UNIVERSIDAD COMPLUTENSE MADRID

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ARE INNOVATIONS RELEVANT FOR CONSUMERS IN THE HOSPITALITY INDUSTRY? A HEDONIC APPROACH FOR CUBAN HOTELS

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Working Papers / Documentos de Trabajo. ISSN: 2255-5471
DT CCEE-1505 Junio 2015
http://eprints.ucm.es/33111/

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Abstract:
This paper evaluates the impact of innovative activity in the hotel industry on the willingness to pay by consumers. To this end we estimate a hedonic price function where innovation is identified indirectly through certain attributes. The contrast is performed on a representative sample of Cuban hotels considering a large number of attributes of hotels and rooms. To solve the usual problems of collinearity an original procedure is developed. The results highlight the importance of the attributes linked to innovation and internationalization on the price of the rooms of Cuban hotels.

Keywords: Innovation, Hospitality industry, Prices, hedonic pricing method.

¿ES RELEVANTE LA INNOVACIÓN PARA LOS CLIENTES EN LA INDUSTRIA HOTELERA? UN ENFOQUE HEDÓNICO PARA LOS HOTELES CUBANOS

Resumen:
Este trabajo evalúa el impacto de la actividad innovadora en la industria hotelera sobre la disposición a pagar por los consumidores. Con este objetivo se estima una función hedónica de precios donde las innovaciones se identifican indirectamente a través de ciertos atributos de los hoteles. El contraste se realiza sobre una muestra representativa de hoteles cubanos considerando un número importante de atributos de los hoteles y de las habitaciones. Para solventar el problema habitual de colinealidad en este contexto, se desarrolla un procedimiento original. Los resultados ponen de manifiesto la importancia de los atributos ligados a la innovación e internacionalización sobre el precio de las habitaciones de los hoteles cubanos.

Palabras clave: Innovación, Industria hotelera, Precios, Métodos de precios hedónicos.

JEL: D46, L83, O32

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Junio 2015 (fecha de recepción)

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Are Innovations relevant for consumers in the hospitality industry?
A hedonic approach for Cuban hotels

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April, 2015

1. INTRODUCTION

Tourism has become one of the activities on which the economic growth of many countries is based. Within this sector, the hotel industry is one of the key pieces both for its ability to generate added value and employment and because, in itself, it contributes to generate the tourist attraction at destinations. This is the reason these companies have to develop innovative activities with three basic objectives: improve efficiency through new productive and organizational processes; to contribute to the generation of attraction through new products or attributes; and finally to improve the marketing of tourism activities (COTEC, 2007).

Although many authors have considered that the innovative activity of an economy revolves around the manufacturing sector, by the material nature of its production (Dosi, 1988), in recent years it is emphasized that innovation in the service sector has a different nature because the production is immaterial and innovations take place in a different manner (Miles, 2003 and 2008).

Thus, following Hjalager (2010), innovation can occur in five ways: product or service innovations, process innovations, organizational or managerial innovations, market innovations, and institutional (or network) innovations. In this sense, Orfila, Crespi and Martinez (2005) argue that in this industry, and as a result of the close interaction between production and consumption (coterminality), the classic division between product and process innovations is difficult to make. Finally, there seems to be some agreement that the areas where innovation is manifested in the hotel industry is in the generation of new services, greater customization and diversification, improvements in the processes that produce cost savings and new and efficient marketing mechanisms that ultimately improve customer satisfaction, occupancy rates, and prices at which the rooms are sold.

The need for innovation activities by hotel companies contrasts with the lack of studies that have attempted to analyze the impact of these innovation strategies on firm performance (Hjalager, 2010). In this sense, one way to assess the effectiveness of these innovation activities is analyzing the impact of some of them - ones perceived by consumers- on the market price of the rooms.

In this context of coterminality, the price at which the rooms are sold, besides being a major strategic variable of hotel companies, will become a true reflection of the market value of the innovations introduced in the hotel service. In other words, the equilibrium price will reveal how much consumers are willing to pay for each relevant feature of the hotel, including innovative attributes. It is true that this does not only refer to visible aspects (hotel facilities and services) but also intangibles (reputation, branding, marketing strategy, etc.), as well as those derived from its location[1].

[1] In a context of equilibrium in this market -i.e. the existence of a price that clears the market-, any innovation that has market value will lead to increased demand, which will increase the market price.

In this sense, Cuba is an appropriate economy to assess such effects. With more than 2 million tourists in 2014, is located in a geographical area of strong traditional expertise in this sector: The Caribbean. However, the strong commitment of Cuba for mass tourism originates in the late eighties when following the disintegration of the USSR and the socialist bloc, with which Cuba conducted more than 75% of its foreign trade, a major economic crisis occurred. This situation forced to a major economic transformations that placed the tourism sector as one of the economic base of the country (Martin de Holan and Phillips, 1997). In fact, it is in 1994 when the Ministry of Tourism (MINTUR) is created and issued an explicit tourism policy. Although this policy has had different orientations, the tourism sector has always been tightly controlled by the government. Nowadays, all hotels are state-owned. However, many of them are part of international chains operated by joint ventures or transferred through leases or franchises, while others are still managed by state chains. In addition, the relative importance of each management model differs in the three tourist markets that can be identified. Foreign managed hotels dominate in the case of sun and beach tourism, fully integrated in the international market. The situation is quite balanced in the segment of the cultural-urban tourism that occurs around Havana and Santiago de Cuba. Finally, the national management dominates the inland tourism. This composition allows for the evaluation of the extent to which internationalization involves the introduction of a different conception in the provision of hotel services, and also a way of absorbing foreign technology and innovative distribution channels for this industry in Cuba.

Therefore, it seems that this is the proper context to use the hedonic price theory that has been widely used in the analysis of the prices of numerous goods and services. Especially important has been its use in the case of real estate, as Andersson (2010) suggests, it has a great resemblance to the hotel industry.

The basic idea of this method proposed by Rosen (1974) is that the goods or services differ depending on whether they have, or not, certain attributes that are demanded by consumers[2]. Then, the final good is only a package of these attributes. Its application allows determination of the price - or price increase - associated to each particular attribute. Thus, in our case, it is possible to assess the market value of hotel innovative attributes.

In this sense, there are three contributions of this article. The first is that the impact of innovations is evaluated on hotel room prices in an indirectly way through specific hotel attributes. The second is that we propose an original procedure to try to solve the problem of multicollinearity that occurs in the estimation of hedonic functions when a significant number of attributes is incorporated, as it is the case of hotel room characteristics. The third is that this analysis is performed in the Cuban context, permitting investigation of the impact of internationalization on the process of technological diffusion in middle income economies with limited innovative capabilities.

For this purpose, next section presents a brief review of hedonic price theory. Also, the main problems of their practical implementation are described. Third section describes data sources as well as the identification of innovative attributes of hotels. The fourth section presents the results of estimating the full specification of the proposed hedonic function with one million partial alternative specifications analyzing sensitivity of estimated coefficients depending on concrete specification. Furthermore, an internal meta-analysis on later results is performed in order to synthesize and obtain estimators robust to different specifications. These results are complemented by an analysis of variance decomposition technique using Shapley Value in order to assess the relative importance of each room/hotel attribute group on prices. This article ends with the usual conclusions and final considerations.

[2] See the excellent reviews conducted in Chin and Chau (2003) and Malpezzi (2002).

2. HEDONIC THEORY

Hedonic theory assumes that all products can be decomposed into a number of attributes, each of which has a market. The product market is heterogeneous in terms of the attributes that each variety of the product has. However homogeneity is assumed in the markets of attributes (i.e. all products that have the same attribute they have it equally). Although there are some earlier contributions of this procedure[3], Rosen (1974), based on the ideas of Lancaster (1966) on the New Consumer Theory applied to markets of heterogeneous goods, was who eventually developed a unified treatment of the underlying markets model, and thus establishing the theoretical foundations of hedonic price functions.

In Rosen's (1974) model, we consider a market for a good Z differentiated by their n characteristics or attributes. Any variety of the good may be defined by a vector of the characteristics zi [Z = (z_1, …, z_n)]. Thus, the utility function of the individual depends on the consumption of a basket of other goods, here defined by the X vector, and the quantity of attributes provided by the consumption of good Z: U=f(X, z_1, …, z_n). Normalizing the price of other goods to the unit, the budget constraint would be given by: M = X + p(z_1, …, z_n). Consumers maximize utility subject to the budget constraint and choose the levels of each attribute that satisfy the equation:

$$\frac{\partial U/\partial z_i}{\partial U/\partial X} = \frac{\partial p}{\partial z_i} \qquad [1]$$

The expression [1] indicates that, ceteris paribus, the marginal rate of substitution between the i-th feature of good Z and X must be equal to its marginal cost. Therefore, the implicit

[3] Previous procedures were used by Waught (1929) who conducted a study for the prices of the asparagus in Boston, and Court (1939) who calculated a price index for General Motors cars. Houthakker (1952) made some contributions on the same line.

marginal price for each attribute is obtained by differentiating the hedonic price function, expressed in terms of the characteristics of the good,

$$\frac{\partial p}{\partial z_i} = p_i(z_1, \dots, z_n) \qquad [2]$$

This expression gives, ceteris paribus, the increase in expenditure required to purchase an additional unit of the attribute. Rosen's model has a second stage, usually ignored, that provides the supply side and thus the marginal cost of producing an additional unit of each attribute. In equilibrium, the functions of demand and supply for consumers and producers, respectively, are tangent to the hedonic function at the same point. That point expresses the equality between price and marginal cost, i.e. the market equilibrium. This point determines the quantity of the attribute to be produced, such that its marginal cost is equal to the price that the consumers are willing to pay for that particular attribute, thus clearing the market.

This approach has undoubted empirical advantages, such as the low information required to estimate it, as it is not necessary to know the characteristics or preferences of the consumers involved in the market. Furthermore, the model allows identification of marginal prices for each attribute from each estimated parameter. Finally, the results provide information about the structure of average consumer preferences.

However, it has also received some criticism relating to its limitations. With respect to the theoretical assumptions, the hedonic theory points out to the need of homogeneity within each of the markets for attributes. This criticism may lead to the need of correctly identifying the relevant market (Chin and Chau, 2003). The second assumption is that the market operates under perfect competition understood as the existence of a significant number of buyers and sellers unable to alter prices, with free entry and exit, and perfect

information. Finally, this theory implies the existence of a market equilibrium and no relationship between the implicit prices of the various attributes.

Also some empirical criticisms have been pointed out with implications on the validity and interpretation of results (Malpezzi, 2002 and Chin and Chau, 2003). The first relates to the specific functional form adopted in estimating the model: linear, semi-logarithmic or logarithmic. In this sense, the theory does not really offer a good guide (Butler, 1982), leaving the decision to the best criterion. However, there is certain consensus in favor of the semi-logarithmic form[4] for its undoubted advantages: it partly solves the problem of heteroscedasticity, it is simple from a computational point of view, and it allows for the use of dummy variables and not just quantitative variables as it is the case of the logarithmic form. Additionally, the obtained coefficient for each attribute has a direct interpretation; it represents the percentage change in price associated to a unit change in the independent variable - which would be a price-premia in the case of qualitative variables[5] -. Finally, the semi-logarithmic form is less sensitive to the specification of the model (i.e. considered attributes) than the linear form.

Another aspect relates to the variables (attributes) included in the concrete specification of the model which may show the usual problem of collinearity. This is solved by selecting attributes. Thus, over-identification of the model (inclusion of irrelevant attributes) generates consistent and unbiased but inefficient estimators, while an infra-specification of the model produces efficient but inconsistent and biased coefficients. Sometimes the

[4] Christensen, Lau and Jorgenson (1973) and Capozza, Hendershott and Green (1996) suggest the use of the translog functional form. Meanwhile, Halverson and Pollakowski (1981) discuss the use of more flexible functional forms, analyzing the application of functional forms Box and Cox (1964) showing that the specification of these functions is more general and all other proposals are particular cases.

[5] In the generic form of the hedonic price equation $lnp = \alpha + \beta d$, the price elasticity with respect to an attribute d would be: $\varepsilon_{p,d} = \frac{\partial p}{\partial d}\frac{d}{p} = \beta$. However, when the independent variables are dummies that reflect the possession, or not, of a given attribute, the price-premium related to having that attribute is obtained according to the following expression: $\Delta p = \left(\frac{p_1}{p_0} - 1\right) * 100 = \left(\frac{e^{\alpha+\beta}}{e^{\alpha}} - 1\right) * 100 = \left(e^{\beta} - 1\right) * 100$.

information on the relevant characteristics may not be available or it may be measured with errors, and thus the estimates often have both types of limitations. Precisely, Butler (1982) suggests inclusion of just those attributes having production costs and generating variations in consumer utility. Meanwhile, Mok et al. (1995) find that the bias due to the omission of attributes is small once the most important characteristics, which are usually available, are included in the model specification.

The use of hedonic theory has been quite important in the context of the hotel industry. Although many papers have considered attributes that could be considered as describing or identifying innovation features, they have not been analyzed from the perspective proposed here. Table 1 shows the main papers published in the context of the hotel industry. As it can be seen, there is a big difference in both the characteristics of the samples used, as well as the number of considered attributes, never exceeding 35 in any of the listed papers. On the contrary, there is some consistency in the literature to incorporate attributes belonging to the different aspects that a hedonic analysis should consider in this industry. Marketing aspects including membership of hotel chain, localization features, hotel facilities and services, room characteristics and amenities, as well as some features derived from the purchase of the service (packaging with other services), or the level of satisfaction/enjoyment of the stay (e.g. the type of maintenance: room and board). This selection of attributes is usually done to combine aspects of non-rival consumption -all concerning the location and hotel facilities- and rival consumption -those that relate to the characteristics of the rooms-. Another common feature of all these previous papers is *ex ante* selection between the possible attributes to avoid collinearity among them, although usually the authors don't refer to the possible over-estimation issues of obtained parameters.

(Table 1 here)

3. DATA AND IDENTIFICATION OF INNOVATIVE ATTRIBUTES

To the best of our knowledge, there is not an official hotels guide in Cuba including information on prices and characteristics of establishments simultaneously. For this reason, it has been used, as in the case of Andersson (2010), the information available through an online booking website. Specifically, the CUBAHOTELRESERVATION[6] website provides information on usual rates applying to different types of rooms in each hotel, along with a fairly detailed description of its characteristics. However, it should be noted that it neither is official information nor follows the approach of guide for hotels, in the sense that the various tourist establishments must not fill in a specific questionnaire about the facilities or services provided by hotels. In any case it is commercial information. This observation is relevant because it sometimes seems that certain endowments or services the hotels actually possess are not listed, or they only appear in those low category hotels, because high category ones only highlight novelty attributes.

Regarding the definition of the relevant market, the web is oriented to the international market, excluding hotel establishments of very low category (only one star and hostels). In the sample we have included urban hotels, beach hotels and inland hotels. The urban and cultural tourism is basically centered in Havana and Santiago de Cuba. The sun and beach segment operates almost entirely under the all-included system. Finally, inland tourism corresponds to eco-tourism and excursion tourism. However, in the case of Cuba, is quite usual to combine different areas of the country in one trip, so considering the orientation of the website, we have considered that all establishments are oriented to the same market from the perspective of the consumer.

[6] www.cubahotelreservation.com is a website operated by Cuba Travel Network, a division of Caribbean Travel Network BV which is in turn a subsidiary of Caribbean Travel Network NV based in the Netherlands.

From this source we have obtained information corresponding to 176 hotels (the information was collected in late 2010). In principle, the coverage is quite extensive (see Table 2) since it represents 60% of the hotels in Cuba in the group of selected categories and over 70% of the rooms in 2010 in relation to the information contained in the National Bureau of Statistics (ONE, in Spanish). Coverage increases with quality, being close to 100% in five-star hotels and above a third in two stars. Also, we have identified nearly a hundred different features of both hotels and rooms. Finally, we have taken 334 prices corresponding to different types of rooms available at these hotels.

(Table 2 here)

Given the large number of features that are available, the existence of multicollinearity is quite probable. In general, authors either reduce the number of attributes or gather them to avoid the problem of multicollinearity (Andersson, 2010 and Aguilo, Alegre and Riera, 2001). In our case, we are going to drop only those variables with proven measurement error, i.e. a feature not recorded in many hotels even though is certainly present, or a feature which is available in most of the hotels(when more than 95% of hotels possess it), (*cf.* Annex)

Finally, we have 52 different attributes[7] (12 marketing characteristics, 6 location characteristics, 12 hotel facilities, 13 hotel services and 11 features of the rooms), although six of them have different values –stars (5 values), different types of rooms (4 values), hotel size (4 settings), hotel chain (16 values), hotel brand (10 values), and tourist area (8 values)-. Dummy variables have been computed from all these features.

This information is completed with that obtained, also in December 2010, on guest reviews from TripAdvisor and Trivago web sites. Specifically, we have collected aggregate valuation

[7] See the Annex to check the characteristics being gathered.

of about 97,600 different guests, equivalent to an average of 555 reviews per hotel. Thus, TripAdvisor valuation has been obtained for 159 Cuban hotels, corresponding to 56,533 reviews. In this case, the overall rating is assigned by customers on a scale from 1 to 5 points. Meanwhile, Trivago valuation is available for 149 hotels corresponding to 41,079 customers. In this case the score ranges between 0 and 100, and it is obtained, in turn, from the associated tour operators or hotel bookings web sites.

Two variables are constructed from this information. The popularity indicator is calculated as the ratio between the number of opinions in both sources and the hotel rooms. It is interpreted as an indicator of consumers' knowledge of hotels. The satisfaction indicator is calculated as an indicator between 0 and 100 from the scores assigned in both sources using the expression,

$$S_{i=}\frac{\left[\left(P_{i,TRIPADVISOR}-1\right)*25\right]O_{i,TRIPADVISOR}+P_{i,TRIVAGO}O_{i,TRIVAGO}}{O_{i,TRIPADVISOR}+O_{i,TRIVAGO}} \qquad [3]$$

Where $P_{i,X}$ refers to the average score obtained by the hotel i in web site X, and $O_{i,X}$ is the number of reviews received by hotel i in web site X. Popularity and satisfaction indicators are segmented according to their medians. As a result, two dummy variables for hotels showing greater popularity and satisfaction than the average are respectively constructed[8].

It should be noted that the final sample of 38.359 observations was obtained expanding the sample corresponding to the 334 different types of rooms, maintaining the rooms' endowments of each hotel.

Determination of the market value of innovations would require merging innovation surveys with databases of features and prices of hotels. As this is far from possible, we are

[8] Note that this computation is performed in the sample of 176 hotels, so that the distribution of ones and zeros is not equal in the final sample of rooms.

going to use the scarce literature on innovation in the hotel industry to identify the attributes that might reflect the innovative activity of hotels and then deduct their relevance on hotel prices' determination. Orfila, Crespi and Martinez (2005) conclude that innovative activities of firms are related to both the category and size of the hotels. In their opinion the technical and organizational complexity of these larger establishments produces more innovative activities.

Membership in a hotel chain allows transmission of know-how, information flows, the exploitation of intangible assets such as brand image and prestige (Darr, Argote and Epple, 1995; Ingram, 1996; Ingram and Baum, 1997). It also provides access to different and more efficient techniques of management and marketing. In the case of Cuba it is possible to analyze these effects in two ways: the effect of the membership and the access to foreign technologies throughout a foreign hotel chain. Moreover, the presence of foreign hotels is a channel for innovation attainment in countries with low innovative power in this industry (Lashley and Morrison, 2000).

A third innovative aspect to consider is, on one hand, those attributes that try to diversify hotel supply (Reiwoldt, 2006; Enz and Siguaw, 2003), and on the other hand , to adapt the supply to the requirements of customers (Gray, Matear and Matheson, 2000) . Among the first, we consider the degree of diversification of hotel rooms, and in the second the individualized attention to customers and the hotel specialization in some particular segment of customers (families, businesses, etc.)[9].

[9] The specific brands under which every hotel operates within chains could also be an evidence of some specialization. However, this would be more a horizontal than a technological differentiation.

4. **ESTIMATING THE HEDONIC FUNCTION WITH INNOVATIVE ATTRIBUTES**

The hedonic function that evaluates the effect of innovative attributes on room prices adopts the semi-logarithmic form,

$$lnP_i = \alpha_0 + \sum_{j=1}^{I} \beta_j^I \, d_{ij}^I + \sum_{k=1}^{H} \beta_k^H \, d_{ik}^H + \epsilon_i \qquad [4]$$

Where:

p_i: is the price for room i

d_{ij}^I: is a dummy variable indicating the possession of the innovative attribute j in room i (or for the hotel to which the room belongs).

d_{ik}^H: is a dummy variable indicating the possession of the non-related innovative attribute j in room i (or for the hotel to which the room belongs).

In order to estimate the hedonic equation we use the extended sample of 38,359 observations –conditioned to the actual room capacity of the sample of rooms-, that is, we estimate using Weighted Least Squares. Table 3 presents the increases in prices associated to each attribute and derived from the coefficients obtained from the estimation of different specifications of the expression [4]. Column (2) records the results when all attributes are included, whilst column (3) registers the estimation results when the variables with statistically insignificant parameters in column (2) are excluded. A common problem in these estimations is the presence of multicollinearity between the different attributes included in the specification. In this regard, it is difficult to select the characteristics that should be included. In fact, this is one of the main econometric problems that arise in the

estimation of hedonic equations. This paper proposes an original procedure to palliate this problem. Furthermore, the inclusion in the final specification of an excessive number of attributes (i.e. over-specification) leads to a problem of inefficiency in the estimation process. Conversely, the infra-specification of the model generates inconsistency and bias of estimates. In this sense, results are often very sensitive to the specification adopted. For this reason we carry out one million estimations of randomly chosen specifications that include different combinations of considered attributes.

(Table 3 here)

Multi-value variables (category, hotel size-class, variety in the type of rooms, tourist area, hotel chains, and hotel brands) are broken down in dummy variables, one for each possible value. The full model specification must drop a dummy variable in each group to avoid perfect multicollinearity. The random model allows the estimation of all dummies (except when all dummies enter simultaneously in the specification). Therefore, the price increases between the full and the random models are not entirely comparable for those dummies that belong to groups defined in an exclusive way. In the complete model, interpretation of the estimated coefficients for these dummy variables should be done in relation to the omitted one. By contrast, in the random model each estimated coefficient for each variable should be interpreted against all others.

Columns (4) to (6) present percentiles 5th, 50th and 95th of the price increases resulting from the estimation of different random specifications of the hedonic function. Columns (7) to (9) provide the percentage of estimates that are significant at 90, 95 and 99% significance levels. Then, in columns (10) to (13), we present the percentages of coefficients by sign (positive or negative) and significance (at least 90%). Finally, columns (14) and (15)

provide the average price increase and associated standard deviation derived from the complete set of random specifications.

Finally, we carry out an internal meta-analysis on every attribute using estimated coefficients from random specifications. The internal Meta-analysis takes into account average values once the outliers have been removed. These omitted estimates correspond to those specifications that include either an excessive or a very small number of attributes (over-identification or infra-specification, respectively), also those estimates presenting too high variance or those being collinear with other variables included in the model specification. The internal meta-model estimated in this case for every attribute takes the form:

$$\beta_i^Z = \gamma_z + \gamma_1 nvar_i + \gamma_2(\sigma_i^+)^2 + \gamma_3(\sigma_i^-)^2 + \sum_{p=1}^{94} \eta_p V_{ip} + u_i \qquad [5]$$

Where:

β_i^Z: is the estimated coefficient obtained for attribute z in the specification i of expression [4].

γ_z: is the meta-analysis estimated mean value for the coefficient associated with the attribute z.

$nvar_i$: is the number of attributes included in the specification i of equation [4]. This variable captures both the effect of over or infra identified models on parameter estimates. Additionally, this variable detects collinearity between z and remaining attributes.

$(\sigma_i^+)^2$ and $(\sigma_i^-)^2$: are the estimated variances for the coefficient β_i^Z. If the coefficient is positive then $(\sigma_i^+)^2$ contains the variance of estimated coefficient and hence $(\sigma_i^-)^2 = 0$.

The reverse occurs if the coefficient is negative. These variables try to control for those possible outliers associated with high variance estimators. This proposal is due to Bom and Ligharth (2014) to control for the existence of asymmetry.

V_{ip}: is a dummy variable for each of the other p attributes, it equals 1 if attribute p is incorporated in the specification i of expression [4], and zero otherwise. These variables control for the possible effect of cross collinearity between each of the other attributes and the attribute z.

In the estimation of the meta-model, all variables are transformed subtracting its own mean, except for the case of variances, where the median is subtracted. This does not distort the estimated averages in the meta-analysis, but controls for outliers. The price increases for each attribute resulting from the estimated meta-regressions are presented in column (16).

The results for the complete model show an exaggerated and non-credible effect of some of the considered attributes on room prices. Probably this is because of the existence of high collinearity between attributes. By contrast, the price increases estimated in the random specifications are more moderate and thus credible.

Regarding the results derived from random models, it should be noted the high sensitivity of estimated coefficients -and therefore the price increases calculated from them- to model specification. This result, highlighted by the variance of estimated coefficients, stresses the high collinearity between attributes. Indeed, when comparing price increases in the 5th and 95th percentiles is evident that, the results changed significantly in the majority of cases. Often, the parameter oscillations maintain the same sign and statistical significance. However, both the sign and the statistical significance are sometimes altered. This econometric exercise reveals that previous results from papers including a small number of

attributes should be interpreted with caution. Precisely the internal meta-analysis aims to determine parameter estimates robust to specifications.

The results from the meta-analysis[10] show the importance of the hotel category on prices, conditioned by other attributes. The price of five star luxury hotels is 90% higher than two star hotels. In the same line, hotel chain membership has a significant impact on prices. Membership in an international chain, compared with a national one, increases the price by 23.6% on average[11], although the effect is different for each chain. In fact, only the Cuban hotel chain Habaguanex, specialized in boutique hotels and centered in Old Havana, shows a clear positive effect on the average price. The rest of the great Cuban chains either have a negative differential effect (Gran Caribe and Islazul) or mixed effects (Cubanacan, which is the only one with some diversification through its various brands). More doubts exist regarding the effect of the hotel size on room prices. These results support the idea that technological and organizational sophistication, the implementation of organizational models and more advanced distribution processes produce positive effects on prices. It also highlights the role of internationalization as a channel for innovations entry.

In addition, we also find some evidence of the positive effect on prices of attributes related to diversification and product adaptation to customer. This is the case of the positive result found for the different types of rooms (diversification) that every hotel have. In fact, greater diversification of supply reflects the existence of certain capacity to satisfy the needs of customers, implying a more complex management process that increases guest's satisfaction. This interpretation is reinforced by the positive effect on room prices caused by hotel specialization in certain clientele (with the exception of families) and the existence of personalized attention.

[10] The meta-regression analysis is performed using mixed effects by means of the Weighted Least Squares (WLS) estimator.
[11] This result is obtained calculating the average price increases observed for foreign hotel chains and national ones, being weighted by their corresponding number of rooms.

The rest of considered hotel and room attributes show mixed results. Thus, both the popularity and satisfaction (especially the latter) offer a positive impact on prices. The brands that operate various chains also show significant impacts over prices, that must be added to those found for the chains. This is the case of the positive effects on prices found for Cubanacan and E Hotels (within the Cubanacan chain) and Paradisus (within Sol-Melia), and also the negative effect of Club Amigo (Cubanacan). The two considered location aspects (touristic region and specific location) show conclusive results which indicate the relevance of natural or cultural aspects in defining the attractiveness of the destination. Regarding other features, we obtain that most specific attributes and those of exclusive use, such as the ones relating to the different characteristics of the rooms, have a greater impact on prices that attributes available for all hotel guests.

In general, results seem to support that those aspects that indirectly point out to the existence of more efficient marketing, organization and management processes oriented to the creation of a hotel services more tailored and customized with greater innovative activities, have a positive impact on prices that consumers are willing to pay.

Finally, in order to assess the relative importance of each of these groups of attributes on price variability, we have implemented a variance decomposition procedure departing from the linear hedonic model [4]. Then, if the effects of each attribute group are completely independent of the others, we can operate hierarchically introducing the different groups of attributes in the lineal model and registering the associated increase in the adjusted-R^2.

However, different groups of attributes are cross-nested due to the interrelation between some attributes in different groups (i.e. hotel categories with some hotel facilities or services). This makes it difficult to determine the specific contribution of each group of attributes to the over-all price variance. The Shapley Value approach proposed by

Kattuman et al. (2011) is well suited to deal with the problem raised by covariances between effects. The Shapley Value methodology considers all possible sequences in which every group of attributes can enter in the full model. Giving each group of attributes the opportunity to Contribute to Adjusted-R^2 in all possible paths from null to the full model gives each the opportunity to claim fair and due share of any covariance between it and the other effects. Then, the Shapley Value of any group of attributes is calculated as the weighted average effect of that effect's marginal contribution to all possible coalitions.

In our case, we have considered thirteen groups of attributes. So the null model would not include any of them (with a null adjusted-R^2) and the complete model would have the thirteen groups (with ajusted-R^2 of about 91% -Table 3 -). To get from the null model to the full one we must go through 13 different stages (first only an attribute group will be incorporated, two groups of attributes considered in a second stage, and so on). Every stage should incorporate a set of attributes that has not been previously incorporated, thus the possibilities that may occur generate different paths. The Shapley Value basically performs a weighted average of the adjusted-R^2 increases due to the incorporation of each of the sets of attributes at each of the different phases. This weighted average can be decomposed into two simple averages. In one hand, we have the average increase in R^2 resulting from the incorporation of each group of attributes in the different model specifications performed at each stage (having an average increase in R^2 for each group of attributes at each stage). In the other, we calculate for each group of attributes the average of the increases in the different phases (there will be a mean value for each group of attributes).

The results for the Shapley Value of different groups of attributes in each of the stages, and the total average are presented in Table 4. The results demonstrate that among the groups of attributes considered, membership to different hotel chains shows greater explanatory

power (16.7% of total -adjusted-R^2 of the model) together with hotel categories (13.5%). A lower but important impact is observed for the facilities and services of the rooms (10.2%), hotel brands (9.5%), differentiation in rooms (8.9%) and the type of hotel (8.3%). Results also show that the identified attributes related to innovation explain almost 50% of the variance in prices. This result shows the importance of innovative activities in the specific case of the Cuban hotel industry and the tourism sector in general.

(Table 4 here)

5. CONCLUSIONS AND FINAL CONSIDERATIONS

This article has attempted to evaluate the effect of the innovative activity on the willingness to pay of consumers.

To this end, we have estimated a hedonic price function where innovation is indirectly identified through those attributes that literature has proven to be related to the innovative activity or are a result from innovation processes: hotel chain membership, hotel size, hotel category, diversification in the types of rooms, and attributes related to the adaptation to specific customer needs, either by a thematic specialization or by developing mechanisms for individualized attention.

The estimation is performed using a database that represents nearly 40,000 rooms taken from 334 different room princes corresponding to 176 Cuban hotels dedicated to international tourism. Data is complemented with information on satisfaction and popularity of the hotels. We also have information on almost a hundred different features that have been incorporated in the hedonic price function.

In order to solve the usual problems of collinearity inherent to the estimation of hedonic functions with many attributes, we develop an original process through the estimation of a million different specifications of the proposed hedonic price model. Subsequent meta-analysis on each of the parameters of interest provides estimates consistent to model specification. Finally, we performed an analysis of variance decomposition using the procedure of Shapley Value, to obtain the relative importance of each attribute group in price variability.

The results highlight the importance on room prices determination of membership of international hotel chains, high quality offers, diversified rooms, and the adaptability to

specific needs of each client. All this attributes are related to more innovative activity of hotel companies. Results also prove that diversification through specific brands and higher provision of room facilities and services -rival consumption- have a major impact on prices. Minor effects, though relevant, are due to the location of hotels and other hotels' services and endowments.

The results suggest two lines of action for the tourism businesses. First, it seems evident that policies leading to increase quality, greater diversity in tourism activities, and customized attention to guests exert positive impacts on prices. In this sense, it seems that the development of large hotels with a great variety of rooms can be compatible with high quality small hotels which focus on specific segments of guests. In all of them, innovation must play a fundamental role both to reduce costs and to more successfully organize diversified supply.

In addition, integration into global hotel chains, particularly in Cuba, allows access to technology and more efficient organization and marketing processes. In short, the results show the importance and the benefits of the innovative activity in the hotel sector. Therefore the promotion of these innovative activities by firms and governments implies both, the improvement of the current situation, as well as a better preparation for the coming future in the hotel industry.

Finally, in order to provide more conclusive results, qualitative variables on the innovative activity of hotels, as well as the education level of employees should be also considered. The incorporation of these variables into the hedonic price function will provide more direct effects of innovation on prices.

ANNEX: AGGREGATION OF ATTRIBUTES

Aggregated attribute	Single attribute
TOURISTIC REGION	
Varadero	Varadero and Matanzas
Caribbean	Cayo Largo, Bahía de Cochinos, Cienfuegos and Trinidad
Center	Villa Clara, Sancti Spiritus, Camagüey and Las Tunas
Holgín and Santa Lucía	Holguín and Santa Lucía
East	Santiago de Cuba, Gramma and Baracoa
SPECIFIC LOCALIZATION	
Nature	Countryside and Eco-hotel
HOTEL FACILITIES	
Disco	Club and Disco
Sauna	Sauna, Spa and Solarium
Gaming facilities	Casino, Bowling and Game room
HOTEL SERVICES	
Internet	Internet in lobby, Wi-fi, Free internet, Internet in rooms
Diving activities	Diving courses, diving center
Activities without monitor	Morning activities, Afternoon activities, volleyball, golf, mini-golf, ping-pong, tennis, bicycle, motorcycle
Aquatic sports	Water skiing, windsurfing, snorkeling, catamaran, aqua bike, pedal boat, water-ski & banana
Activities with monitor	Outdoors activities, horse riding, tai-chi, aerobic, archery
Complementary services	Car rental, Motorcycle rentals, Taxi
Children services	Nursery, baby-sitter, kids club, cradle in the rum (on request)
Poolside bar	Poolside bar, Poolside snack-bar

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TABLE 1. HEEDONIC PRICE ESTIMATIONS IN THE HOTEL INDUSTRY

Authors	Data	Especif.	Comercialization	Localization	Hotel facilities	Hotel services	Room	Rate
Carvell & Herrin (1990)	San Francisco, 1982-1986, 20 hotels	Linear, quadratic 9	Category	City center	Gym	Calls Cleanliness Add. revenue	Personal-Concierge	B&B
Bull (1994)	Australia, XXXXX, 15 hotels	Linear, quadratic, semilog, Box-Cox 6	Category Hotel Age	City center Natural Attraction		Restaurant Calls		
Wu (1998)	Arkansas and Kansas, 1989, 115 motels	Linear, 8	Category Hotel Chain	City center Transport	Swimming pool Business facilities	Restaurant Cinema		
Aguilo, Alegre & Riera (2001)	Mallorca, 1999, 202 hotels	Linear,29	Category, Pintoresque, Special prices, Touroperator, Hotel size, Floors	City center Natural Attraction Touristic area	Elevator, Gym, Garden, Swimming pool, Sauna, Tennis, Heating	Bicycle, Money exchange, Sports, Golf, children, doctor,	Air condition, Mini-bar, Special views, TV, Bed type	Board
White & Mulligan (2002)	Arizona, Colorado, New Mexico y Utah, 1998, 584 hotels	Linear, 11	Product concentration, Hotel Chain, Hotel size	City center Weather Productive estructure	Swimming pool, Spa			B&B
Papatheodorou (2002)	Mediterranean Countries, XXXXX, 288 hotels/apartments	Log 9	Category, Touroperator, Hotel chain, Hotel size	Touristic area		Self service	Apartment	Board
Aguilo, Alegre & Sard (2003)	Balears, 2000, 693 hotels	Linear,35	Category, Pintoresque, Touroperator, Market, Hotel size, Floors	City center, Natural attraction, Touristic área, Beach,	Elevator, Gym, Garden, Swimming pool, Sauna, Tennis,	Bicycle, Sport activities, Golf, children, Entertaiment, TV satelite	Air condition, Mini-bar, Special views, TV, Bed type	Board, exclusive touroperator
Monty & Skidmore (2003)	Wisconsin, 2000, 15 hotels	Semilog, 12	Hotel size,	City center, Traffic,	Elevator,		Room size, Hydromassage, Private Bathroom,	Season, Vouchers, Weekend

							Hearth, Kitchen appliance	
Fleischer & Tchetchik (2005)	Israel, 2000, 197 hotels	Linear, 14	Category, Touroperator, Market, Hotel age, Hotel size			Human capital, Touristic activities	Design, Boungalow, Special view	B&B
Coenders, Espinet & Saez (2003)	Spain, 1999, 471 hotels	Semilog, 7	Category,	City centre, Beach,		Sports,	Air condition, Mini-bar, TV	
Espinet, Saez, Coenders & Fluvia (2003)	Costa Brava, 1991-1998, XXXX	Semilog, 14	Category, Hotel size	City centre, Beach	Refurnished, Garden, Parking, Squash, Tennis	Golf	Air condition, Mini-bar, TV	Season
Thrane (2005)	Gran Canaria, 2003-2004, 252 hotels	Semilog, 18	Category, Touroperator, Hotel age, Hotel size	Noisy area, Beach, Shopping area, Touristic area	Resort, Swimming pool	Restaurant, Reception 24 hours	Type of room, Air condition, TV, Kitchen	B&B
Espinet & Fluviá (2005)	Spain, 2002, xxxxx	Semilog, 10	Category, Quality, Hotel size	Touristic area, Beach	Parking,	Entertaiment, Sport activities		Season
Haroutunian, Mitsis & Pashardes (2005)	Mediterranean countries, xxxxx, 349 hotels	13	Category,	Touristic area	Parking, Spa, Mini-golf	Beauty Salon, Restaurant, Piano, Sport activities, Entertaiment	Private Bathroom	Season, All inclusive
Thrane (2007)	Oslo, 2005, 74 hotels	Semilog, 9	Category, Hotel size	Transportation	Parking, Swimming pool,			
Hamilton (2007)	Schleswig-Holstein (Germany), 2001-2005, 189 hotels	Semilog, 5	Category	Natural attraction, Touristic area, Beach, Concentration		Restaurant, Room service	Mini-bar, Hair dryer	
Andersson (2010)	Singapore 2006-2007 65 hotels	Semilog, 15	Category Pintoresque Satisfaction	Touristic area Transportation City centre	Gym, Swimming pool		Superior room, Safe box	
Kuminoff, Zhang y Rudi (2010)	Virginia (USA), 2008, 223 hotels	Linear, 24	Category, Green certificate, Hotel size, Business hotel	City center, Natural attraction, Touristic area, Beach	Gym, Swimming pool, Jacuzzi, Tennis, Non smoking area	Golf, Internet	Pets allowed, Superior room, Internet	B&B
Hung, Shang &	Taiwan, 2006,	Semilog,	Hotel chain, Resort,	Beach		Cleanliness		

Wang (2010)	58 hotels	6	Hotel age, Hotel size					
Chen & Rothschild (2010)	Taipei, 2007, 73 hotels	Semilog, 14	Category, Hotel chain, , Business hotel	City center,	Gym, Swimming pool, Bar,		Room size, TV, Private Bathroom, Internet	B&B, Buffet Breakfast
Lee & Jang (2011)	USA, 2006, 106 hotels	Semilog, 8	Hotel chain	City center, State, Transportation	Parking,	Internet	Suite	B&B
Zhang, Zhang, Lu, Cheng & Zhang (2011)	Beijing, 2005, 228 hotels	Linear, semilog, 5	Category, Hotel age, Hotel size	Touristic atractions, Transportation				
Tung, Lai & Huang (2012)	Taiwan, 2008, 59 hotels	Semilog, 20	Category, Hotel chain, Hotel size, Business	Transportation, Touristic attractions,	Handicap, Gym, Swimming pool, Spa,	Human capital, Pick-up service, Tourist information, Money exchange, Internet		Fidelity program, On line survey, Board

TABLE 2. SAMPLE COVERAGE IN 2010

	Hotel number			Room number		
	Population	Sample	Coverage (%)	Population	Sample	Coverage (%)
Hotels&Hostels	565			65.031		
Hotels	380			55.872		
Hotels 2-5 stars	291	176	60.5	53.429	38.359	71.8
5 stars	29	28	96.6	12.801	12.245	95.7
4 stars	86	64	74.4	23.775	16.584	69.8
3 stars	108	61	56.5	12.001	7.468	62.2
2 stars	68	23	33.8	4.852	2.062	42.5

Source: Own elaboration from Cuban National Bureau of Statistics and Cubahotelreservation

TABLE 3. RESULTS OF THE ESTIMATION OF THE HEDONIC PRICE MODEL FOR CUBAN HOTELS

		COMPLETE MODEL		ALEATORY MODEL												
	% observ.	All variables	Significative	Price increase in Percentile			% p-val<=			% Positive		% Negative		Average		
				5	50	95	0.10	0.05	0.01	Total	Signif.	Total	Signif.	Aritmetic	SD	Meta-analysis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
ATTRIBUTES RELATED TO INNOVATION																
STAR RATING																
- 2 stars	5,4	-	-	-66,0	-34,5	-12,6	99,8	99,8	99,7	0,2	0,1	99,8	99,7	-36,6	16,3	**-35,9**
- 3 stars	19,5	47,4 ***	47,4 ***	-53,0	-15,7	30,4	97,6	97,1	96,2	14,0	12,9	86,0	84,7	-16,5	22,8	**-17,9**
- 4 stars	43,2	71,9 ***	71,9 ***	-39,0	-7,9	65,7	97,4	96,8	95,9	29,8	28,6	70,2	68,8	-1,5	30,7	**-6,5**
- 5 stars	16,2	110,6 ***	110,4 ***	-18,9	20,3	120,8	97,7	97,3	96,5	83,2	82,1	16,8	15,7	31,0	41,8	**21,1**
- 5 stars deluxe	15,7	182,1 ***	182,1 ***	20,1	50,6	179,1	100,0	100,0	100,0	100,0	100,0	0,0	0,0	67,6	51,5	**54,1**
HOTEL SIZE																
- <=50 rooms	2,9	-	-	-21,8	-4,1	13,7	87,7	85,4	80,9	34,5	28,5	65,5	59,1	-4,0	10,7	**-4,1**
- >50 and <=200 rooms	15,2	5,8 ***	5,8 ***	-18,6	-4,6	9,4	90,2	88,3	84,7	27,8	23,1	72,2	67,1	-4,6	8,5	**-6,3**
- >200 and <=400 rooms	41,1	15,1 ***	15,3 ***	-10,7	2,4	21,7	91,0	89,3	86,0	61,3	56,7	38,7	34,3	3,5	10,0	**2,0**
- >400 rooms	40,8	7,6 ***	7,5 ***	-9,0	6,1	31,5	92,7	91,3	88,6	72,2	68,4	27,8	24,3	7,9	12,8	**6,8**
HOTEL CHAIN																
- WITHOUT CHAIN	0,2	-	-	-11,6	21,5	66,7	83,9	80,8	74,8	84,7	75,3	15,3	8,7	23,7	24,0	**21,5**
- ACCORD	2,3	-25,8 ***	-25,2 ***	-39,9	-15,6	12,4	93,0	91,7	89,1	16,9	13,5	83,1	79,4	-14,9	16,0	**-16,6**
- BARCELÓ	5,7	-24,7 ***	-24,7 ***	-38,3	-19,0	5,7	96,7	96,1	94,8	9,9	8,4	90,1	88,3	-18,0	13,6	**-19,1**
- BE LIVE	3,0	-0,2	-	-27,3	-6,8	16,6	91,3	89,6	86,4	29,9	25,7	70,1	65,5	-6,3	13,4	**-7,2**
- BLAU	3,0	33,1 ***	33,1 ***	-3,2	29,8	68,3	97,6	97,1	96,2	93,2	91,9	6,8	5,7	30,9	21,9	**29,0**
- CUBANACAN	15,4	-13,3 ***	-13,5 ***	-33,4	-5,9	29,8	94,1	93,0	90,8	37,5	34,6	62,5	59,5	-3,8	21,6	**-8,1**
- GAVIOTA	6,2	-10,4 ***	-10,2 ***	-30,2	-9,7	16,1	94,2	93,1	90,9	26,2	23,4	73,8	70,8	-8,7	14,2	**-9,8**
- GRAN CARIBE	11,3	-25,2 ***	-25,1 ***	-33,1	-16,2	1,7	97,6	97,1	96,1	6,7	5,6	93,3	92,0	-16,0	10,6	**-16,7**
- HABAGUANEX	1,4	-8,8 ***	-8,7 ***	5,4	38,4	80,9	98,4	98,1	97,4	97,4	96,5	2,6	1,9	40,2	23,1	**38,3**
- HOTELES C	4,4	-33,6 ***	-33,5 ***	-34,6	-13,2	9,8	94,8	93,8	91,8	17,0	14,5	83,0	80,3	-12,9	13,6	**-14,0**
- HOTETUR	3,2	12,5 ***	13,0 ***	-13,1	11,1	37,8	93,2	92,0	89,5	77,5	73,9	22,5	19,3	11,6	15,6	**10,5**
- IBEROSTAR	5,8	10,6 ***	11,2 ***	-3,9	33,0	74,9	98,2	97,9	97,2	92,8	91,9	7,2	6,3	34,0	23,7	**31,9**
- ISLAZUL	6,4	-28,0 ***	-27,8 ***	-54,4	-40,9	-24,6	100,0	100,0	100,0	0,0	0,0	100,0	100,0	-40,4	9,1	**-41,0**
- NH	2,5	29,3 ***	29,2 ***	8,8	50,5	106,7	99,0	98,8	98,4	98,4	97,8	1,6	1,2	53,2	30,2	**50,3**
- OCCIDENTAL	3,8	-5,8 ***	-5,5 ***	-28,5	0,1	35,8	93,0	91,6	89,0	50,2	46,7	49,8	46,3	1,4	19,7	**-0,5**
- SOL-MELIA	25,4	12,6 ***	13,0 ***	23,4	58,7	131,7	99,9	99,9	99,9	99,9	99,9	0,1	0,1	65,3	35,4	**62,0**
ROOM DIVERSIFICATION																
- Only one room type	42,8	-	-	-44,2	-22,6	-7,3	99,7	99,6	99,5	0,6	0,4	99,4	99,3	-24,0	11,3	**-24,8**
- Two room types	20,7	5,1 ***	5,1 ***	-33,3	-4,9	21,3	95,7	94,9	93,3	38,3	36,1	61,7	59,6	-6,9	17,2	**-8,6**
- Three room types	14,8	28,1 ***	28,4 ***	-14,6	15,4	52,4	97,0	96,4	95,3	79,8	78,2	20,2	18,8	16,8	20,2	**14,9**
- Four or more room types	21,7	45,8 ***	45,8 ***	7,5	32,9	78,2	99,4	99,3	99,1	99,1	98,8	0,9	0,6	36,6	22,3	**34,6**
HOTEL TYPE																
- Family atmosphere	71,2	-0,9 **	-0,9 **	-14,0	-4,7	4,4	92,5	91,1	88,3	19,1	15,6	80,9	76,9	-4,7	5,6	**-4,7**
- Business	17,1	7,1 ***	7,3 ***	-2,2	14,2	34,5	96,4	95,8	94,4	91,9	90,0	8,1	6,5	14,9	11,3	**14,3**
- Historical building	7,2	38,3 ***	38,4 ***	-0,8	20,0	43,6	97,2	96,7	95,6	94,3	92,7	5,7	4,5	20,5	13,5	**19,8**
- Romantic atmosphere	51,3	-3,4 ***	-3,4 ***	1,9	13,7	31,3	98,4	98,0	97,4	97,5	96,6	2,5	1,8	14,8	9,1	**14,0**
- Prepared for events	52,7	-2,1 ***	-2,2 ***	-0,2	10,0	25,1	96,9	96,3	95,0	94,6	92,8	5,4	4,0	10,9	7,9	**10,4**
INDIVIDUALIZED ATTENTION	**9,3**	23,1 ***	23,1 ***	18,7	32,9	54,8	100,0	100,0	100,0	100,0	100,0	0,0	0,0	34,4	11,4	**33,2**

TABLE 3. RESULTS OF THE ESTIMATION OF THE HEDONIC PRICE MODEL FOR CUBAN HOTELS (continuation)

		COMPLETE MODEL		ALEATORY MODEL												
	% observ.	All variables	Significative	Price increase in Percentile			% p-val<=			% Positive		% Negative		Average		
				5	50	95	0.10	0.05	0.01	Total	Signif.	Total	Signif.	Aritmetic	SD	Meta-analysis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
ATTRIBUTES NON RELATED TO INNOVATION																
POPULAR HOTEL	**56,7**	8,0 ***	8,1 ***	-3,3	6,6	19,6	94,3	93,3	91,1	85,2	82,2	14,8	12,1	7,2	7,0	**6,9**
HIGH SATISFACTION HOTEL	**53,9**	14,6 ***	14,6 ***	15,4	28,1	44,1	100,0	100,0	100,0	100,0	100,0	0,0	0,0	28,7	8,8	**28,3**
HOTEL BRAND																
- Mercure (ACCORD)	1,1	16,3 ***	15,6 ***	-35,4	-9,2	37,4	90,5	88,7	85,1	34,1	29,5	65,9	61,0	-5,3	22,8	**-8,0**
- Brisa (CUBANACAN)	2,9	8,3 ***	8,5 ***	-35,8	-8,7	25,9	92,2	90,7	87,9	30,8	27,0	69,2	65,2	-7,3	19,1	**-7,5**
- Club Amigo (CUBANACAN)	5,8	-0,7	-	-43,9	-20,4	7,4	96,3	95,6	94,1	10,3	8,5	89,7	87,7	-19,6	15,9	**-19,7**
- Cubanacan (CUBANACAN)	5,8	14,1 ***	14,7 ***	-16,2	18,0	54,9	95,4	94,6	92,8	83,0	80,7	17,0	14,8	18,5	21,4	**19,3**
- Horizontes (CUBANACAN)	0,9	-	-	-43,8	-15,3	29,3	91,5	89,9	86,7	26,3	22,2	73,7	69,3	-12,3	22,9	**-13,4**
- Hoteles E (CUBANACAN)	0,1	29,3 ***	29,6 ***	-1,7	43,2	111,3	92,4	90,8	87,7	94,2	89,5	5,8	2,9	47,7	35,7	**43,2**
- Meliá (SOL-MELIA)	11,6	6,4 ***	6,3 ***	-33,6	0,4	54,9	96,0	95,3	93,8	50,6	48,6	49,4	47,4	4,4	26,8	**4,5**
- Paradisus (SOL-MELIA)	3,0	35,1 ***	35,0 ***	19,9	58,6	148,6	99,7	99,7	99,5	99,6	99,4	0,4	0,3	67,7	40,5	**64,0**
- Sol (SOL-MELIA)	5,3	-	-	-33,0	9,2	58,9	95,4	94,5	92,8	63,9	61,6	36,1	33,8	11,1	27,6	**11,1**
- Tryp (SOL-MELIA)	5,6	26,6 ***	26,6 ***	-31,8	16,2	59,6	96,3	95,6	94,3	68,9	67,0	31,1	29,3	15,4	28,2	**15,5**
TOURISTIC REGION																
- Pinar del Río	0,7	32,7 ***	33,0 ***	-11,4	29,6	69,6	94,8	93,8	91,7	88,2	85,3	11,8	9,5	29,4	24,7	**27,5**
- Habana	17,7	235,3 ***	236,0 ***	12,1	69,3	214,8	99,4	99,3	99,1	98,1	97,8	1,9	1,6	90,3	65,3	**81,9**
- Varadero	36,6	15,6 ***	15,7 ***	-25,3	-2,0	20,6	93,7	92,5	90,1	43,7	40,6	56,3	53,2	-2,0	14,5	**-3,1**
- Caribe	6,7	28,1 ***	28,3 ***	-6,9	14,9	39,5	95,8	95,0	93,4	87,8	85,5	12,2	10,3	15,3	15,0	**14,5**
- Center	2,6	-	-	-33,3	-12,2	7,8	92,3	90,9	88,0	16,1	12,5	83,9	79,8	-12,5	13,0	**-13,4**
- Jardines del Rey	18,7	-23,8 ***	-23,7 ***	-37,7	-14,0	7,9	95,6	94,7	93,1	13,1	11,1	86,9	84,5	-14,7	14,4	**-15,8**
- Holguín-Santa Lucía	12,2	5,3 ***	5,4 ***	-24,5	-2,7	17,0	92,8	91,5	88,8	40,9	37,4	59,1	55,4	-3,0	13,4	**-3,9**
- East	4,8	-11,1 ***	-11,0 ***	-32,9	-16,6	0,5	97,2	96,7	95,6	5,4	4,2	94,6	93,0	-16,5	10,8	**-17,1**
SPECIFIC LOCALIZATION																
- Beach	76,0	13,0 ***	12,7 ***	11,4	46,1	89,5	99,2	99,0	98,7	99,0	98,6	1,0	0,6	47,7	23,9	**46,0**
- Nature	5,4	32,0 ***	31,9 ***	-10,5	8,6	28,5	92,4	90,9	88,1	76,8	72,8	23,2	19,6	8,7	11,8	**8,1**
- Cayo	20,4	28,8 ***	28,8 ***	-17,4	3,5	42,0	92,9	91,5	88,8	58,2	54,6	41,8	38,3	7,1	18,7	**7,7**
- City	21,1	8,3 ***	8,1 ***	-41,3	-15,3	14,2	94,1	93,0	90,8	18,5	15,7	81,5	78,4	-14,7	16,8	**-16,1**
- Ciudad de la Habana	16,8	-61,1 ***	-61,1 ***	-63,0	-18,7	46,4	98,6	98,4	97,8	42,7	42,0	57,3	56,6	-12,0	38,0	**-26,1**
HOTEL FACILITIES																
- Parking	69,3	9,1 ***	9,2 ***	-5,3	4,7	14,6	93,2	92,0	89,4	78,2	74,7	21,8	18,5	4,7	6,0	**4,6**
- Disco	16,8	20,4 ***	20,4 ***	-1,0	10,8	23,0	97,1	96,6	95,5	93,5	91,9	6,5	5,2	10,9	7,3	**10,8**
- Handicapped accessible	13,7	11,9 ***	11,7 ***	-0,4	9,8	21,5	96,3	95,5	94,1	94,2	92,1	5,8	4,2	10,1	6,7	**9,9**
- Sauna	30,8	3,4 ***	3,4 ***	-0,4	9,4	21,0	96,7	96,1	94,9	94,2	92,4	5,8	4,3	9,7	6,5	**9,5**
- Jacuzzi	21,3	6,1 ***	6,1 ***	-8,6	2,7	17,5	90,5	88,7	85,2	64,3	59,5	35,7	31,0	3,4	8,0	**3,0**
- Gaming facilities	34,2	-14,4 ***	-14,4 ***	-14,9	-3,8	7,9	91,9	90,3	87,3	28,8	24,9	71,2	66,9	-3,7	6,9	**-3,9**
- Barbacue	12,6	-12,5 ***	-12,5 ***	-20,3	-10,5	3,0	96,5	95,8	94,5	9,2	7,6	90,8	88,9	-9,8	7,2	**-10,1**
- Swimming pool	94,7	-15,1 ***	-15,1 ***	-18,9	-5,7	12,5	90,4	88,6	85,0	28,2	23,6	71,8	66,8	-4,8	9,7	**-5,2**
- Elevators	41,1	-6,7 ***	-6,7 ***	-6,6	3,9	16,8	92,5	91,0	88,2	72,5	68,6	27,5	23,8	4,3	7,2	**4,0**
- Garden	44,3	1,9 ***	1,9 ***	-2,5	6,0	16,9	93,9	92,8	90,5	87,2	84,0	12,8	9,9	6,4	5,9	**6,2**

TABLE 3. RESULTS OF THE ESTIMATION OF THE HEDONIC PRICE MODEL FOR CUBAN HOTELS (continuation)

		COMPLETE MODEL		ALEATORY MODEL												
	% observ.	All variables	Significative	Price increase in Percentile			% p-val<=			% Positive		% Negative		Average		
				5	50	95	0.10	0.05	0.01	Total	Signif.	Total	Signif.	Aritmetic	SD	Meta-analysis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
HOTEL SERVICES																
- Billiars	13,5	0,7	-	-6,4	3,9	14,7	90,7	88,9	85,5	73,0	68,2	27,0	22,5	4,0	6,4	**3,7**
- Tourism Bureau	77,4	1,8 ***	1,7 ***	-8,5	0,8	9,8	89,3	87,3	83,4	55,9	50,6	44,1	38,8	0,8	5,5	**0,6**
- Medical service	20,3	-16,2 ***	-16,4 ***	-15,2	-6,9	2,9	95,3	94,4	92,5	11,7	9,5	88,3	85,8	-6,6	5,5	**-6,8**
- Internet	29,2	-9,1 ***	-9,2 ***	-11,5	-2,9	7,0	90,3	88,5	84,9	30,0	25,4	70,0	64,9	-2,7	5,7	**-2,8**
- Diving activities	25,6	4,0 ***	3,8 ***	-0,5	9,5	21,5	96,8	96,2	95,0	94,1	92,3	5,9	4,5	9,9	6,7	**9,7**
- Activities without monitor	77,3	-3,1 ***	-3,0 ***	-14,7	-2,9	11,7	91,6	90,0	86,9	35,8	31,6	64,2	60,0	-2,4	8,1	**-2,7**
- Aquatic sports	44,5	8,3 ***	8,3 ***	-8,6	3,5	18,0	90,8	89,0	85,6	67,2	62,5	32,8	28,3	3,9	8,2	**3,7**
- Massage	30,5	-2,0 ***	-1,9 ***	-6,5	2,9	13,7	91,1	89,4	86,1	68,0	63,4	32,0	27,7	3,1	6,2	**3,0**
- Activities with monitor	41,9	-9,0 ***	-8,8 ***	-15,9	-4,1	9,1	92,0	90,5	87,5	29,6	25,7	70,4	66,3	-3,8	7,6	**-4,1**
- Fax	40,1	-3,0 ***	-3,0 ***	-10,0	-0,7	10,2	88,6	86,4	82,2	45,3	39,6	54,7	49,0	-0,4	6,2	**-0,6**
- Complementary servicies	50,7	-8,4 ***	-8,4 ***	-13,0	-2,6	8,7	90,7	89,0	85,5	34,8	30,3	65,2	60,4	-2,4	6,6	**-2,7**
- Children services	45,1	-1,5 ***	-1,5 ***	-9,7	-0,2	9,8	90,2	88,3	84,6	48,6	43,7	51,4	46,5	-0,1	6,0	**-0,4**
- Laundry	37,8	4,7 ***	4,7 ***	-11,9	-1,0	10,4	89,8	87,9	84,1	43,9	38,9	56,1	50,9	-0,9	6,8	**-1,1**
- Poolside bar	28,8	15,5 ***	15,5 ***	-0,7	9,8	20,3	97,0	96,4	95,3	93,8	92,1	6,2	4,9	9,8	6,4	**9,6**
- All inclusive	75,0	38,4 ***	38,4 ***	6,5	30,9	65,1	98,7	98,5	98,0	98,6	97,8	1,4	0,9	32,7	18,0	**32,2**
- Restaurante a la carta		0,0	-	-10,7	2,4	16,8	91,5	89,8	86,7	61,7	57,3	38,3	34,1	2,6	8,3	**2,3**
ROOM FACILITIES AND SERVICES																
- Large Beds	9,0	-7,2 ***	-7,2 ***	-20,2	-7,8	5,7	93,8	92,6	90,2	16,8	13,9	83,2	79,9	-7,6	7,9	**-8,0**
- Minibar	19,3	7,3 ***	7,3 ***	1,4	10,0	22,5	98,1	97,7	96,9	97,5	96,4	2,5	1,6	10,7	6,5	**10,4**
- Safe-box	81,4	5,9 ***	6,0 ***	3,2	11,3	20,3	99,2	99,0	98,6	99,1	98,6	0,9	0,6	11,5	5,2	**11,2**
- Adittional rooms	8,8	37,0 ***	37,0 ***	31,3	38,7	48,8	100,0	100,0	100,0	100,0	100,0	0,0	0,0	39,2	5,4	**38,7**
- Terrace/Balcony	46,6	0,0	-	-10,3	-2,8	4,5	90,6	88,8	85,3	25,4	20,9	74,6	69,7	-2,8	4,5	**-2,8**
- Special views	11,1	1,7 ***	1,7 ***	-10,3	-3,5	4,7	89,8	87,8	84,0	21,4	16,7	78,6	73,1	-3,3	4,6	**-3,5**
- Hot water	90,2	6,8 ***	6,8 ***	1,4	13,1	27,2	97,7	97,3	96,4	97,0	95,7	3,0	2,1	13,6	7,9	**13,1**
- 220 volts	34,5	-0,1	-	-9,0	-2,3	5,2	90,1	88,3	84,6	29,8	25,1	70,2	65,1	-2,1	4,3	**-2,2**
- Room service	19,3	-9,1 ***	-9,1 ***	-8,8	2,4	15,5	91,9	90,3	87,3	62,0	57,9	38,0	34,0	2,7	7,5	**2,3**
- Complements	66,8	2,5 ***	2,5 ***	-1,5	9,8	26,9	95,8	95,0	93,5	91,8	89,5	8,2	6,3	10,9	8,8	**10,4**
NUMBER OF OBSERVATIONS		38359	38359													
AJUSTED R-SQUARED		0,909	0,909													

TABLE 4. VARIANCE DECOMPOSITION USING SHAPLEY VALUE METHODOLOGY

	average increase in Adjusted-R2 depending on the order of entry in the final model every group of attributes														
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	Shapley Value	Percentage
ATTRIBUTES RELATED TO INNOVATION														**49,42**	**54,34**
STAR RATING	61,24	32,84	19,44	12,50	8,56	6,16	4,63	3,60	2,89	2,41	2,09	1,90	1,80	12,31	13,54
HOTEL SIZE	28,67	11,25	4,73	2,16	1,08	0,59	0,35	0,23	0,17	0,13	0,11	0,09	0,09	3,82	4,20
HOTEL CHAIN	68,10	38,76	24,49	16,76	12,14	9,16	7,11	5,62	4,49	3,60	2,87	2,27	1,78	15,17	16,67
ROOM DIVERSIFICATION	45,54	22,83	12,61	7,53	4,78	3,20	2,27	1,69	1,32	1,07	0,88	0,74	0,67	8,09	8,89
HOTEL TYPE	47,12	22,32	11,38	6,19	3,56	2,16	1,39	0,96	0,70	0,54	0,45	0,40	0,40	7,51	8,25
INDIVIDUALIZED ATTENTION	12,96	7,30	4,08	2,43	1,57	1,10	0,83	0,65	0,53	0,45	0,38	0,33	0,30	2,53	2,78
ATTRIBUTES NON RELATED TO INNOVATION														**41,53**	**45,66**
POPULAR & SATISFACTION	28,20	14,12	8,31	5,47	3,84	2,81	2,10	1,58	1,19	0,90	0,67	0,49	0,36	5,39	5,92
HOTEL BRAND	45,42	24,02	14,18	9,06	6,10	4,25	3,04	2,21	1,61	1,16	0,82	0,56	0,37	8,68	9,54
LOCALIZATION REGION	19,05	7,69	3,86	2,56	2,09	1,93	1,86	1,83	1,79	1,75	1,69	1,62	1,57	3,79	4,17
SPECIFIC LOCALIZATION	21,33	9,37	5,08	3,40	2,63	2,23	1,97	1,79	1,63	1,48	1,34	1,20	1,10	4,20	4,61
HOTEL FACILITIES	27,95	12,49	6,46	3,92	2,75	2,17	1,86	1,66	1,51	1,37	1,22	1,05	0,85	5,02	5,52
HOTEL SERVICES	21,22	11,23	7,45	5,64	4,53	3,72	3,09	2,57	2,14	1,78	1,47	1,23	1,08	5,17	5,68
ROOM FACILITIES AND SERVICES	47,35	24,05	13,50	8,35	5,67	4,21	3,38	2,89	2,58	2,38	2,24	2,15	2,10	9,30	10,22
TOTAL														**90,96**	**100,00**