INTERRELACIÓN ENTRE EFICIENCIA TÉCNICA Y UTILIZACIÓN DE LAS TIC EN DEL SECTOR HOTELERO ESPAÑOL EN BASE A SU FORMA JURÍDICA

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Resumen:

La realidad económica imperante en el sector turístico en las últimas décadas se encuentra asociada al crecimiento, difusión y el uso de las Tecnologías de la Información y la Comunicación (TIC). En base al debate generado en la literatura entre el uso intensivo de las TIC y la mejora de la eficiencia de las empresas ha mostrado una clara convergencia en diferentes sectores económicos.

En la presente investigación se pretende realizar el análisis empírico a fin de dar respuesta a dos hipótesis: una primera ha pretendido contrastar la a existencia de una relación positiva entre la Eficiencia Técnica (ET) de las empresas hoteleras españolas y el uso de las TIC. Mientras una segunda hipótesis se encuentra asociada al análisis del el impacto que la forma jurídica de la empresa tiene en la ET.

Para poder probar dichas hipótesis, se ha realizado la estimación de la ET mediante el método paramétrico de la frontera estocástica. Mientras que para la observación del impacto de la forma jurídica en cuanto a la ET se han utilizado los árboles de decisión. Para ello se ha manejado una muestra de 214 empresas españolas en el periodo 2009-2016. Los datos están extraídos de SABI.

Los resultados obtenidos nos llevan a concluir cómo el uso de las TIC se configura como un factor influyente en la ET de forma significativa y positiva. Así como las empresas que se constituyen en Sociedad Limitada tienen mayor afectación en la ET en relación con las Sociedades Anónimas.

Palabras clave: Turismo; eficiencia técnica; sector alojamiento turístico; TIC; forma jurídica

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THE INTERRELATION BETWEEN TECHNICAL EFFICIENCY AND USE OF ICT IN THE SPANISH HOTEL SECTOR ON THE BASIS OF ITS LEGAL FORM

Abstract:

The prevailing economic reality in the tourism sector in recent decades is associated with the growth, dissemination and use of Information and Communication Technologies (ICT). Based on the debate generated in the literature between the intensive use of ICTs and the improvement of business efficiency, it has shown a clear convergence in different economic sectors.
The present research aims to carry out the empirical analysis in order to respond to two hypotheses: the first one has tried to contrast the existence of a positive relationship between the Technical Efficiency (TE) of the Spanish hotel companies and the use of the ICT. While a second hypothesis is associated with the analysis of the impact that the legal form of the company has on the TE.

In order to be able to test said hypotheses, the estimation of the TE has been carried out by means of the parametric method of the stochastic frontier. The decision trees have been used to observe the impact of the legal form on the TE. For this purpose, a sample of 214 Spanish companies has been used in the 2009-2016 period. The data are extracted from SABI.

The results obtained lead us to conclude how the use of ICT is configured as an influential factor in DE in a significant and positive way. As well as the companies that are constituted as Limited Companies have a greater effect on the DE in relation to the Corporations.

Keywords: Tourism; technical efficiency; tourist accommodation sector; ICT; legal form.

1. INTRODUCTION

Much has been written about efficiency, although research on the concept of productive efficiency has been routinely associated with entrepreneurial performance. In recent decades, this has received a rebound in the development of theoretical-empirical literature in a multitude of economic sectors (Coll-Serrano and Blasco-Blasco, 2009; Lambarraa, Stefanou, Serra and Gil, 2009) and countries (Hwang and Chang, 2003; Agasisti, Dal Bianco and Griffini, 2016). The reasons that lead to a more adequate analysis of the efficiency variable are determined by the growing competitiveness in all economic sectors, together with the advance of globalization, where the need to evaluate the actions taken by the company is increasingly pressing (Álvarez Pinilla, 2001).

In this sense, the tourism sector has not been an exception to this type of research (Barros and Alves, 2004; Blasco and Moya, 2005; Cracolici, Nijkamp and Rietveld, 2008). However, the works published with respect to the Spanish tourism sector focus mainly on "*the development of new products, influence of the sector on the CPI, improvement of competitiveness and other aspects related to the organisation of this type of companies*" (Blasco and Moya, 2005: 664). Delimiting in a notable way other types of variables that affect the tourist sector, such as technical efficiency (TE), which is a variable of optimization of business behavior (Álvarez Pinilla, 2001).

The emergence of new Information and Communication Technologies (ICT) -which includes in an appropriate way the convergent set of digital applications of microelectronics, computing, telecommunications, optoelectronics, as well as nanotechnology and biotechnology (Albers, 2006)- has produced an oscillatory impact on the society in which we live and has undoubtedly had a direct effect on organizations. Among these changes, it is worth highlighting how organisations adapt to new times through a restructuring of old organisational forms (Chavera and Arias, 2012). Therefore, the evolution of ICTs has been accompanied by a clear evolution of internal organizational models (from bureaucratically vertical companies to horizontal and external companies (network)) (Benjamin and Levinson, 1993; Vásquez, Bonaguro, Leal y García, 2007). Castells (2000: 196) defines network companies as "*the result of the convergence of the organizational changes described and the assimilation and use of new digital technologies*". Therefore, Castells himself (2000) argues the need to seek a clear flexibility within the company in order to be more efficient and effective. However, it seems that, in reality, the Spanish industrial landscape affirms that the limited application of ICT use is due to self-limiting structures, as well as the lack of a clear investment in the constant improvement of ICT application.

Likewise, in recent years tourism has been one of the economic sectors most affected by the introduction of ICTs. Which has experienced one of the most significant growth in recent years (Berné, García, García and Múgica, 2011). It is clear that ICT, unlike traditional channels, have

been the main responsible for promoting the marketing and promotion of tourism companies nationally and internationally (Berné, García, García and Múgica, 2012; Vega, Gil and Del Vecchio, 2014). In addition, other levels seem to be gaining relevance, such as the adoption of intelligent technologies (IoT, Big Data, Artificial Intelligence, etc.) (Trequattrini, Shams, Lardo and Lombardi, 2016; Lombardi, 2019).

However, the reality of the introduction of ICTs in such a remarkable way should be accompanied by the constant improvement not only of the income of tourism enterprises, but also of the increase of efficiency and business productivity (Miró and Pereira, 2017). In the reality of the Spanish industrial fabric there is a clear position in favour of this statement, although the debate is not without contradictions depending on the sector analysed. As far as the tourism sector is concerned, the trend implied by a relationship between the use of ICT in tourism companies and the improvement of the TE is analysed (Alberca y Parte, 2013).

Under this line of research, an analysis is made of the situation of the TE of companies in the tourism sector according to their legal form. This line is novel insofar as there is no detailed literature on this perspective in the sector analysed here (Santos and Gómez, 2009; Jackute, 2014).

Based on the most relevant contributions of previous research and theories, the following hypotheses are proposed:

Hypothesis 1: ICT has a positive and causal impact on the improvement of TE.

Hypothesis 2: The legal form (Limited Liability Company and Limited Company) corresponds to a better TE.

The rest of the work is organized as follows. The second section reviews the literature analysing the Spanish hotel sector, technical efficiency, as well as the analysis of the implementation of ICT in tourism companies as a competitive variable. The third section presents the methodology used to make the corresponding estimates. The fourth section presents the database used to measure the TE, and the relationship between this variable and ICTs. In the fifth section, the main results obtained are analysed. Finally, some brief conclusions are proposed.

2. THEORETICAL FRAMEWORK

At an international level, and more specifically in Spain, one of the economic sectors that has been gaining most prominence in recent decades is the tourism sector. So much so that this tourist sector has become an essential component in the configuration of the productive, social and territorial structure of the national economy. However, recent years have been affected by the international crisis that began in the third quarter of 2007, which negatively affected the issuing markets (Cuadrado-Roura and López Morales, 2015). For this reason, the tourism sector was

framed in a context of profound change, generating new positive synergies and being much more dynamic (Miró and Pereira, 2017).

Under the prism of these circumstances there has been a clear evolution towards the knowledge economy that is interpreted within the context of globalization, the digitalization process and the constant changes of consumption patterns (Requena, Torrent and Lladós, 2001). As for the second process, the use of Information and Communication Technologies (ICT) has been identified. This phenomenon generates new opportunities and advantages, both for innovation and for the improvement of efficiency and competitive capacity. In this case, the Spanish tourism company has intensified the use of ICT, which enables the creation and constitution of the network company in the tourism sector to be strengthened, as it has a positive impact on productivity, an increase in workers' salaries and a clear increase in international competitiveness (Vilaseca, Torrent, Lladós and Garay, 2006).

Thanks to the use of ICTs, the tourism sector has undergone an organisational transformation, with greater flexibility towards innovation by both the organisation itself and the workers, and a more horizontal way of working with other companies that allows for more efficient knowledge transfer (Buhalis and Law, 2008; Cerezo Medina and Guevara Plaza, 2015). Thus, the tourism sector has clearly adapted to the new economic options and has evolved into a network company being much more efficient and responding to an international market 24 hours a day 7 days a week.

Thus, ICTs make it possible to reorganize the traditional supply-demand relationship channels, and it is therefore necessary to agree on a partnership between the use of ICTs and efficiency (Buhalis, 2003; Ivars, Solsona and Giner, 2015). But what is meant by efficiency? Productive efficiency is defined as the relationship between outputs and inputs involved in production. This relationship has led the analysis of efficiency to focus, in recent years, on the study of a company's capacity to improve its productivity by improving the use of available resources (Coelli, Rao, O'Donnell and Battese, 2005).

In this context, the concept introduced by Farrell (1957) of technical efficiency (TE) is introduced. The TE specifically reflects the company's ability to obtain the maximum number of outputs, given some inputs. Thus, it is necessary to show how this definition allows an analysis from two clearly differentiated perspectives. In the first one it is analysed from the vision of the inputs in the final production (Figure 1.1). A second perspective analyses output given inputs (Figure 1.2).

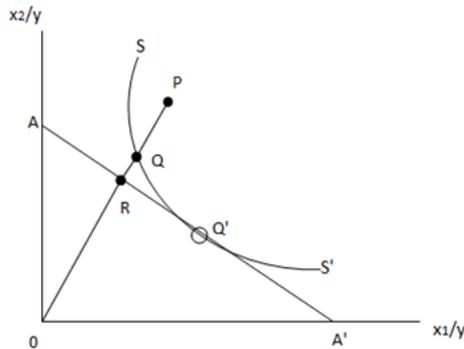**Figure 1.** Concept of technical efficiency

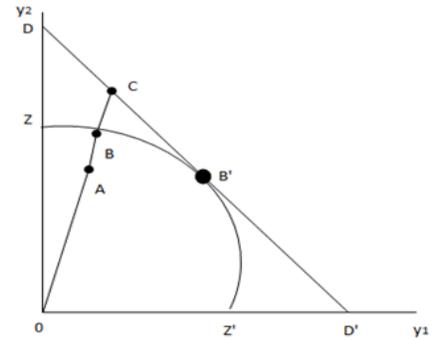***Figure 1.1.** Inputs oriented measures*

***Figure 1.2.** Outputs oriented measures*

Source: Own elaboration

Figure 1.1 describes an isoquant unit defined by the SS' curve which identifies the multiple compositions of the two productive factors that a perfectly efficient enterprise could use to produce a unit of output. Any company that is located at point P indicates that it is technically inefficient because the use of inputs can be reduced to point Q. Thus, the segment delimited by the QP points implies technical inefficiency. Thus, the percentage by which all inputs can be proportionally reduced by maintaining the output production in an output unit is defined by QP / OP. That is to say, for a company to be technically efficient it must be in the point Q', on the SS' isoquant.

With respect to Figure 1.2, the concept is similar to that stated in the previous figure, although the measures are output oriented. Obtaining the production of final outputs from the taking of some given inputs.

Thus, efficiency measures are relative and not absolute, where the value reached by a given company belongs to the observed deviation of a company with respect to those considered as more efficient given the available information. In this sense, the methodology proposed by Farrell is a technique based on the concept of "benchmark" or referencing (Flores and Gómez-Limón, 2006).

Therefore, a comparative study is carried out between comparable companies, that is, those that use the same type of inputs to produce a set of similar outputs. To reach a higher level of generality, we call them "Decision Making Units" (DMU).

The corroboration of the existence of a difference of TE between DMU is implied by a set of inputs, among which the legal form taken by the analysed companies is also taken into consideration. Of the different forms of mercantile societies that the Spanish legislation allows to constitute a company, the Limited Company (S.L.) and the Limited Liability Company (S.A.) are the majority ones. However, the majority of companies are constituted as S.L. In 2016, according to data extracted from the INE, 99.41% of the total number of companies were constituted as S.L. The hotel sector does not escape this reality since 91.92% of the companies in the total number of S.L. and S.A. of the data extracted from DIRCE[3] in 2013 correspond to S.L., showing a growth of 1.05% with respect to 2012. While the companies S.A. had a decrease of 2.87%.

On the other hand, the hotel sector is one of the main Spanish tourist sub-sectors as it provides accommodation to 63% of tourists who spend the night in Spain (Alberca y Parte, 2013). While the increase in the Spanish hotel offer in the years between 2009 and 2016 has been 0.44%[4]. However, the increase in overnight stays in the same years has been 24.21%, taking into account the occupancy rate held close to 50% it seems that hotel capacity exceeds the entry of tourists, negatively affecting business profitability (Alberca y Parte, 2013).

As for the Autonomous Communities with the largest number of hotel beds offered are in the Balearic Islands, the Canary Islands, Catalonia, Andalusia, Valencia and Madrid, which correspond to 77% of the total Spanish hotel beds (Gonzalo, 2012).

Finally, it is worth highlighting as a company that the "strategic use of ICT can help the company to improve its efficiency and become more competitive, essentially through the channel implied by innovative dynamism" (Vilaseca et al., 2006:31). Therefore, confirming that the rates of return on investment and the use of ICT are higher than the use of other productive factors (Díaz-Chao and Torrent-Sellens, 2010).

3.   METHODOLOGY

3.1.   Technical Efficiency: Stochastic Frontier

As it has been defined, the aim is to estimate the optimum border, which is why in this work a very extended method is used, the estimation using the Stochastic Border (SB, hereinafter). This method receives an important qualitative impulse from the works carried out by Aigner, Lovell, and Schmidt (1977) and Meeusen and van den Broeck (1977).

The estimation of TE by parametric approximation (Lovell and Schmidt, 1988; Greene, 2008) presupposes a functional form for the production function and, therefore, an econometric estimation of that function.

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[3] Directorio Central de Empresas (DIRCE)

[4] Data extracted from the Hotel Occupancy Survey - INE

The following model is used to carry out this estimation:

$$y = f(x; \beta)\exp\{v - u\}$$

(1)

Where y is defined as output, x is the input vector, and β is a vector of technological parameters.

Thus, variables are defined as:

- Variable output (y):

    (1) Exploitation income

- Variable inputs (x):

    (1) Material Cost

    (2) Labour Cost

    (3) Cost of Capital

Thus, two random parameters are introduced: the first, v, which captures the effects of statistical noise. The second term, u, shows the effects of technical inefficiency. Thus, the model makes it possible to estimate the efficiency (if u = 0) or inefficiency of the process (u > 0). Usually, the estimation of the model is done by means of the maximum likelihood. These two disturbances are incorporated into the behavioural functions.

For the estimation of the TE, the following model will be used:

$$TE_{it} = \frac{y_i}{f(x_i;\beta)\exp(v_i)} = \exp(-\mu_i)$$

(2)

3.2. Relationship between TE and ICT

In relation to the hypothesis raised regarding the causal relationship between improved TE and ICT use, a parametric approach is used to calculate the Cobb-Douglas production function (Miró, 2018).

After a preliminary examination of the estimation of the variable TE, the estimation of the production function is made with panel data for the period 2009-2016. In this case, the model used is based on the estimation of a Cobb-Douglas-type production function with a production factor:

$$TE_{it} = \hat{\beta}_0 + \hat{\beta}_{ICT} lnICT + u_{it}$$

(3)

Where TE is the company dependent variable i = 1,..., N for the period t = 2009,..., 2016, which depends on the ICT variable defined as the intangible asset that measures the company's innovative capacity (Van Ark, et al., 2009; Marrano and Haskel, 2009; Díaz-Chao and Torrent-Sellens, 2010). Finally, u_{it} represents the term error, which gathers all those factors of reality, unobservable or due to external circumstances.

3.3. Decision trees

This sub-section analyses the methodology of decision trees, also known as segmentation models. This methodology used in Miró and Pereira (2016: 566) "The objective is to define and validate the models in order to determine which variables explain the variability of a dependent variable (Breiman, Friedman, Olshen & Stone, 1984)". Mainly, an algorithm is constituted that allows to construct trees that are applied to problems of regression and classification. Thus, these explanatory techniques belong to the set of regression models, however, they have the advantage that both the criterion and the predictor variables can be quantitative or qualitative in nature.

Thus, the main objective of applying this methodology is determined by demonstrating whether there is a causal relationship between the TE and the legal form of the company. Likewise, a second group of analysis is constituted that compares the TE taking into account the specific AA.CC. where the companies are located.

There are four main algorithms that can be used to carry out the tree analysis:

CHAID (Chi-square automatic interaction detector), exhaustive CHAID, (CRT classification and regression trees) and QUEST (fast, impartial, efficient statistical tree). In this article we use the exhaustive CHAID, with the presentation of binary trees, which contains all the possible segmentations of each predictor (Kass, 1980).

In this document, the TE is the variable used to construct the decision tree, which is estimated according to the Cobb-Douglas production function as defined above. The criterion variable is the region where the enterprises are located. Finally, we evaluate the relationship between the TE and the proxy for legal form, i.e., whether the company is a Limited Liability Company or a Limited Company.

This model is designed as an algorithm to build trees that are applied to regression and classification problems. They are explanatory techniques that belong to the set of regression models but have the advantage that both the criterion and the predictive variable can be quantitative or qualitative in nature.

The regression tree has nodes; each set of nodes is drawn with the local estimate of each output. In each node the conditional probability of relevance of each class is stored:

$$P\left(c\,\|v_j(x)\right)=\frac{P\left(c\,\|v_j(x)\right)}{\sum_{k=1}^{n_c}P\left(c_k,v_j(x)\right)}$$

(4)

The combination of classifiers is carried out by the majority:

$$g_c(x)=\frac{1}{n_t}\sum_{j=1}^{n_t}\overline{P}\left(c\,|v_j(x)\right)$$

(5)

In this document we will classify the cases into groups or predict the values of a dependent variable (target) based on the values of the independent variables (predictors). Therefore, the procedure provides us with validation tools for exploratory and confirmatory classification analysis that can be used in multiple techniques.

This type of analysis identifies homogeneous groups with high or low risk and facilitates the construction of rules for making predictions on individual cases.

4. DATABASE

The Survey on Business Strategies (ESEE) (Fariñas and Jaumandreu, 1999) has been used regularly in the literature at the microeconomic level (Fariñas and Jaumandreu, 1999). However, in recent years a database has appeared that allows working at a business level, such as the Iberian Balance Sheet Analysis System (SABI) (Coll-Serrano and Blasco-Blasco, 2007 and 2009).

SABI provides a comprehensive tool for analysing the sectoral scenario at a highly detailed level of economic activity. The database contains general information and annual accounts of more than 1,000,000 Spanish companies and 320,000 Portuguese companies.

In order to determine the selection of the individuals that will make up the database under study, they will be conditioned on the basis of three filters:

- The first one, only includes corporate companies and those individuals that have deposited in the Annual Accounts of the Mercantile Registry.
- A second group, where the companies must be active in the economic sphere, so that in SABI they will have the status of "active".
- Finally, companies for which the activity code is not available are excluded.

Individuals who do not comply with one of these three characteristics are automatically eliminated from the sample.

Likewise, one of the characteristics of the sample obtained from SABI is their incomplete nature, a direct consequence of the usual business rotation in any economy. These would be:

- The annual incorporation of newly created companies.
- The cessation of the activity of others.
- Lack of information in the balance sheet and profit and loss account for each year by different firms.

Therefore, the entries and exits of the companies in the sample can be considered as a random effect on the population. Whether they are new entrants or exits (including those where information is missing for all years of the sample).

This situation allows business turnover in the sector to be observed and the economic consideration of the sector to be evaluated. However, it makes the analysed data panel unbalanced.

5. DATA ANALYSIS

This research focuses on the accommodation sector for the Spanish tourist sector, where the results allow us to verify in a quantitative and reasoned manner how the evolution of the TE has been during the years under study; as well as which are the most efficient Autonomous Communities (in an aggregate manner); and, finally, to determine whether the ICT variable has a positive effect on the improvement of the TE.

5.1. Technical efficiency of the hotel sector

The main objective of this epigraph consists of the estimation and comparison of the TE of the tourist accommodation subsector at Spanish level during the period 2009-2016, using the stochastic border methodology.

Table 1 below shows the main results obtained from the variable TE. In this variable they have been divided into four cohorts, which allows for a better view of the distribution of companies in terms of their average value of TE.

On the basis of empirical analysis, it can be seen how companies tend to have a low efficiency (values less than 0.1) with a total of 81.12% with respect to the sample as a whole. While only 0.35% exceeds 0.50 of the TE value. This result implies that the sector's DMUs clearly show that they have a substantial margin for improvement in terms of efficiency, that is, that they can improve the use of their inputs, since the DMUs could be more efficient when using the inputs (Avalos and de Aguirre, 2008).

Table 1. Distribution of TE by number of companies by cohort

TE Cohort	No. Companies	%
≤ 0.1	1,856	81.12
0.1 – 0.25	392	17.13
– 0.50	32	1.40
>0.50	8	0.35
Total		*100*

Source: Own preparation

In order to check the distribution, a distribution by percentiles is made (see Table 2) where the first thing that can be highlighted is the average value of TE taken by the sector corresponding to 0.0859622, which allows us to affirm that the average efficiency of the sector is relatively low. Under this prism it is observed how the central values (the 5th percentile) are not taken as a reference point with respect to the change from lower values to higher values, since the change is smaller. In this environment, it can be stated how companies have very low overall TE values.

Table 2. Average TE of the hotel sector

Percentiles	TE	Minor Values	Percentiles	TE	Major Values
1%	0.044	0.039	75%	0.090	0.649
5%	0.049	0.039	90%	0.119	0.649
10%	0.051	0.039	95%	0.163	0.649
25%	0.061	0.039	99%	0.432	0.649
50%	0.072				

Source: Own elaboration

Analysing the evolution of the total number of companies by regions during the period under study, there is a clear decrease in the Spanish industrial fabric from 2009 (Garrido Yserte, Gallo Rivera and Martínez Gautier, 2015). However, the tourist accommodation sector has had an opposite evolution (Infante-Moro, Infante-Moro, Martínez-López and García-Ordaz, 2016), as there has been a positive variation of 0.2% from 2008 to 2014 (Table 3).
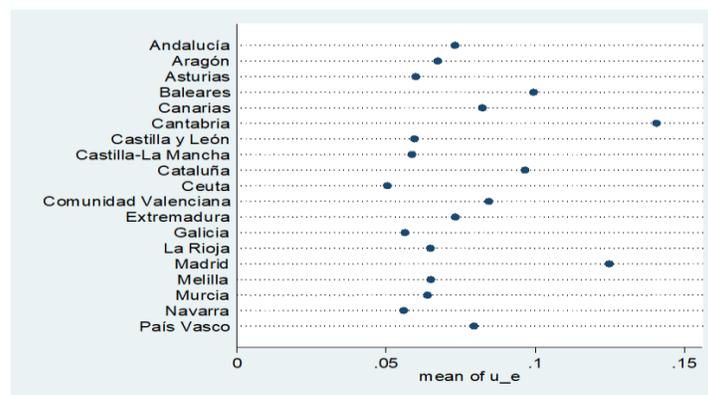
Table 3. Variation in the number of hotels from 2008 to 2014

Year	*Number of hotels*	*Year*	*Number of hotels*
2008	*14695*	*2012*	*14995*
2009	*14824*	*2013*	*14822*
2010	*14838*	*2014*	*14728*
2011	*14997*	*Variation 2008 – 2014*	*0.2%*

Source: Own preparation based on data extracted from *Ostelea School of Tourism & Hospitality*

Regarding the analysis by Autonomous Communities, the empirical evidence shows the information of the aggregate means of the TE, these results are shown in the following Figure 2. Where it can be observed how the Autonomous Communities of Cantabria, Madrid, Balearic Islands and Catalonia are those with a higher TE value. The result obtained by Cantabria contrasts with the expected results. However, in recent years Cantabria has been generating greater interest in tourists, becoming an increasingly competitive destination (González y Conde, 2011; Sariego and Mazarrasa, 2017). With respect to the Autonomous Communities of Madrid, by capital condition, and the Balearic Islands and Catalonia are regions positioned in favour of tourism (López-Bonilla and López-Bonilla, 2006).

Figure 2. Average value of the TE per AA.CC.

Source: Own elaboration

5.2. Relationship between TE and ICT

The theoretical-empirical literature shows that in many economic sectors there is a causal relationship between TE and ICT use and/or investment (Fernández Menéndez, López Sánchez, Rodríguez Duarte and Sandulli, 2007; Botello Peñaloza, Pedraza Avella and Contreras Pacheco, 2015).

Once the estimation of the production function [3] has been carried out, the result of the relationship between TE and the use of ICT by the companies corresponding to the tourist accommodation sector is obtained (Table 4).

Table 4. Estimated result of function TE - ICT

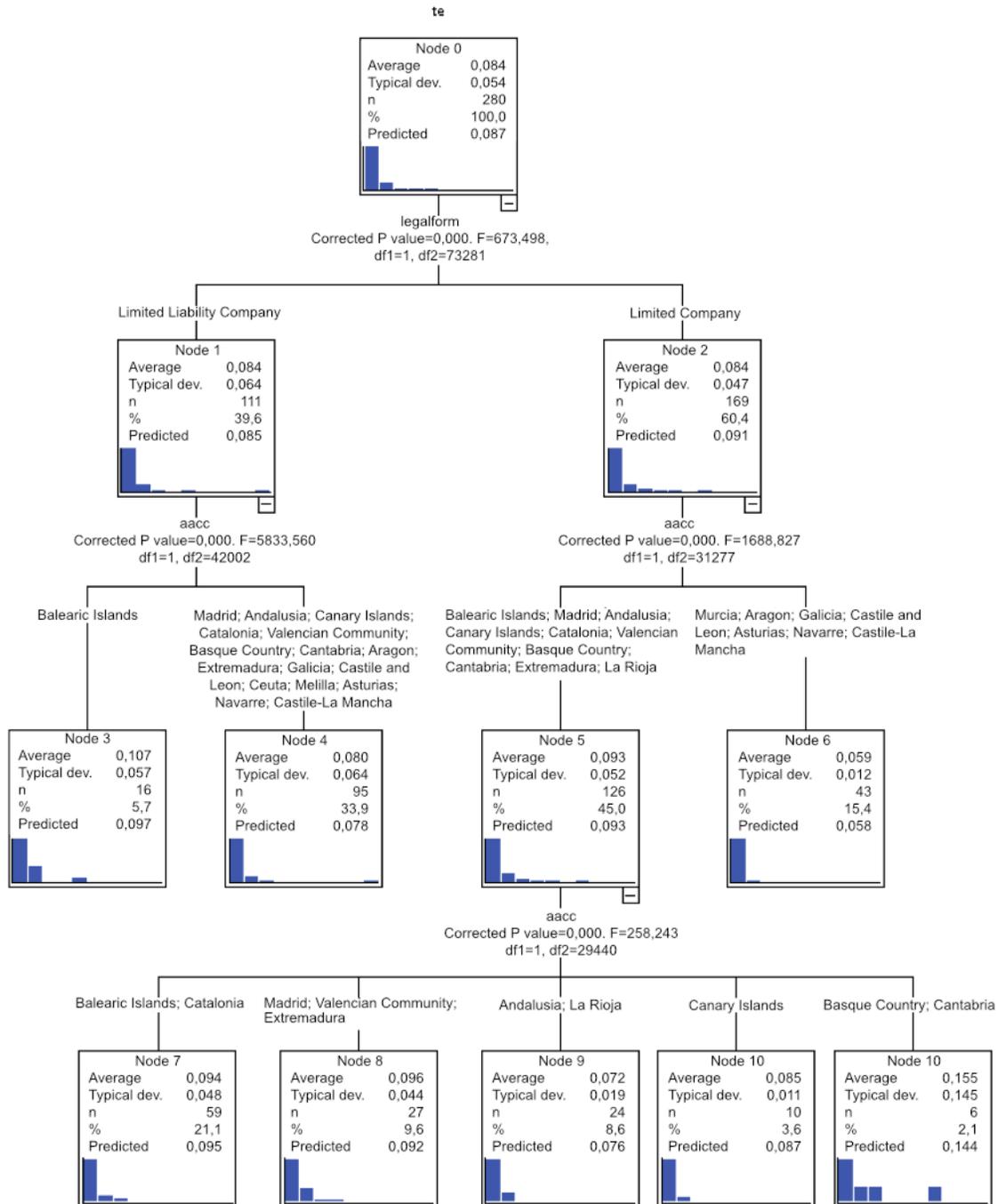| *TE*	*Coeficient*	*Standard mistake*	*t*	*P>t*
lnICT	*0.003*	*0.00048*	*7.05*	*0.000*
_cons	*0.072*	*0.0020*	*36.01*	*0.000*

Prob > F = 0.0000

Source: Own elaboration

The estimate shows that ICT use increases TE by 0.00341%. This result agrees with those found in the literature related to the industrial sectors analysed, and with the tourist sectors. Likewise, the existence of significant differences with a probability of 0.00% can be observed, so we reject the null hypothesis that our variable follows a normal distribution.

5.3. Decision trees

This section shows the main results obtained that allow us to contrast the hypothesis that shows whether there is a relationship between the TE and the legal form of the tourist accommodation, as well as the importance of the AA.CC. where the accommodation is located.

The following Figure 3 shows the decision tree, taking the TE as a dependent variable. While the legal form and the Autonomous Communities are considered as the independent variables.

Figure 3. Decision tree

Source: Own elaboration

Each node in the tree shows the predicted value, which is the mean value for the dependent variable in that node. The results show that the tree leads to the same partition as the observations, fourteen secondary nodes suggesting the presence of eleven groups and that the detected portions are all statistically significant (p-value < 0.05).

Specifically, the first two nodes classified by legal forms: Limited Liability Company and Limited Company show how those companies that are formed as Limited Company have a greater influence with respect to the TE, this corresponds to node 2. This means that those companies with a legal form Limited Company have a greater value of TE.

The following predictor shows how the companies incorporated as Limited Companies are distributed in the different AA.CC. have a greater influence on the improvement of the TE. It can be observed how those companies that are in the Autonomous Communities of Andalusia, Balearic Islands, Canary Islands, Catalonia, Valencian Community, Cantabria, Extremadura, La Rioja, Madrid, Basque Country (node 5) have a higher percentage with respect to the relationship between region and TE with 45%.

Finally, the third predictor shows the group designated by node 5 which is/are the Autonomous Communities that have an influence with respect to the TE. In this case, node 7 shows how the Balearic Islands and Catalonia are those Spanish regions with companies with a legal form Limited Company with the best TE value. This is not surprising considering the importance of tourism in these Autonomous Communities, and the improvement in the efficiency indexes evaluated in recent years (Camacho-Ballesta, Navarro-Espigares and Rodríguez-Molina, 2002).

6.   CONCLUSIONS

The main objective of this work has been focused on providing an overview of the reality of the hotel sector, as well as the TE of the same. In this case, we wanted to analyse the importance of the use of ICT in the improvement of the TE of companies (Botello Peñaloza et al., 2015). Likewise, a response has been given to the hypothesis raised that the legal form of companies has an impact on a high TE, as well as the location of the accommodation in a specific Autonomous Community.

The first conclusion that has been drawn is determined by how the TE in the housing sector has broad scope for improvement. Due to the results observed, it can be stated that the TE in this sector is contracted (Alberca et al., 2013).

It is worth noting that the Autonomous Communities of Cantabria, Madrid, the Balearic Islands and Catalonia are those with the highest average TE value. This conclusion is not surprising due to the fact that they are Autonomous Communities that are clearly committed to mass tourism (Opaschowski, 2015), and that they have a clear knowledge of improving the use of inputs that leads to an improvement in TE.

Regarding the contrast of the hypothesis raised regarding how the use of ICT and companies in the Spanish accommodation sector substantially improves TE. This result confirms the hypothesis raised, as well as denotes that a use and training by ICT companies allows the TE to grow (Fernández Menéndez et al., 2007; Botello Peñaloza et al., 2015).

Finally, the decision tree has shown how the companies that are constituted as Limited Companies are those that have a better average value of TE, over the Limited Liability Companies. Likewise, the geographical location of the companies is important. In this sense, those companies that are in the Autonomous Communities of the Balearic Islands and Catalonia have a positive influence on the value of TE.

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