tourist products has thus ceased being exclusive to agencies. The sector that has taken most advantage of this business opportunity has been that of airlines (especially the low-cost ones) who have been in the lead due to their wide experience in direct sales. Other sectors are those of hotels and, increasingly more, rent-a-car firms. 86% of hotel owners consider that within three years their clients will prefer to book via their web sites instead of doing so through an online travel agency. Moreover, airlines predict saving 25% more in the commissions paid to distributors. However, the cruises sector foresees maintaining its greater sales volume through agencies, not only due to the type of products but also their high cost.
b) Competition. The ease of access to the end-user entails the appearance of new competitors. Such is the case of the online travel agencies. Without needing to maintain a widespread network of offices, they can compete with the large travel agencies with their many branches by eliminating or weakening entrance barriers and achieving important costs reductions. Examples are “eDreams”, “Rumbo”, “Lastminute”, “viajar.com”, “Atrápalo.com” and “Terminal A” (De la Rosa [12]). Traditional travel agencies still get 56% of the total sales in the tourist intermediation sector. However, the results of the online travel agencies reflect the increase of this segment in recent years. Thus, the first eight online agencies in Spain billed a total of 838 million euros in 2006. This figure was 31.3% higher than that of 2005. Despite being positive figures, the growth rate of the billing has decreased considerably with respect to previous years, in which percentages as high as 118% (in 2005) and 141% (in 2004) were achieved (Vazquez et al. [31]).
c) Concentration. This is one of processes and services with an increasingly lower number of actors, via business operations of vertical and horizontal integration. What stands out from this is the growth of the large tourist groups – for example, “Globalia”, “Marsans”,

"Orizonia" (previously "Iberoestar"), "Barceló", "Transhotel" and "Serhs". These have alliances with various companies that develop their activity in different sectors of tourism[1].

d) It is also necessary to highlight the concentration of the sales of just a few companies. The seven largest agencies had more than half the sector's sales in 2006 and grew 12.5% with respect to the previous year (De la Rosa [12]).
e) Technification. The growth of new technologies stands out. These are alternative and complementary to those that exist and can provide costs reductions, simplify the business structure and eliminate hierarchical levels. In this way, they produce structures that are more horizontal and efficient and increase the competitive potential of the companies. This is because they have more information of the environment and this makes their strategic management more dynamic.

Given the complexity of this situation that travel agencies are facing, it is noted that new technologies are more than just a threat to travel agencies. They also provide a wide range of opportunities that the agencies have to know how to take advantage of and manage efficiently in an increasingly more complex context.

The work of this article is carried out within the framework of this new scenario of the travel agencies subsector. Its main aim is to analyse the efficiency of this subsector. It is important to highlight that there are few studies published that are dedicated to the analysis of the efficiency of travel agencies. A consensus of the inputs and outputs used and the methodology applied to carry out the analysis of efficiency does not exist. However, the inputs most frequently used in the analysis of efficiency can be grouped into variables relative to the work factor (Kösel and Aksu [21]; Wöber [32]), travel spending (Wöber [32]; Kösal and Aksu [21]), and environmental factors (Bell and Morrey [4]). The total sales variables and the number of clients tend to be used for the outputs (Barros and Dieke [2]). This present work uses the DEA methodology. This allows for the measuring and comparing of the efficiency indexes of travel agencies, as well as showing possible action lines for each agency to improve its efficiency level. Finally, and in accordance with the results obtained, the way in which specific characteristics can affect the efficiency parameters will be analysed. Analysis based on the Tobit regression model allows the identifying of whether the vertical integration strategy, the agency size and the ROA results variable are relevant factors in explaining the levels of efficiency attained. The study results can be useful for travel agencies as the analysis carried out allows them to get to know how their management has performed by comparing them with the indexes of the efficiencies obtained by different travel agencies.

## 2. Methodology

### *2.1 Data Envelopment Analysis*

The Data Envelopment Analysis (DEA) developed by Charnes et al. [6], from Farrell's seminal work (1957), is a non-parametric methodology that, considering certain inputs and outputs of different decision units, provides a ranking by giving each of them a score of relative efficiency. The units that obtain a greater quantity of outputs with the lowest quantity of inputs will be the

[1] This same phenomenon can be noted in the hotel subsector as is reflected in the article of Jiménez [20].

most efficient and, therefore, will achieve the highest scores, while at the same time defining the "efficient frontier".

The estimating of the efficiency coefficients is conditioned by the type of model to be used: a model oriented towards inputs or outputs. The former is based on the minimising of the inputs given a particular level of outputs, while the latter looks for the maximisation of the outputs given a quantity of inputs.

Charnes et al. [6] proposed a model assuming constant returns to scale (CRS). This model is known in the literature as the CCR model. Later studies have introduced different suppositions. Banker et al. [1], assumed variable returns to scale (VRS), giving rise to the model known as BCC. Other models less frequently used in the literature are the additive model of Charnes et al. [7], the cone-ratio DEA model of Charnes et al. [8], and the Assurance Region model of Thompson et al. ([29], [30]). Extensions of the DEA model are found in the DEA-Malmquist (Malmquist [25]) and the DEA-allocative model. The Dea-Malmquist divides the change in the total productivity into the change of technical efficiency in a period of time. The DEA-allocative model distinguishes between technical and assignment efficiency.

The DEA model consists of solving a fractional programming problem for each of the Units, with the objective function being the efficiency level of each unit. Thus , if we consider $n$ homogeneous Units ($j=1,2,...n$), for each of which we use the same inputs ($x_1,x_2,...,x_m$) to obtain the same outputs ($y_1,...,y_s$), the efficiency of $DMU_0$ is calculated by solving the non-linear problem (Charnes et al. [6]).

$$Max\ h_0 = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}}$$

$$s.t.\ \sum_r u_r y_{rj} - \sum_i v_i x_{ij} \le 0 \quad \nabla j$$

$$u_r, v_i \ge \varepsilon \qquad \nabla r,i$$

The model proposed allows the search for the weightings of the outputs and inputs $\{u_r, v_i\}$ that maximise the efficiency index of the unit assessed, $h_0$, defined as the quotient between the weighted sum of outputs and the weighted sum of inputs, subject to the restriction that no Decision Making Unit (DMU) can have a score of efficiency greater than one using these same weights. If, subject to this restriction, it is possible to find a set of weightings such that the efficiency index of the Unit assessed is equal to 1 ( $h_0^* = 1$), the Unit is efficient in relation to the other units. If, on the contrary, $h_0^* < 1$, the Unit is inefficient, even using the set of weightings most favorable for it, it is possible to find another Unit that obtains a greater efficiency index with these same weightings.

With the aim of solving the fractional program, three characteristics of the model must be specified: the input-output orientation of the model, the scale returns and the weightings. The input-output orientation of the DEA is based on the market conditions of the DMUs (Decision Making Units). As a general rule, it is assumed that resource orientation is used in competitive market conditions, given that the inputs are under the control of the DMU, whose aim is to

maximise the output subject to the market demand. On the other hand, in monopolistic markets, resource orientation is used, given that the output is endogenous and the input is exogenous. With respect to the returns to scale, these may be constant or variable. Both forms are often used (CRS and VRS models) with the aim of obtaining the decomposition of the global technical efficiency into pure technical efficiency and scale efficiency. The weightings that appear in the objective function are endogenous and defined by the algorithm implemented in the DEA. These weights measure the distance between the DMU and the production frontier.

Applying the Charnes and Cooper [19] theory of fractional programming, making the change of variables $\mu_r = tu_r$ and $v_i = tv_i$ where $t = (\sum_i v_i x_{i0})^{-1}$, the linear programming model to be used is:

$$
\begin{aligned}
Max \quad & \sum_{r=1}^{s} \mu_r y_{r0} \\
s.t \quad & \sum_{i} v_i x_{i0} = 1 \\
& \sum_{r} \mu_r y_{rj} - \sum_{i} v_i x_{ij} \le 0 \quad \nabla j \\
& u_r, v_i \ge \varepsilon \qquad\qquad \nabla r, i
\end{aligned}
$$

where $\varepsilon$ is a real, positive and small number that allows the elimination of the possibility of the model's variables having a zero value.

The model oriented at the output assumes that the decision units are operating on an optimal scale with constant scale results (CRS). That is, in this type of model the influence that the existence of scale economies could have in the assessing of the efficiency ratio or index of the decision units is not being considered. With the aim of taking into account scale economies, variable scale results models (VRS) are used. These allow comparing a DMU with those of its size and not with all DMUs present in the problem.

Since the appearance of DEA in 1978, the development of this methodology both in the theoretical area (Cook and Seidford [9] and the empirical area has been growing. The relevant empirical applications that use this methodology have a place not only in the public sector (Lowell and Muñiz [23]) but also in the private sector (Giner and Muñoz [15]).

### *2.2 Data and Input/Output Selection*

The SABI (Sistema de Análisis de Balances Ibéricos) database is the one used to carry out the empirical analysis of the work. This is a database of the company Informa that has collected the annual accounts of the main Spanish and Portuguese companies since 1990. It is an interesting tool that allows the carrying out of business analysis, comparisons between companies or company groups, rankings, concentration and segmentation analysis and sectorial studies.

The non-parametric models of estimating the production frontier require the appropriate identifying and measuring of the inputs (resources) and outputs (transformation of the resources) which are going to be used in the analysis. Checking the academic literature referring to the analysis of the efficiency of the travel agencies subsector, the opinion of the Directors of the sector analysed and the availability of the information required in the SABI database have been the criteria used for selecting the inputs and outputs in this article. The productive factors,

number of employees and the number of offices have served as inputs. The number of employees is the most representative indicator of the work factor and the number of offices represents the proxy variable of the capital factor. The information relating to the number of offices - that does not appear in the SABI database - has been obtained using primary information sources (telephone interviews) and secondary sources.
The output depends on the global sales volume of each agency. Indeed, the final aim of travel agencies is to sell products and services connected with travelling at a price and in conditions that are more advantageous than those that could be obtained going directly to the suppliers. Though the travel agencies have a portfolio of various products, the information connected with the sales of each product is not available. This is why the global sales volume is used as the output for each agency. On the other hand, since the profit of a tourist intermediation company comes from the commissions established for each service that are similar in the sector, the output sales become a reliable indicator of the business profit for this type of activity.
Moreover, the selection of inputs and outputs carried out obeys the gauges of the DEA, by virtue of which the minimum number of DMUs (Decision Making Units) has to verify the following criteria (Cooper et al.[10]:

$$DMU \geq \max\{m \times s, 3(m+s)\}$$

To estimate the production frontier, data from the 34 retail and wholesale agencies with the highest sales volume in 2007 in the SABI Database have been used.
In 2007, a general tendency towards stagnation in the number of travel agencies was noted. Nevertheless, average growths of 6% have been registered during a decade, and we find ourselves in an advantageous situation with respect to other European countries. Facts such as the growth of travel sales via Internet (a growth of 40% compared to 2006) and the emergence of new profiles of travellers, are two factors influencing the lower growth rhythm and new openings of travel agencies. These facts can be considered typical of the evolution of a mature sector in which the traditional intermediation will continue to retain its basic role in travel distribution.
Table 1 (*a* and *b*) presents the main descriptive statistics of the variables used in the Data Envelopment Analysis and the correlation analysis between the inputs and the output selected. The results obtained show a strong lineal relation between the inputs included in the study and the sales volume output. The high degree of correlation of 0.92 between the number of offices and the sales volume inputs is noteworthy. On the other hand, due to the strong correlation between the number of office and the number of employees, 0.60, it could be said that it is the number of offices that contributes more significantly to the explaining the efficiency of the travel agencies.

**Table 1 (a). Descriptive statistics Table Inputs-Output 2008.**

| Variables | Minimum | Maximum | Average | Standard deviation |
|---|---|---|---|---|
| *Inputs* | | | | |
| Employees | 16 | 4459 | 576 | 253.054 |
| Offices | 2 | 750 | 137 | 134.83 |
| *Outputs* | | | | |
| Sales (thousand euros) | 28999.113 | 2051173 | 287807.58 | 146752.251 |

**Table 1 (b). Correlation Table Inputs-Output 2008.**

Correlation

| | Employees | Offices | Sales (thousand euros) |
|---|---|---|---|
| Employees | 1 | 0.605603352 | 0.76966 |
| Offices | 0.6056 | 1 | 0.91576 |
| Sales (thousand euros) | 0.76966 | 0.91576 | 1 |

### *2.3 DEA Results*

In this work, the technical efficiency has been measured using the DEA non-parametric analysis with an orientation input. Likewise, one modelling has been carried out with a constant results scale (CRS) and another with a variable results scale (VRS). This allows an estimation of the scale efficiency for each agency (SE) to be calculated. The efficiency index under the hypothesis of scale results variables only measures the pure technical efficiency (ETP). However, the technical efficiency index under the supposition of constant scale results (ETG) is a non-additive combination of the pure technical efficiency and the scale efficiency (Golany and Roll [16]). The quotient between the indexes of global efficiency and pure technical efficiency provides a measurement of the scale efficiency.

$$SE = \frac{ETG}{ETP}$$

The results of the efficiency indexes for each of the estimation models considered is presented in Table 2.

Assuming that efficiency has its origin in both management skills and scale effects, Table 2 allows the observation of management inefficiencies in accordance with the efficiency indexes obtained in the VRS model. The motive that justifies interpreting the efficiency indexes with the VRS model as management skills is based on the very comparison between the VRS and CRS models. While the CRS model identifies global efficiency, the VRS model allows technical efficiency to be separated from scale efficiency (Golany and Roll, [16]). Consequently, it is accepted that technical efficiency obeys management efficiencies.

Under the CRS supposition, there are only five agencies (5.88%) that work efficiently, being located at the efficient frontier, whereas under the VRS supposition there are three agencies with an efficiency index equal to one (14.7%). Table 2 moreover shows a low level of efficiency in the travel agencies analysed. Indeed, the average technical efficiency index in the model with the constant results scale (CRS) is 0.4435, and in the model with the variable results scale (VRS) it is 0.5604. This represents a low level of efficiency (44.35% and 56.04%, respectively). This fact reveals that the Spanish travel agencies analysed are not using their available resources appropriately. They could obtain better efficiency levels with changes in management methods.

The last column of Table 2 shows that the agencies with scale inefficiency experience either decreasing results or scales increases. It is noted that those that experience decreasing scale results are too large to take advantage of the scale benefits and should reduce their size. On the other hand, the agencies with growing results are too small to take advantage of the favours of scale, which is why they should increase this via consolidation. It is observed that the average

scale efficiency is 0.7916, and although this represents a high percentage of scale efficiency (79.416%), there remains much to be done to improve this efficiency level with appropriate changes in the size of the travel agencies.

**Table 2. DEA efficiency indexes for the 34 Spanish agencies.**

| DMU | Index of CRS Efficiency | VRS Technical Efficiency | Scale Efficiency | | DMU Projection |
|---|---|---|---|---|---|
| unit-1 | 0.2782 | 1.0000 | 0.2782 | Decreasing | |
| unit-2 | 0.2469 | 0.8558 | 0.2885 | | Decreasing |
| unit-3 | 0.2013 | 0.6884 | 0.2924 | | Decreasing |
| unit-4 | 0.2375 | 0.7782 | 0.3051 | | Decreasing |
| unit-5 | 1.0000 | 1.0000 | 1.0000 | Constant | |
| unit-6 | 0.8500 | 0.8535 | 0.9959 | | Constant |
| unit-7 | 0.3596 | 0.5867 | 0.6129 | | Decreasing |
| unit-8 | 0.7609 | 0.7634 | 0.9967 | | Increasing |
| unit-9 | 0.3180 | 0.6093 | 0.5219 | | Constant |
| unit-10 | 0.1490 | 0.2779 | 0.5361 | | Decreasing |
| unit-11 | 0.1113 | 0.2170 | 0.5130 | | Decreasing |
| unit-12 | 1.0000 | 1.0000 | 1.0000 | Constant | |
| unit-13 | 0.3109 | 0.5214 | 0.5962 | | Constant |
| unit-14 | 0.2608 | 0.2682 | 0.9725 | | Increasing |
| unit-15 | 0.4164 | 0.4217 | 0.9872 | | Increasing |
| unit-16 | 0.4594 | 0.4928 | 0.9321 | | Increasing |
| unit-17 | 0.6193 | 0.6313 | 0.9810 | | Increasing |
| unit-18 | 0.5155 | 0.5505 | 0.9363 | | Increasing |
| unit-19 | 0.0305 | 0.0663 | 0.4597 | | Decresing |
| unit-20 | 0.3756 | 0.3906 | 0.9617 | | Increasing |
| unit-21 | 0.6316 | 0.7519 | 0.8400 | | Increasing |
| unit-22 | 0.7297 | 1.0000 | 0.7297 | Increasing | |
| unit-23 | 0.3213 | 0.3352 | 0.9584 | | Increasing |
| unit-24 | 0.5101 | 0.5367 | 0.9504 | | Increasing |
| unit-25 | 0.9450 | 1.0000 | 0.9450 | Increasing | |
| unit-26 | 0.2682 | 0.2825 | 0.9495 | | Increasing |
| unit-27 | 0.4943 | 0.5082 | 0.9726 | | Increasing |
| unit-28 | 0.4466 | 0.5296 | 0.8432 | | Increasing |
| unit-29 | 0.4117 | 0.4203 | 0.9797 | | Increasing |
| unit-30 | 0.3146 | 0.3192 | 0.9856 | | Increasing |
| unit-31 | 0.1898 | 0.1915 | 0.9909 | | Increasing |
| unit-32 | 0.2990 | 0.3370 | 0.8873 | | Increasing |
| unit-33 | 0.4373 | 0.5396 | 0.8104 | | Increasing |
| unit-34 | 0.2994 | 0.3315 | 0.9032 | | Increasing |
| Average | 0.4353 | 0.5856 | 0.7957 | | |
| Typical Dev. | 0.2472 | 0.2570 | 0.2439 | | |
| Maximum | 1 | 1 | 1 | | |
| Median | 0.3676 | 0.5331 | 0.9342 | | |
| Minimum | 0.030 | 0.031 | 0.2782 | | |

In spite of the low efficiency indexes obtained, it is possible to increase them by reducing the quantity of resources used as well as by increasing the output of the agencies that operate inefficiently. Table 3 describes, for those inefficient agencies, what their action lines should be in terms of reducing their inputs and increasing output in order to be efficient. The Table also shows which are the peer group agencies for each of the inefficient agencies used in the projection of their inputs onto the efficient frontier. Knowing the peer group of agencies is interesting for the inefficient agencies, as a change of management strategy of each of the units to attain the aim of efficiency should be based on the strategies used by those agencies which belong to their peer group.

**Table 3. Projection of the inputs-outputs of the inefficient agencies.**

| DMU | Nº Offices | Nº Employees | Sales | reference units | | |
|---|---|---|---|---|---|---|
| unit-1 | 0.00% | 0.00% | 0.00% | unit_1 | | |
| unit-2 | -75.73% | -28.10% | 0.00% | unit_1 | unit-5 | |
| unit-3 | -72.79% | -51.47% | 0.00% | unit_1 | unit-5 | |
| unit -4 | -93.87% | -50.26% | 0.00% | unit_1 | unit-5 | |
| unit -5 | 0.00% | 0.00% | 0.00% | unit_5 | | |
| unit -6 | -14.95% | -14.95% | 0.00% | unit_5 | unit_12 | unit-25 |
| unit -7 | -85.56% | -55.51% | 0.00% | unit_5 | unit_12 | |
| unit -8 | -23.44% | -23.44% | 0.00% | unit_5 | unit_12 | unit-25 |
| unit -9 | -91.35% | -51.07% | 0.00% | unit_5 | unit_12 | |
| unit -10 | -86.39% | -84.33% | 0.00% | unit_5 | unit_12 | |
| unit -11 | -87.97% | -90.10% | 0.00% | unit_5 | unit-22 | |
| unit -12 | 0.00% | 0.00% | 0.00% | unit_12 | | |
| unit -13 | -90.98% | -68.87% | 0.00% | unit_12 | unit-25 | |
| unit -14 | -69.53% | -71.79% | 0.00% | unit_5 | unit-22 | |
| unit -15 | -53.57% | -53.57% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -16 | -45.13% | -45.13% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -17 | -32.89% | -32.89% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -18 | -38.49% | -38.49% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -19 | -96.84% | -96.84% | 0.00% | unit_5 | unit_12 | unit-25 |
| unit -20 | -54.28% | -54.28% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -21 | -19.27% | -19.27% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -22 | 0.00% | 0.00% | 0.00% | unit-22 | | |
| unit -23 | -58.59% | -58.59% | 0.00% | unit_5 | unit-22 | unit-25 |
| unit -24 | -36.73% | -36.73% | 2.01% | unit-22 | unit-25 | |
| unit -25 | 0.00% | 0.00% | 0.00% | unit-25 | | |
| unit -26 | -60.59% | -60.59% | 11.80% | unit-22 | unit-25 | |
| unit -27 | -37.87% | -37.87% | 6.91% | unit-22 | unit-25 | |
| unit -28 | -31.35% | -31.35% | 14.99% | unit-22 | unit-25 | |
| unit -29 | -48.12% | -48.12% | 10.37% | unit-22 | unit-25 | |
| unit -30 | -54.94% | -54.94% | 32.79% | unit-22 | unit-25 | |
| unit -31 | -67.60% | -67.60% | 40.96% | unit-22 | unit-25 | |
| unit -32 | -38.11% | -38.11% | 58.60% | unit-22 | unit-25 | |
| unit -33 | -10.54% | -10.54% | 58.86% | unit-22 | unit-25 | |
| unit -34 | -38.66% | -38.66% | 59.51% | unit-22 | unit-25 | |

It is noted that all the inefficient agencies have to reduce their inputs in order to attain the efficiency level of the peer group. Unit-2, particularly, would need to reduce its number of offices by 75.73% and its number of employees by 28.10% to attain the efficiency level of the peer group (unit-1 and unit-5). All the agencies have to reduce their inputs to be efficient and only 9 agencies also have to increase their outputs to attain the aim of efficiency. The agencies unit-5, unit-25 and unit-22 were the peer units for the majority of the inefficient agencies: Unit-5 and unit-25 were the peers of 18 inefficient agencies, whereas unit-22 was the peer of 19 inefficient agencies.

### *2.4 Explanation of Efficiency*

Once it has been noted that some travel agencies get better results in terms of efficiency than others, the question of what such differences could be due to arises. Efficiency values can be assessed using a Tobit model (Greene [17]) that allows us to identify the typical characteristics of the companies that could affect their levels of efficiency. Using regression models to explain the DEA results is well known in the academic literature (Perrigot and Barros [23]; Mancebón and Molinero [26]; Lovell, Walters and Wood [22]).

The company variables that are going to be considered in the specification of the Tobit model are those connected with their size (Assets), vertical integration (retailers, wholesalers and mixed) and results (ROA).

Once again, the selection of these variables to explain the model are justified by the literature that links efficiency to company size and profitability to assets, as well as to the process of vertical integration in which the travel agencies subsector is seen to be immersed and by the availability of these variables in the SABI Database.

The assessment of the link between size and scale efficiency is based on the numerous advantages that the literature and the opinions of intermediation professionals give to business size. The following stand out: a) the possibility of achieving agreements in purchasing policies, b) a greater negotiating power with respect to suppliers, c) an increase in the financial power to carry out investments connected with promoting, technology, brand image, etc., d) a decrease in the possibility of being absorbed by a large group; and e) an improvement and modernization of the economic and administrative management (Bote et al. [5]).

As is noted in checking the literature on travel agencies, no empirical evidence is detected about the existence of a positive link between vertical integration and efficiency. However, the interests of retailer agencies in vertical integration are taken into account in the sector. In fact, integration stimulates them to carry out specific activities allowing them to increase their resources to improve their presence in the market and makes it easier for them to make tourist products (Bote et al. [5]).

Finally, it has traditionally been assumed that efficiency is correlated with different indicators of results such as profitability on assets or on investments (Mester [27]). In this line, the link between profit on assets and efficiency for tourist distribution is examined.

The Tobit model used has the following mathematical expression:

$$y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{21i} + \beta_3 x_{3i} + u_i \quad y_i^* > 0$$

$$y_i^* = 0 \qquad\qquad\qquad\qquad\qquad\qquad\quad y_i^* \le 0$$

$y^*$ being the efficiency index of each agency and the variables $X_j$ ($j=1.2.3$) the previously-mentioned explanatory variables. Table 4 shows the results of the regressions for the dependent variables of scale efficiency and technical efficiency.

**Table 4 Censured Tobit Model**

| | Model I. Dependent variable Scale Efficiency | | Model II. Dependent variable Technical Efficiency | |
|---|---|---|---|---|
| | Coefficients | pvalue | Coefficients | pvalue |
| Constant | 0.34 | 0.0015* | 0.75 | 0.000 |
| Assets | -8.37e-05 | 0.0400* | | |
| ROA | 0.016 | 0.0342* | -0.0335 | 0.0424* |
| Integration Vertical | -0.033 | 0.0656 | -0.8264 | 0.0631 |
| Total Obs. | 34 | | 34 | |
| LR chi2 | 461.85 | | 500.32 | |
| Prob > chi2 | 0.0000 | | 0.0000 | |

The ROA variables and size influence scale efficiency, being statistically significant at a significance level under 5%. On the other hand, there is no evidence that vertical integration significantly influences the efficiency level. It is noted that efficiency decreases with size and vertical integration. The negative sign of the assets variable indicates that size has a negative influence on efficiency. That is, the companies with a smaller size are those with greater levels of efficiency. On the other hand, the ROA results variable has a positive effect on scale efficiency, corroborating the existence of a correlation between this efficiency and result indicators (Mester [27]).

If we analyse the decisive factors of technical efficiency using the Tobit model, it cannot be stated that the vertical integration variable has an evident impact on technical efficiency as, at a significance level of 5%, it is not statistically significant.

## 3. Conclusions

The importance of analysing efficiency in the travel agencies sector is explained by the change of paradigm that this sector is going through, defined by concentration and business competition, the development of telecommunications and disintermediation.

The analysis of efficiency using the non-parametric DEA technique requires the selecting of different inputs and outputs of the decision-making units, DMUs. This is a difficult and controversial question, as different researchers would have varying points of view about which should be the inputs and outputs for this analysis. The selection of the inputs and outputs used in this article are based on the existing academic literature about the tourist sector, the opinion of the Directors of travel agencies, as well as the availability of the variables in the SABI Database.

The DEA analysis shows that the majority of Spanish agencies did business inefficiently in 2008. Considering constant scale results, only 8.8% of the sample's agencies operate efficiently and are to be found on the efficient frontier. This percentage increases to 14.7% when variable scale results are assumed. Very low levels of pure technical efficiency are noted. This indicates unsuitable management due to not using the available resources appropriately. Scale efficiency

is, therefore, the dominant source of efficiency. Nevertheless, having an average efficiency index of 0.7416 (74.16%), the agencies should carry out a greater effort to improve this source of efficiency via changes in their size.

The agencies do not, generally, operate at an optimum size as those agencies with scale inefficiencies are notable for being too large (decreasing results) or too small (increasing results) to take advantage of scale benefits.

Though the efficiency levels noted are very low – the average efficiency index being 58.56% - it is possible to increase these levels by reducing the quantity of resources used and increase the output of those agencies that operate inefficiently until the levels of the inputs and outputs of their peers are attained. To do so, the change called for in the management strategy of each inefficient agency should be based on those used by their peer agencies. In any case, Table 4 shows the input levels that should be used to implement management strategies that allow them to be efficient.

The study also analyses the connection between the Assets, ROA and Vertical Integration variables and technical and scale efficiency. The estimation results of a Tobit model show that the Assets and ROA company variables have an important influence on explaining scale efficiency. It cannot be affirmed that the Vertical Integration variable has a significant influence on scale efficiency. Finally, no empirical evidence at all is noted about the influence of these variables on the pure technical efficiency levels.

In short, the results of the study can be useful for the management of travel agencies as they can get to know how this has been via noting and comparing the efficiency indexes obtained in the analysis carried out.

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