



**SCHOOL OF PRODUCTION ENGINEERING & MANAGEMENT**



**MASTER IN TECHNOLOGY & INNOVATION MANAGEMENT**

# **MEASUREMENT OF CUSTOMER PREFERENCES FOR DESIGNING LUXURY HOTELS USING CONJOINT ANALYSIS**

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## **Abstract**

Urban hotels have attributes that potential clients could choose from to create their preferences while selecting which hotel to stay. This study would identify what attributes are considered by consumers, as well as combinations of attributes that need to be analysed into the main preferences of consumers. The purpose of this study is to determine the level of attribute which becomes important to a consumer and group the consumers with similar preferences. The research data were collected via questionnaire from different groups of people around the world. Data processing was performed using Adaptive Choice Based Conjoint Analysis (ACBC) based on the importance level of the attributes. Segmentation was achieved with K-Means cluster analysis to group the consumers. One Way Multivariate Analysis (MANOVA) was employed to determine if there was any significant correlation between the independent variables (demographics) and the dependent variables (attributes). The most important attributes were proven to be those of room service and sound proof windows, followed by the location of a hotel and the existence of a bar/restaurant. The demographics of age and country of origin were the most significantly correlated to the hotel attributes.

Keywords: Attributes, preferences, Adaptive Choice Based Conjoint Analysis, K-Means Clustering, One Way MANOVA analysis.

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# 1. Introduction

Greece's economy is heavily depended on tourism and it would not be an exaggeration to say that tourism is its most important industry. Tourism generates over a quarter of Greece's gross domestic product, according to data presented by the Institute of the Greek Tourism Confederation (INSETE). Tourism accounts for a whopping 31 percent of Greece's GDP (15.6bn euro in revenues from 30.1mn visitors in 2018) and 26 percent of the labor force the same year (988,000).The data highlight the industry's importance to the national economy and employment, as well as tourism's quasi-monopolistic status in the country's growth.(*Tourism in Greece | The Borgen Project*, n.d.)

Hotels are an important sector of the tourist industry and in the latest years most hotels have upgraded their facilities and the provided services. The hotel industry due to the large number of hotels, both resort and urban hotels, is a very competitive business This study will consider an urban or city hotel but not the typical resort that operates only during the summer with holiday crowds. An urban hotel, is a hotel that operates all year round and its customers vary from holiday visitors to businessmen. There are some hotels that can be characterized as basic that tend to attract visitors with low budget and their primary concern is to find a cheap hotel with basic features. On the other side of the spectrum, there are the more sophisticated customers who despite the fact that they do consider price as an important factor, are also willing to pay more to get extra services, luxury and leisure.

Hotel owners ask many important questions before building from scratch or renovating an existing building to create a hotel: "What location should I choose? How big the room should be? Should be a basic room or one with pleasing aesthetics and design? Is it a shower sufficient and what a customer would be willing to pay extra, if I provide him with a jacuzzi?"

The purpose of this thesis is to use conjoint analysis to optimally design a luxury urban hotel by understanding precisely how customers value its different features and services. This analysis will offer the best balance of features or prices the customer is willing to pay or result in different combinations of features and services for different segments of the market.

In Chapter One the objective of this research will be introduced and the layout of the thesis structure will be presented.

In Chapter Two an overview of the existing literature will be provided where relevant academic studies have tried to answer similar questions to the ones posed in this study. These studies will be evaluated and identify patterns, gaps and methods.

In Chapter Three the chosen methodology that will be used to measure the willingness to pay for hotel attributes according to customers will be examined. It will include the overall approach of the research, the methods of collecting data, which methods were used to analyze that data and the scientific tools that made the analysis possible. The method of Adaptive Choice-Based Conjoint Analysis (ACBC) will be employed to create questionnaires with the help of Sawtooth Software that will be sent to potential customers via email. The questionnaires were compiled after breaking down the features and services of a hotel into its constituent parts, called attributes and levels, then test combinations of these attributes in order to find out customer preferences and expectations.

A set of profiles (possible combinations of attributes and levels) was created to produce a set of options from which customers will then be asked to choose. According to these choices, the optimum level of features and services will be determined in order to balance value to the customer against cost to the hotel and forecast potential demand or market share in a competitive market situation.

In Chapter Four the data obtained will be analyzed in detail, to obtain the results necessary to complete this study. This chapter will report the results of the research and will include graphs, charts, tables and

statistics. The results of ACBC will be fed in Matlab to conduct a Cluster Analysis to classify the customers into homogeneous preference groups. , a multivariate analysis of variance (MANOVA) will be performed to determine if independent variables like the demographic characteristics correlate to dependent variables like hotel attributes.

In chapter Five the results will be interpreted and discussed to identify patterns, relationships and trends. Most importantly the discussion will show if the expectations of the study were met and the questions were sufficiently answered. Finally, in chapter Six the conclusions and findings will be presented and possible recommendations will be given based on the customer preferences and their willingness to pay.

## **2. Literature Review**

### **2.1. Introduction**

This chapter includes two sections that are to be examined. The first section will provide an overview of the past academic research done on hotel customer preferences by evaluating and analyzing books, journals and internet sites that have performed similar research. By doing so, a gap in the research can be identified and propose a new theory or method to look into an old problem.

The second section will construct a theoretical framework upon which the research and methodology will be based and draw research proposals that will need to be examined and verified.

### **2.2. Previous Research on Hotel Attributes**

There have been many studies and research in the area of hotel preferences and attributes that affect customer behavior and satisfaction while choosing a hotel. Attributes can be defined as the services, features and facilities that a hotel could offer to their customers. Depending on their satisfaction derived by these attributes, the consumers will decide which hotel to book next time they travel (Lewis, 1983), (Wuest et al., 1996).

Dolnicar and Otter conducted one of the most important studies by reviewing past research about hotel attributes (Dolnicar, 2003). The study revises empirical studies from 1983-2000 that examined various hotel attributes and showed that the most studied areas were service, hotel, location and room. The attributes of the hotel area were analyzed further and it was established that the most important attributes were in descending order: hotel location, service quality, reputation and friendliness of staff. They noted that these findings were heterogeneous because the studies involved used different target groups and methodologies.

Additional, on the subject under investigation, research papers examined solely the category of business travelers (Lewis, 1983),

(McCleary et al., 1993), (Gundersen et al., 1996), (Bowen & Shoemaker, 1998), (Dubé & Renaghan, 1999), the category of American business travelers exclusively (Oh & Weaver, 1993) and finally Barsky and Labagh considered the types of business travelers in comparison with leisure travelers (Barsky & Labagh, 1992). Other studies included among others the areas of hotels in general, three star hotels, four star hotels, (Cadotte & Turgeon, 1988), (Ryan, 1991), (Ananth, 1992), (Saleh & Ryan, 1992), (Hartline & Jones, 1996). However, the most important study that Dolnicar examined was the seminal work of Wind, Green, Shifflet & Scarborough. They evaluated customers' preferences based upon a selection of 50 attributes to design the Courtyard Hotels by the Marriot chain (Wind et al., 1989). This study will be elaborated further momentarily.

Since the 2000s, studies were conducted to further explore customer preferences, attributes and willingness to pay when selecting a hotel. A few showed how leisure and business travelers evaluate differently attributes. A study that used Importance-Performance Analysis (IPA) (Chu & Choi, 2000) concluded that Room and Front Desk were the most important attributes for leisure travelers while Security was the most important for business travelers.

Business travelers also found important the location, cleanliness and the quality of pillows and mattress. Dolnicar et al. (Dolnicar, 2002) designed a study based on open questionnaire about the expectations and disappointments of business travelers and concluded that cleanliness was the number one attribute followed by friendliness of staff and food quality. Their disappointments included problematic behavior by hotel staff and personnel.

The latest research has focused on environmental and green practices in hotels. Fuentes-Moraleda et al. (Fuentes-Moraleda et al., 2019) examined customers' willingness to pay for green practices in boutique hotels and found out that younger customers, below the age of 35, and customers with salary over 25,000 euro were found to be more environmentally concerned and were willing to pay more for a hotel that

favors environmental-based management. The above study used logit and linear regression to come to these conclusions. Another study regarding environmental practices using hedonic pricing methodology, concluded that customers were willing to pay more if the hotel adopted green practices (Sánchez-Ollero et al., 2014).

Millar and Baloglu, (Millar & Baloglu, 2008) tried to evaluate customers' preferences for green hotels while using both quantitative and qualitative questionnaires analyzed by MANOVA and found out that customers preferred recycling bins and energy saving lightings in rooms to refillable soaps and shampoos.

Another study done by Baruca and Civre (Baruca & Civre, 2012), aimed to point out which attributes were considered by customers when choosing a hotel to stay. The results of the survey were analyzed using Cluster analysis and four segments based on demographics were identified. The first segment thought that their opinion as well of others' was important for the selection process. The second segment would check all advertising to conclude to their choice, while the third were the "difficult" customers who would verify everything like recommendations, location and price. The fourth segment would check the hotel itself, like location, price and facilities. One of the many limitations of the study was the fact that demographics were limited to gender, age and nationality but lacked information on education, income and marital status.

Baber and Kaurav (Baber & Kaurav, 2015) examined customer preferences in selecting a hotel in India with the use of questionnaires that were processed with non-parametric statistical tools. The results concluded that cleanliness, parking and security were the top attributes selected out of 30. However, there were many different selections of attributes for the various segments like, gender, age and marital status. Panichpathom and Wongpradu (Panichpathom & Wongpradu, 2018) used conjoint analysis to determine how baby boomers in Thailand choose attributes to denote hotel preferences. It was established that the most important attributes in order of preference were clean beds,

free breakfast, adjustable temperature, and fast water heating.

Arenoe and Van Der Rest, (Arenoe & van der Rest, 2019) used Choice Based Conjoint (CBC) Analysis to determine whether time, as an attribute, played any role in customers' choice of hotels. They found out that a bigger window of time to book was significant when a cancellation or change of date were necessary.

Masiero et al. (Masiero et al., 2015) tried to determine which hotel attributes were important for business travelers in comparison with leisure travelers and first timers in contrast with repeaters with the use of discrete choice method. The attributes considered were room views, hotel floor, club access, free mini-bar items, smartphone service and cancelation policy. The results showed that each of the above mentioned market segments had a different perception while choosing attributes.

To evaluate the past studies, the authors, methodology, target group and attributes involved will be listed in the table below.

*Table 1: Review of Past Studies and their Attributes*

Author	Target group	Methodology
Lewis 1984 (b)	business and pleasure travellers	descriptive statistics
Lewis 1984 (a)	business travellers	factor analysis, analysis of variance
Cadotte & Turgeon 1988	hotel guests	descriptive
Wind, Green, Shifflet & Scarbrough 1989	hotel guests	hybrid conjoint analysis
Saleh & Ryan 1991	four star hotel guests	gap analysis
Ananth et al. 1992	mature	descriptive & factor

	segments	analysis
Barsky & Labagh 1992	business vs. pleasure travellers	descriptive statistics
Saleh & Ryan 1992	four star hotel guests	factor analysis
McCleary, Weaver & Hutchinson 1993	business travellers	factor, discriminant analysis
Weaver & Oh 1993	American business travellers	mean values and group comparisons
Tsaur & Tzeng 1995	three star hotel guests	descriptive statistics
Griffen, Shea & Weaver 1996	business travellers	discriminant analysis
Gundersen, Heide & Olsson 1996	business travellers	causal modelling
Hartline & Jones 1996	hotel guests	causal modelling
Bowen & Shoemaker 1998	luxury hotel business travellers	structural modelling approach
Dube & Renaghan 1999	leisure, business, meeting, convention	frequency tables
Chu & Choi 2000	Leisure vs business travellers	Importance- Performance Analysis
Dolnicar 2002	business travellers	questionnaire
Fuentes & Moralenda 2019	Green hotels	logit and linear regression
Olero, Pozo & Mera	Green hotels	hedonic pricing

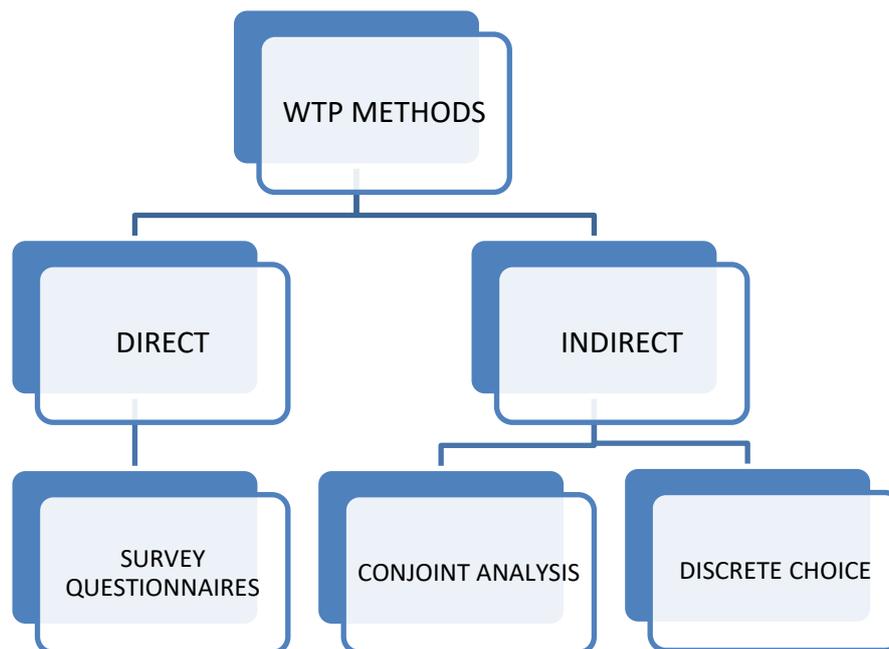
2014		
Millar & Baloglou 2008	Green hotels	MANOVA
Baruca & Civre 2012	Hotel guests	Cluster analysis
Baber & Kaurav 2015	Hotel guests	non-parametric statistical tools
Panichpathom & Wongpradu 2018	Baby boomers	Conjoint Analysis
Arenoe & Van De Rest 2019	Hotel guests	Choice Based Conjoint Analysis
Masiero, Heo & Pan 2015	Leisure vs business travelers First timers vs repeaters	Discrete Choice

### 2.3. Theoretical Framework

**Willingness to Pay (WTP)** is the maximum amount a customer/consumer is willing to pay to buy a product or service. (Phillips, 2005). This maximum price is also called reservation price and it means that if a customer would like to book a hotel room for 300 euro, he will be willing to pay 300 euro or less but 300.01 euro.

There are two methods employed to measure WTP, the Direct and the Indirect (figure 1).

Figure 1: Different Methods of Measuring WTP



**The direct method** requires a survey with questionnaires that the customers are willing to answer. Sometimes open-ended questions are used. The direct method might be easier to be performed without complex data analysis but has some drawbacks. It might be difficult for a customer to answer questions that refer to complex and unfamiliar concepts or they might want to pretend that their WTP is higher than in reality so as to show off and avoid being regarded as penny-pinchers.

**The indirect method** presents the customers with different alternatives of a product to choose from, that are constituted of a number of attributes. The customers choose the profile of the product they are most willing to pay for. The indirect method uses two approaches to measure WTP, one is Discrete Choice and the other is Conjoint Analysis. Both methods are similar since they present to customers alternative profiles made of attributes, which in return are broken down to levels and part-worths are calculated for the levels. Their difference lie in their estimation methods (Breidert et al., 2006). It could be also stated that the discrete choice employs experimental methods to accurately predict the market, while conjoint analysis

calculates utilities instead (*Difference-between-Discrete-Choice-Model-and-Conjoint @ Sawtoothsoftware.Com*, n.d.)

**Market Segmentation** is the process that takes a number of heterogeneous customers that have different levels of WTP and divides them into smaller segments depending on the demographic, geographic, behavioral and psychographic characteristics that they might have in common.

The best method used to identify segments is Cluster Analysis that would group customers of similar characteristics in one cluster and those with dissimilar characteristics will be grouped in another-cluster. There are various types of clustering, the most important being (*Hierarchical Clustering - Agglomerative, Divisive & Dendogram*, n.d.):

**Partitional Clustering** - (i.e. K-Means, K-Medoids)

**Hierarchical Clustering** – Agglomerative and Divisive Hierarchical Clustering

**Density-Based Clustering** – (i.e. DBSCAN, OPTICS & DENCLUE)

**Grid-Based Clustering** – (i.e. STING, WaveCluster & CLIQUE)

**Model-Based Clustering** – (i.e. COBWEB)

**Past Research** would be our guide and it would constitute the theoretical framework based on an existing theory in a field of inquiry that is related and reflects the hypothesis of a study. It is a blueprint that is often “borrowed” by the researcher to build his/her own research inquiry. It serves as the foundation upon which a research is constructed.

The most relevant study from our literature review, is the previously mentioned concerning the Courtyard Marriott. The authors of this study considered seven (7) features that were thought to be important (see below) and each feature had a number of attributes, fifty (50) in total.

### **External Factors**

Room

Food

Lounge

Leisure

Service

Security

Hybrid Conjoint Analysis was used to create different bundles of preferences that combined different combinations of hotel attributes to design a successful chain of hotels. It should be noted that the study did not take into account how demographic variables like age, sex, country of origin, education etc., could affect the choice of hotel attributes selection.

The purpose of this study would be to identify customers' preferences while choosing an urban hotel, using choice based conjoint analysis and K-means clustering analysis. Multivariate Analysis of Variance (MANOVA) would then be employed to examine if there is a correlation between the independent variables like demographics and the dependent variables of hotel attributes.

Therefore two research questions (RQ) must be examined:

RQ1: Which alternative profile of attributes will best suit the preferences and the WTP of a luxury hotel customer?

RQ2: Which market segments will exhibit preferences with similar attributes?

## **3. Research Methodology**

### **3.1. Introduction**

This chapter will present the theory behind the methodology used to conduct this study, the methods of collecting data, the tools used and the methods analyzing the data. The first section will lay out the theory of conjoint analysis, the type of conjoint analysis, the clustering algorithm of K-means and statistical methods like MANOVA that determine relationships between variables.

### **3.2. Adaptive Choice Based Conjoint Analysis (ACBC)**

The adaptive Choice Based Conjoint Analysis (ACBC) developed by Sawtooth Software, was the preferable method used because it can employ a large number of characteristics (more than five) and levels. ACBC is more than a conventional Choice Based Conjoint (CBC).

ACBC becomes more engaging and mimics real world experience, where the consumer screens a variety of products but is given the opportunity to focus on the features that he finds more interesting. This method helps the consumer decide which combination of attributes and levels provide a better product. If the consumer has to choose between different variations of the same product, he would usually pick the one that offers him the greatest satisfaction.

ACBC is used to identify consumer preferences by combining different attributes and levels to form their ideal or dream product, in our case their dream hotel. An attribute is a characteristic of a product that consists of different levels. In Figure 3, the attributes and levels used in our survey are displayed. An example of an attribute is "sound-proof windows" and its levels are "Yes" and "No". Another example of attribute is "Number of rooms" and its levels are "6-10", "11-20" and "21+".

## Figure 2: Attributes and Levels

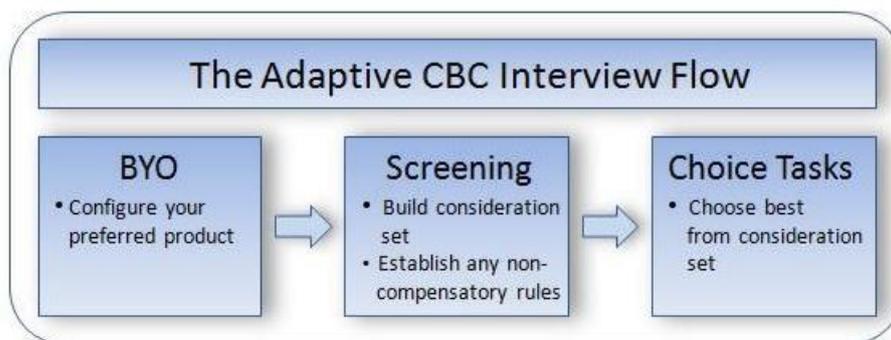
In the following screens you will have to assess different luxury city hotel descriptions (combination of features) for a double room during high season. The hotel descriptions differ in terms of **Hotel building, Room facilities, Room services, Transport,** and **Leisure**, as follows:

- Number of rooms:** 6-10, 11-20, 21+
- Location:** Old town, New town
- Sound proof windows:** Yes, no
- Room decoration:** Minimal, Sophisticated design
- Jacuzzi:** Yes, No
- Quality of mattress/pillows:** Deluxe, Standard
- Cable-satellite tv:** Yes, No
- Safe locker:** Small size, Laptop size
- Bathroom amenities:** Standard local brand, Luxurious/expensive brands
- Type of amenities:** Standard (soap, shower gel, shampoo, conditioner, hair dryer), Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
- Room service:** Breakfast + Dinner, Breakfast only, None
- Sauna-SPA:** Yes, No
- Gym:** Yes, No
- Bar/restaurant:** Yes, No

The ACBC interview is interactive and customized to the preferences of each individual. In Figure 4, the ACBC interview flow that shows the three sections that make up the survey, is presented:

The Build Your Own (BYO) section, the Screening section and the Choice tasks section that would be analyzed below.

*Figure 3: The ACBC Interview Flow (adapted by [www.sawtoothsoftware.com](http://www.sawtoothsoftware.com))*



**BYO Section.** In this section of the interview the consumers are asked to answer a "Build Your Own" (BYO) question based on various attributes and their respective levels. The consumers decide to choose their preferred level that corresponds to each attribute. Some levels are accompanied by a corresponding price. A typical screen for this section of the interview is shown in Figure 4. An example of an attribute is

**Jacuzzi**, and its levels are **Yes** or **No**, while the level **Yes** includes an extra price of 25 euro per day.

Figure 4: Sample Page from the BYO Section

Please select the hotel you'd be most likely to stay. For each feature, select your preferred option.

Feature	Select Feature	Cost for Feature
<b>Number of rooms</b>	<input type="radio"/> 6-10 <input checked="" type="radio"/> 11-20 <input type="radio"/> 21+	€ 0
<b>Location</b>	<input checked="" type="radio"/> Old town (+ €28) <input type="radio"/> New town	€ 28
<b>Sound proof windows</b>	<input checked="" type="radio"/> Yes (+ €8) <input type="radio"/> No	€ 8
<b>Room decoration</b>	<input type="radio"/> Minimal <input checked="" type="radio"/> Sophisticated design (+ €20)	€ 20
<b>Jacuzzi</b>	<input checked="" type="radio"/> Yes (+ €25) <input type="radio"/> No	€ 25
<b>Quality of mattress/pillows</b>	<input type="radio"/> Standard <input checked="" type="radio"/> Deluxe (+ €8)	€ 8
<b>Cable-satellite tv</b>	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
<b>Safe locker</b>	<input type="radio"/> Small size <input checked="" type="radio"/> Laptop size (+ €8)	€ 8
<b>Bathroom amenities</b>	<input type="radio"/> Standard local brand <input checked="" type="radio"/> Luxurious/expensive brands (+ €8)	€ 8
<b>Type of amenities</b>	<input type="radio"/> Standard (soap, shower gel, shampoo, conditioner, hair dryer) <input checked="" type="radio"/> Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers (+ €5)	€ 5
<b>Room service</b>	<input type="radio"/> Breakfast + Dinner (+ €25) <input checked="" type="radio"/> Breakfast only (+ €8) <input type="radio"/> None	€ 8
<b>Sauna-SPA</b>	<input checked="" type="radio"/> Yes (+ €25) <input type="radio"/> No	€ 25
<b>Gym</b>	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
<b>Bar/restaurant</b>	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
<b>Total</b>		€ 233

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**Screening Section.** In the second section of the interview "screening" questions are presented to the consumer, where different theoretical products composed by different combinations of attributes and levels. In our case the ACBC software presented four different products for a total of five screens. The products are based on the consumer's BYO choices and at least all levels are presented once. In this Section, the consumer would not make a final choice, but he or she would indicate if the formed products could be considered "a possibility" or "won't work for me." A typical screen from this section is shown in Figure 5.

*Figure 5: Sample Page from The Screening Section*

Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.  
(2 of 5)

<b>Number of rooms</b>	21+	11-20	11-20	6-10
<b>Location</b>	Old town	New town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes	No
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	Yes	No	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Standard	Deluxe
<b>Cable-satellite tv</b>	No	No	No	No
<b>Safe locker</b>	Small size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Standard local brand	Luxurious/expensive brands	Luxurious/expensive brands
<b>Type of amenities</b>	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast + Dinner	Breakfast only	Breakfast only	Breakfast only
<b>Sauna-SPA</b>	Yes	No	Yes	Yes
<b>Gym</b>	Yes	No	No	No
<b>Bar/restaurant</b>	No	Yes	No	No
<b>Summed pricing attribute</b>	€263	€137	€172	€291
	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me

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**Unacceptable Screening Rules.** During the screening section the ACBC software introduces the “Unacceptable Screening Rules” where the consumer continuously ignores and avoids a certain attribute level. The software presents then the consumer with a list of the systematically avoided attribute levels, to choose one as a cut-off. In Figure 6, it can be seen that this particular consumer ignored the soundproof windows attribute and chose No as it’s level. So the soundproof window attribute is considered from now on an unacceptable threshold. If the consumer would be asked to evaluate a product concept that he has not been presented before, the unacceptable rule, would make certain that a new product would be composed that it would not include the sound proof windows as a possibility.

*Figure 6: Screening for “Unacceptable” Attribute Levels*

We've noticed that you've avoided hotels with certain characteristics shown below. Would any of these features be **totally unacceptable**? If so, mark the **one feature that is most unacceptable**, so we can just focus on hotels that meet your needs.

- Sound proof windows - No
- Cable-satellite tv - Yes
- Safe locker - Small size
- Number of rooms - 6-10
- Number of rooms - 21+
  
- None of these is totally unacceptable.

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**Choice Task Section.** The ACBC software presents to the consumer three different product concepts that were marked as “a possibility” and follow the unacceptable rule cut-off. In Figure 7, it can be seen that some of the attributes are marked as grey because they are considered of equal importance in all three concepts. This would help the consumer ignore the constant grey attributes and examine in more detail the

secondary attributes that are clear cut. At the bottom of the screen a summed price attribute is included, that shows how the choices a consumer made, could affect the overall price of a room per night. In Figure 7, it can be seen that the consumer chose a concept's attribute levels that resulted in the mid-range overall price of 233 euro, compared to the highest price of 263 euro and the lowest price of 177 euro.

*Figure 7: Sample Page from the Choice Task Section*

Among these three, which is the best option? (I've grayed out any features that are the same, so you can just focus on the differences.)

(4 of 4)

<b>Number of rooms</b>	21+	11-20	11-20
<b>Location</b>	Old town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	Yes	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Standard local brand
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)
<b>Room service</b>	Breakfast only	Breakfast only	None
<b>Sauna-SPA</b>	Yes	Yes	Yes
<b>Gym</b>	No	No	No
<b>Bar/restaurant</b>	No	No	No
<b>Summed pricing attribute</b>	€263	€233	€177
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

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### **3.3. Partitioning Clustering and K-Means Algorithm**

Clustering is the process of creating groups that contain a set of a data points into classes of similar points. The data points that are grouped within a cluster, are similar to each other but very different to data points within another cluster or clusters.

The method of partitioning clustering was chosen to be applied in order to separate the questionnaire participants into different clusters.

In Partitioning Clustering successive clusters are created with the use of iterative process and assigns a set of data points into k-clusters (Profile, 2020).

For the purpose of this study, the K-means clustering algorithm was employed that belongs to the Partitioning Clustering which uses unsupervised learning (Morissette & Chartier, 2013). Every Cluster randomly selects data points to be established as the initial centers of the cluster. These centers are labeled as cluster means or centroids and are used to assign the rest of the data points to the cluster whose centroid is nearest, has the minimum distance from the data points. The cluster centroid update and the assignment of data points follows an iterative process and only stops when the centroids stabilize and do not alter any more. This iterative process uses an algorithm that calculates Euclidean distances between the data points and the cluster centroids. A major characteristic of the K-means is that the number of clusters is not generated by the software but the user would have to pre-define it.

The best clusters are those that are homogeneous when it comes to the relation between its data points and heterogeneous in relation to another cluster.

K-Means clustering algorithms use Silhouette score to evaluate the quality of clusters and compare how well data points are clustered with other points that are similar to each other. The Silhouette score is calculated for each sample of different clusters. To calculate the

Silhouette score for each data point, the following distances need to be calculated out (*KMeans Silhouette Score With Python Examples - DZone AI*, n.d.):

a. Mean distance between a particular data point and all other data points in the same cluster. This distance can also be called a **mean intra-cluster distance**. The mean distances is denoted by **a**.

b. Mean distance between the particular data point and all other data points of the next nearest cluster. This distance can also be called a **mean nearest-cluster distance**. The mean distance is denoted by **b**  
Silhouette score, **S**, for each sample is calculated using the following formula:

$$\text{Silhouette Score} = (b-a)/\max(a,b)$$

where

a= average intra-cluster distance i.e the average distance between each point within a cluster.

b= average inter-cluster distance i.e the average distance between all clusters.

The silhouette coefficient takes values within a range of (-1, 1) (*KMeans Silhouette Score With Python Examples - DZone AI*, n.d.). If the coefficient value is around 1, then the clusters are dense and well separated. If its value is 0 the clusters are overlapping and if below 0 and near -1, then the data points might be in the wrong cluster and they should be moved to another one.

### **3.4. Multivariate Analysis of Variance (MANOVA)**

The one-way multivariate analysis of variance (one-way MANOVA) is a method used in statistics to determine the effect of two or more independent variables on two or more dependent variables. On the other hand, analysis of variance (ANOVA) only takes into consideration the effect of two or more independent variables only on one dependent variable. The purpose of MANOVA is to determine if some dependent variables can be affected by the manipulation of selected independent variables. MANOVA, in simple terms is used to compare independent

groups on multiple continuous outcomes.(*MANOVA - Statistics Solutions*, n.d.)

The dependent variables should be correlated with one another at a lower level. If it is too high, then we could risk multicollinearity. If there is no correlation between them, then they should be not analyzed together. SPSS calculates the F-statistic that results from the linear combination of dependent variables that separates our groups. SPSS also calculates the univariate F for the separate univariate ANOVAs for each dependent variable.

**Assumptions.** The first step to be conducted in SPSS, involves checking if the data extracted from the Sawtooth software can be analysed. To achieve that the data should pass a number of assumptions in order to get proper and valid results.(*Statistics.laerd.com*, 2018)

- Assumption #1: The two or more dependent variables should be continuous. Such variables could be nominal (standard or deluxe) or dichotomous (yes or no).
- Assumption #2: The independent variables should belong to two or more categorical independent groups. For example, gender (male or female) and education (primary, secondary, university, post grad, other).
- Assumption #3: Independence of observation, in such a way, that there is no relationship between observations within a group or between groups.
- Assumption #4: A large and sufficient sample size which means that the number of participants should much larger than the dependent variables.
- Assumption #5: Absence of multicollinearity. The dependent variables should not have a correlation above  $r=0,90$

**MANOVA Results with SPSS.** As with almost all SPSS output, the first table shown, is the “Descriptive Statistics” output table. This table generates means and standard deviations for each individual dependent variable. To assess the significance of differences between the mean values, you must evaluate values in the Multivariate Tests

table and, in some cases, the Tests of Between-Subjects Effects table. The first of these tables contains F and p values for the MANOVA analysis comparing groups' canonical variate means. The "Tests of Between Subject Effects" table presents data for ANOVAs analysed using each individual dependent variable.(Hasan, 2020)

**Multivariate Tests.** In MANOVA in SPSS, the null hypothesis is that the vectors of means on multiple dependent variables are equal across groups. Thus, two hypotheses would be compared with MANOVA Multivariate tests.

H<sub>0</sub> : There are no statistically important differences between the hotel attributes and the demographics.

H<sub>1</sub> : There are statistically important differences between the hotel attributes and the demographics.

SPSS uses a number of statistical methods to assess the statistical significance between groups on the independent variables: Wilks' Lambda, Pillai's Trace, Hotelling's Trace (T), and Roy's Largest Root. The Wilk's Lambda is the method most used:

$$\text{Lambda} = (E1 - E2) / E1.$$

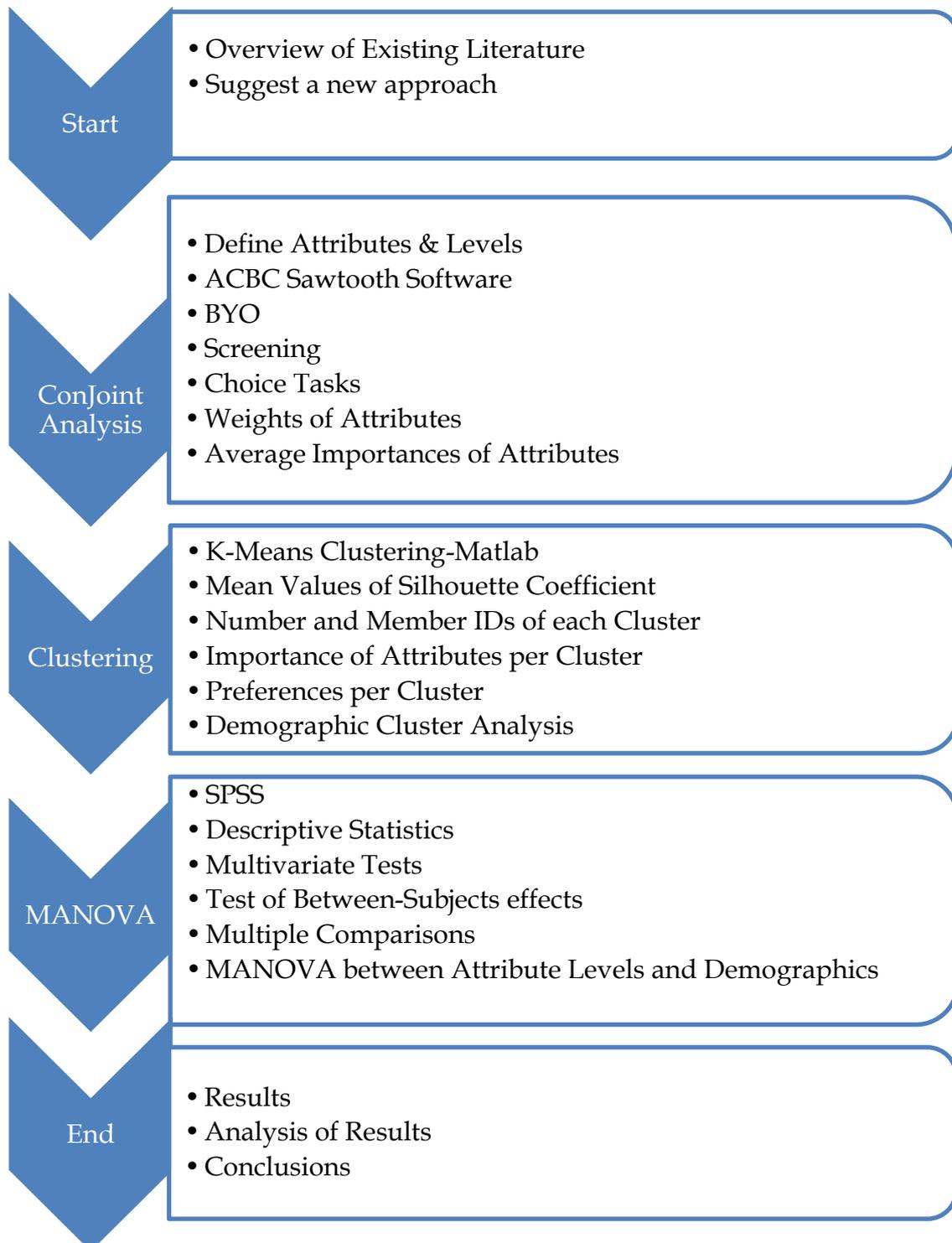
Lambda takes values between 0.0 and 1.0. If Lambda is equal to zero, then the dependent variable cannot be predicted by using this particular independent variable.

The significance value, "Sig" would be examined to find out if the analysis statistically important. If "Sig" is less than 0,05, then the H<sub>0</sub> hypothesis is rejected and the data is statistically important, but if "Sig" is greater than 0,05, then H<sub>0</sub> hypothesis is accepted and there is no statistically importance. The F-statistic is calculated by dividing the means sum of the square for the variable by the variable mean error.

Figure 8, shows a flow chart summarizing the research methodology that would be followed to obtain the necessary results.



Figure 8: Flow Chart presenting the Research Methodology



## 4. Findings and Discussion

### 4.1. ACBC Results

*Table 2: Weights of Attributes*

Number of rooms	3.95372
Location	<b>6.09700</b>
Sound proof windows	<b>7.14605</b>
Room decoration	3.29491
Jacuzzi	3.27576
Quality of mattress/pillows	3.70742
Cable-satellite tv	2.66588
Safe locker	2.41734
Bathroom amenities	2.05874
Type of amenities	2.06502
Room service	<b>8.30953</b>
Sauna-SPA	3.72840
Gym	2.17685
Bar/restaurant	5.62079
Summed pricing attribute	43.48260

On Table 2, the weights of all attributes are presented and it can be observed that the majority of the consumers that took part in this survey chose the room service attribute as the most important, giving it a weight of 8.30953. The second most important attribute was that sound proof windows, with a weight of 7.14605, followed by the location attribute with a weight of 6.09700.

The attributes that proved to be less important for the consumers were those of room and bathroom amenities like cable satellite TV (2.66588), safe locker (2.41734), the bathroom (2.05874) and type of amenities (2.06502) and finally the existence or not of a gym (2.17685).

The average utilities for each attribute levels are presented on Table 3 and are computed based on the value zero (0) as the epicentre. In that respect, the negative values counterbalance the positive values.

*Table 3: Average Importance of Attributes*

<b>Attributes and Dimensions</b>	<b>Average Utilities</b>
<b>Number of rooms</b>	
6-10	-1.92132
11-20	4.24717
21+	-2.32585
<b>Location</b>	
Old Town	27.61232
New Town	-27.61232
<b>Soundproof Windows</b>	
Y	50.59705
N	-50.59705
<b>Room Deco</b>	
Minimal	-8.22140
Sophisticated	8.22140
<b>Jacuzzi</b>	
Y	15.73506
N	-15.73506
<b>Quality of mattress/pillows</b>	
Std	-22.02265
Deluxe	22.02265
<b>Cable TV</b>	
Y	7.84077
N	-7.84077
<b>Safe Locker</b>	
Small sz	-2.72711
Laptop sz	2.72711
<b>Bathroom Amenities</b>	
Std Local Brand	2.74143
Lux/Exp Brands	-2.74143
<b>Type of Amenities</b>	
Standard (soap, shower gel, shampoo, conditioner, hair dryer)	2.31851
Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	-2.31851
<b>Room Service</b>	
Breakfast + Dinner	39.08204
Breakfast	26.75980
None	-65.84185

<b>Sauna/ Spa</b>	
Y	16.89656
N	-16.89656
<b>Gym</b>	
Y	-1.86859
N	1.86859
<b>Bar/ Restaurant</b>	
Y	37.95268
N	-37.95268
<b>Summed pricing attribute</b>	
63	293.56672
356.2	-293.56672
None	254.87785

The average utilities show that the most important attribute is that of soundproof windows with average utility of 50.59705, then the attribute of room service (breakfast and dinner) with an average utility of 39.08204, followed by Bar/Restaurant 37.95268 and finally location (old town) with an average utility of 27.61232.

## 4.2. Clustering Results

The clustering process was based on the weights derived with the help of the ACBC conjoint analysis and the attributes of the selected product. Every single consumer that took part on the survey and considered to be a data point, while the weights of the attributes as coordinates in space.

An excel file was inserted on Matlab that contained the weights and importance of the attributes that were derived from the ACBC conjoint analysis Sawtooth program. The code for K-Means can be seen in appendix B.

The Silhouette coefficient would determine the number of the clusters to be chosen between two, three, four, five, six, seven and eight clusters. The clusters with a silhouette coefficient nearest to 1 would be the preferable number of clusters. According to Table 4, the mean value of silhouette coefficient closer to 1 are for separating the consumers into two clusters.

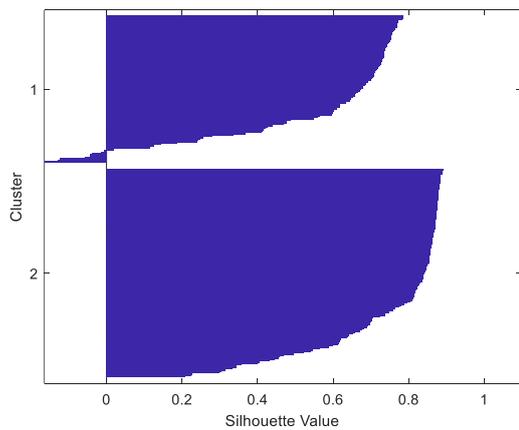
Table 4: Mean Values of Silhouette Coefficient for  $k \in [2, 8]$

Clusters	Mean Silhouette
2	0.6738
3	0.5296
4	0.4393
5	0.4026
6	0.3710
7	0.3268
8	0.2470

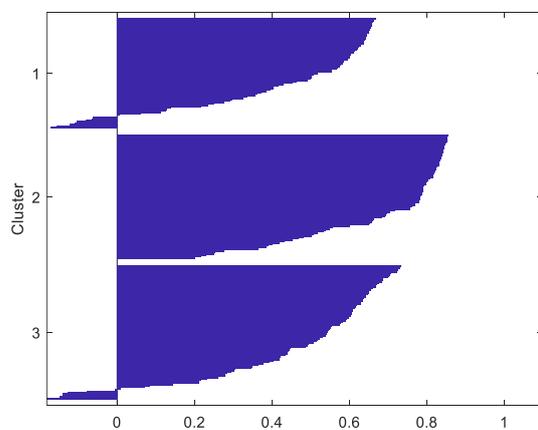
The graphs below show the silhouette coefficients for a different number of clusters. The clusters tested were for two, three, four, five, six, seven and eight respectively.

Figure 9: Silhouette Coefficients for a Different Number of Clusters

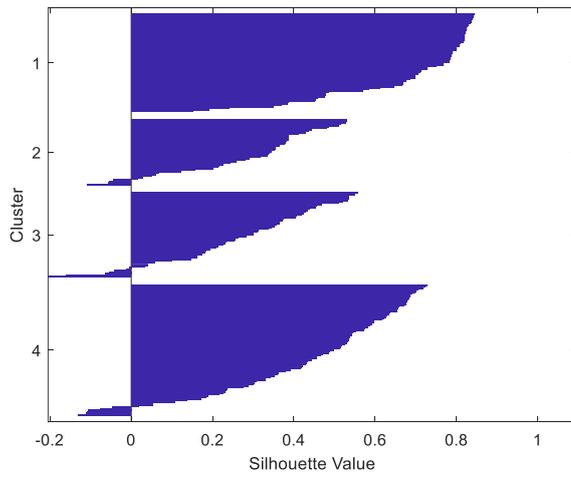
Clustering (k=2)



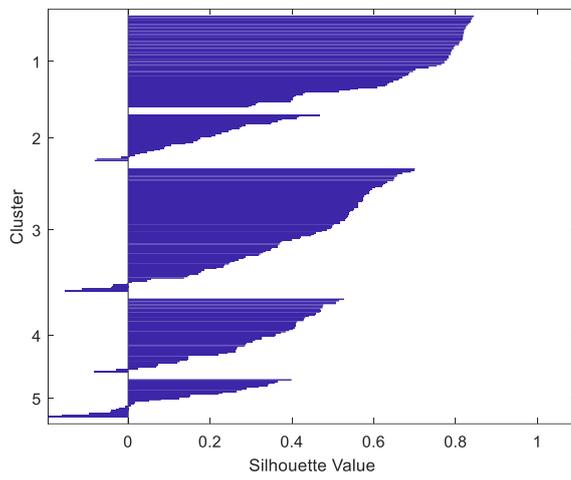
Clustering (k=3)



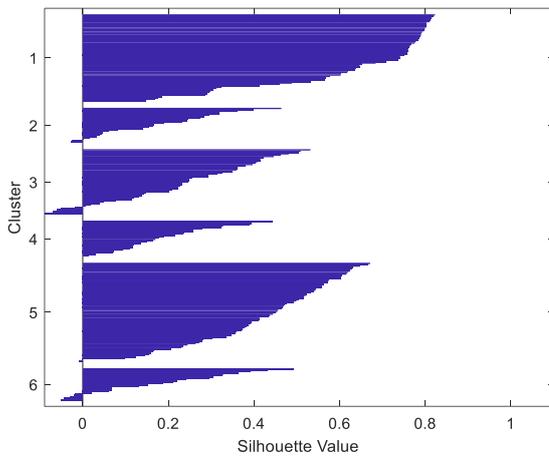
Clustering (k=4)



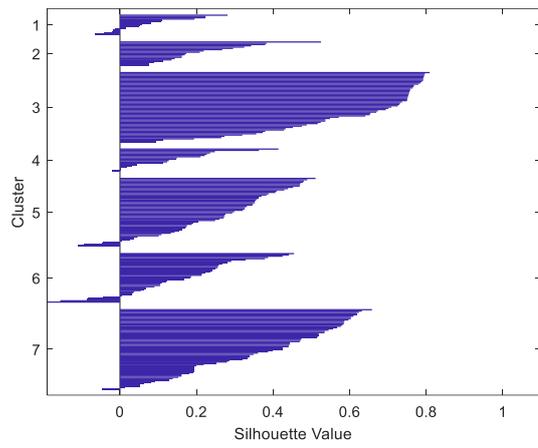
Clustering (k=5)



Clustering (k=6)



### Clustering (k=7)



### Clustering (k=8)

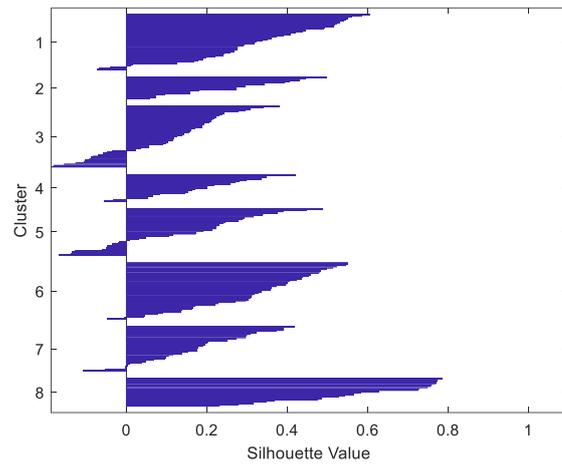


Table 5 shows which attributes are ranked as most important to customers that belong to each of the two clusters. The bottom half of the table presents the two clusters along with the corresponding Customers' IDs. The respondents number in Cluster 1 are 155 and in cluster 2 are 109.

*Table 5: Importance of Attributes per cluster (centroids), Customer IDs*

Attribute	Cluster	
	1	2
Number of rooms	2.870251911463960	5.494431697331383
Location	<b>5.567126801966562</b>	<b>6.850482078303354</b>
Sound proof windows	<b>5.261077916438969</b>	<b>9.826526102495930</b>
Room decoration	2.195466909250308	4.858332970357096
Jacuzzi	2.166656058291916	4.852916016103382
Quality of mattress/pillows	2.573929242579211	5.319253262045353
Cable Satellite TV	2.109487947963555	3.457086729607119
Safe Locker	1.684552277056838	3.459381994751771
Bathroom Amenities	1.529502275254606	2.811313981606653
Type of amenities	1.636570224254397	2.674272466279248
Room Service	<b>6.366884324700616</b>	<b>11.072005495837530</b>
Sauna	2.329175675845950	5.718121963705985
Gym	1.637521550099207	2.943787553751530
Bar/Restaurant	3.419244138314511	8.751430563148638
Summed pricing attribute	58.652552746519405	21.910657124675023
	<b>Cluster 1</b>	<b>Cluster 2</b>
Customer IDs	30,33,34,36,38,39,41,42, 48,51,54,62,67,74,80,82,83,	31,32,40,43,46,47,49,59,

	84,85,88,90,91,92,98,99,100, 101,104,106,109,110,111, 113,114,115,116, 117,118,119,121,125,127, 128,130,132,133, 134,135,136,137,138,139, 140,144,145,147, 148,151,153,154,158,160, 161,163,164,166, 167,169,177,178,179,182, 183,185,186,188, 189,192,200,201,204,205,206, 208,211,227, 236,238,240,241,243,245,251, 252,253,256, 258,259,262,263,265,266,275, 281,283,284, 285,286,290,292,293,301,302, 304,305,307, 308,311,312,317,320,323,324, 327,331,334, 335,337,339,340,341,342,343, 345,346,347, 348,351,352,354, 357,362, 364,367,368,371, 372,374,382,383,384, 385,386,387,388	61,63,66,79, 81,89,93,95, 105,107,108, 112,120,124, 129,131,142,149,150,156, 157,159,162, 168,170,171,174,175,180, 181,184,187, 190,191,193,199,203,215, 217,220,221, 222,224,225,232,233,239, 244,247,248, 249,250,254,260,261,267, 268,269,272, 274,277,278,279,280,282, 287,289,291, 295,300,306,309,310,315, 316,318,319, 321,325,326,328,329,330, 332,338,353, 355,356,360,361,363,365, 370,373,375, 376,377,378,379,380,381
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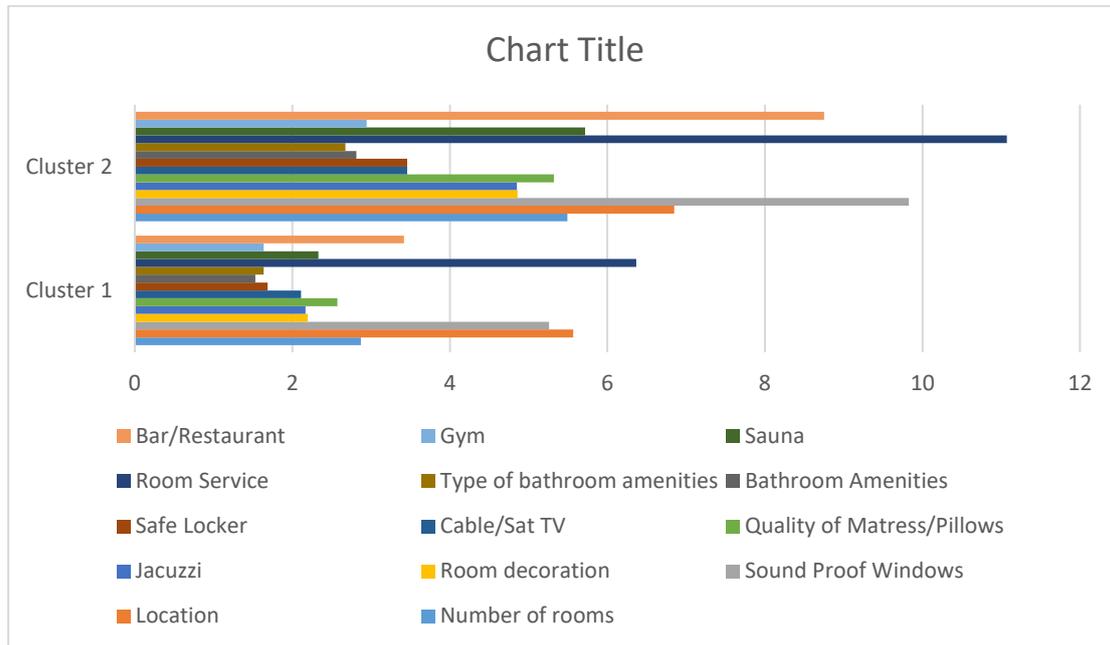
Table 6 and Figure 10, present the ranking of the importance of attributes as they were weighted according to each cluster's respondent preferences. Cluster 1 consumers tend to give more importance to room service (6.366884324700616), then the location (5.567126801966562) of the hotel in the old town as opposed to the new town followed by the existence of sound-proof windows (5.261077916438969), and finally the existence of bar/restaurant (3.419244138314511). Cluster 2 customers rank highest the room service (11.072005495837530) like those of cluster 1, then by sound-proof windows (9.826526102495930), followed by the existence of a bar/restaurant (8.751430563148638) and finally the location (6.850482078303354).

The least important for cluster 1 customers were cable satellite TV, gym, bathroom amenities and types of amenities. Cluster 2 customers least preferred were size of safelocker, gym, type of amenities and bathroom amenities.

*Table 6: Preferences per Cluster concerning Luxury Hotels' features*

Cluster 1		Cluster 2	
1 <sup>st</sup>	Room Service	1 <sup>st</sup>	Room Service
2 <sup>nd</sup>	Location	2 <sup>nd</sup>	Sound proof windows
3 <sup>rd</sup>	Sound proof windows	3 <sup>rd</sup>	Bar/Restaurant
4 <sup>th</sup>	Bar/Restaurant	4 <sup>th</sup>	Location
5 <sup>th</sup>	Sauna	5 <sup>th</sup>	Number of rooms
6 <sup>th</sup>	Number of rooms	6 <sup>th</sup>	Quality of mattress/pillows
7 <sup>th</sup>	Quality of mattress/pillows	7 <sup>th</sup>	Sauna
8 <sup>th</sup>	Room decoration	8 <sup>th</sup>	Room decoration
9 <sup>th</sup>	Jacuzzi	9 <sup>th</sup>	Jacuzzi
10 <sup>th</sup>	Safe Locker	10 <sup>th</sup>	Cable Satellite TV
11 <sup>th</sup>	Cable Satellite TV	11 <sup>th</sup>	Safe Locker
12 <sup>th</sup>	Gym	12 <sup>th</sup>	Gym
13 <sup>th</sup>	Bathroom Amenities	13 <sup>th</sup>	Type of amenities
14 <sup>th</sup>	Type of amenities	14 <sup>th</sup>	Bathroom Amenities

Figure 10: Mean Importance per Cluster concerning Luxury Hotels' features



**Demographic Cluster Analysis.** The clusters can separate the consumers by their demographic characteristics. The group of respondents that belong to cluster 1 contains 86 men and 69 women, out of which 26 live in Greece (16,8%), 22 in England (14,2%), 21 in Austria (13,5%) , 20 in France (12,9%) , 31 in Germany (20%), 17 in Belgium (11%), 8 in Italy (5,2%) , 7 in Spain (4.5%), 1 in Scotland (0.6%), 1 in Holland (0.6%) and 1 in Turkey (0,6%).

Out of these 155 respondents, 24 belong in the age group of 18-24 (15,5%), 51 belong in the age group of 25-34 (32,9%), 46 belong in the age group of 35- 44 (29,7%), 20 belong in the age group of 45-54 (12,9%) , 14 belong in the age group of 55-64 (9%), while no one belongs to the age group above 65.

When it came to education, 83 University graduates (53,5%), 37 were post graduate (23.9%), 33 have finished secondary education (21,3%), 1 primary education (0.6%) and one holds two Bachelor degrees.

Regarding their occupation, the majority of respondents (69) work as employees in the private sector (44.5%), 39 work as self employed (25.2%), 28 were students (18.1%), while a small sample of the

respondents was made of 11 unemployed (7,1%), 5 were doing domestic work (3,2%) and 3 were retired (1,9%).

Cluster 1 includes consumers of all kind of income, as 25 out of the 155 declare a monthly income between 1501-2000€ (18.5%), 24 a monthly income between 501-1000€ (17,8%), 21 a monthly income between 2001-2500 (15.6%), 19 a monthly income between 1001-1500€ (14.1%), followed by 16 consumers with a monthly income between 0-500€ (11.9%), 10 a monthly income between 2501-3000€ (7,4%) , and 6 a monthly income between στα 3001-3500€ (4.4%) and 14 a monthly income of 3500€ (10.4%).

When examining the marital status of the consumers, 84 declare married or in a relationship (54,2%), 67 single (43,2%), while 3 declare divorced (1,9%) and only 1 widowed (0,6%). Respectively, 114 do not have children (73,5%), 17 have 1 child (11%), 22 have 2 children (14,2%), και only 1 has 3 children και 1 more than 4 children (0,6%).

The group of respondents that belong to cluster 2 contains 48 men and 61 women (56%), out of which 17 live in Greece (15.6%), 18 live in England (16.5%), 18 live in Austria (16,5%) , 4 live in France (3.7%), 12 live in Germany (11%), 19 live in Belgium (17.4%), 13 live in Italy (11.9%) , 6 live in Spain (5.5%), 1της in Northern Ireland (0.9%) and 1 in USA (0,9%).

Out of the 109 respondents, 20 belong in the age group between 18-24 (18,3%), 40 belong in the age group between 25- 34 (36,7%), 29 belong in the age group between 35- 44 (26,6%), 13 belong in the age group between 45-54 (11,9%) , 6 belong in the age group between 55-64 (5,5%), and only 1 belong in the age group above 65 (0.9%).

When it comes to the education, 55 are University graduates (50,5%), 20 are post graduates (17,4%), 30 have completed secondary education (27,5%), 3 have completed primary education (2,8%) and 1 said he has completed gymnasium.

Regarding their occupation, the majority of respondents (58) work as employees (53,2%), 21 work as self employed (19,3%), 20 are students

(18.3%), while a small sample includes 4 unemployed (3,7%), 6 work domestically (5,5%) and there is not anyone retired.

Regarding their income, 25 out of 109 declare a monthly income between 1501-2000€ (27.5%), 11 declare a monthly income between 501-1000€ (12,1%), 16 declare a monthly income between 2001-2500 (17,6%), 8 declare a monthly income between 1001-1500€ (8,8%), 9 declare a monthly income between 0-500€ (9.9%), 11 declare a monthly income between 2501-3000€ (12,1%) , only 2 declare a monthly income between 3001-3500€ (2,2%) and 9 with an income above 3500€ (9,9%). Questioned about their marital status, 65 were married or in a relationship (59,6%), 37 single (33,9%) and 7 were divorced (6,4%). Respectively, 69 do not have children (63,3%), 16 have 1 child (14,7%), 19 have 2 children (17,4%), and only 5 have 3 children (4,6%).

### **4.3. MANOVA Results**

#### **4.3.1. MANOVA between Mean Importance of Attributes and Demographics**

MANOVA SPSS analysis was used to examine the effect of the independent variables (demographics) on the dependent variables (relative importance of the hotel attributes).

**Descriptive Statistics.** The first important table that occurred from MANOVA analysis is that of the Descriptive Statistics that provides the mean and the standard deviation of the dependent variables with respect to the independent values. It also provides the total value of the mean and standard deviation between the independent and dependent variables. For each demographic, the results of the descriptive test are presented below.

## **Gender.**

On the first MANOVA analysis between the relative importance of the hotel and the sex of the respondents, it was noted that both men and women give more weight on the following hotel attributes (see table 7):

- **Room Service**
- **Sound-Proof Windows**
- **Location**

*Table 7: Descriptive Statistics Gender*

	Gender	Mean	Std. Deviation	N
Number of rooms	Female	4,1514	3,26165	130
	Male	3,7619	2,89983	134
	Total	3,9537	3,08360	264
Location	Female	6,7800	4,85633	130
	Male	5,4343	3,92786	134
	Total	6,0970	4,45244	264
Soundproof Windows	Female	7,5934	5,63917	130
	Male	6,7121	4,53108	134
	Total	7,1461	5,11616	264
Room Decoration	Female	3,2409	2,88469	130
	Male	3,3473	3,31934	134
	Total	3,2949	3,10746	264
Jacuzzi	Female	3,2107	3,23018	130
	Male	3,3389	3,40142	134
	Total	3,2758	3,31252	264
Quality of mattress Pillows	Female	4,1390	3,05457	130
	Male	3,2887	2,79618	134
	Total	3,7074	2,95158	264
Cable TV	Female	2,8817	2,32110	130
	Male	2,4565	2,19031	134
	Total	2,6659	2,26141	264
Safe Locker	Female	2,4027	2,04720	130
	Male	2,4316	2,40048	134
	Total	2,4173	2,22933	264
Bathroom Amenities	Female	2,0893	1,67135	130
	Male	2,0291	1,75850	134
	Total	2,0587	1,71314	264
	Female	2,1310	1,73301	130

<b>Type of Bathroom Amenities</b>	<b>Male</b>	<b>2,0010</b>	<b>1,53233</b>	<b>134</b>
	<b>Total</b>	<b>2,0650</b>	<b>1,63241</b>	<b>264</b>
<b>Room Service</b>	<b>Female</b>	<b>8,9189</b>	<b>5,48172</b>	<b>130</b>
	<b>Male</b>	<b>7,7184</b>	<b>4,53557</b>	<b>134</b>
	<b>Total</b>	<b>8,3095</b>	<b>5,05011</b>	<b>264</b>
<b>Sauna Spa</b>	<b>Female</b>	<b>3,6997</b>	<b>3,40152</b>	<b>130</b>
	<b>Male</b>	<b>3,7562</b>	<b>4,23027</b>	<b>134</b>
	<b>Total</b>	<b>3,7284</b>	<b>3,83740</b>	<b>264</b>
<b>Gym</b>	<b>Female</b>	<b>2,2223</b>	<b>1,76272</b>	<b>130</b>
	<b>Male</b>	<b>2,1327</b>	<b>1,90699</b>	<b>134</b>
	<b>Total</b>	<b>2,1769</b>	<b>1,83443</b>	<b>264</b>
<b>Bar Restaurant</b>	<b>Female</b>	<b>5,7625</b>	<b>4,94958</b>	<b>130</b>
	<b>Male</b>	<b>5,4833</b>	<b>4,94794</b>	<b>134</b>
	<b>Total</b>	<b>5,6208</b>	<b>4,94131</b>	<b>264</b>
<b>Summed Pricing Attribute</b>	<b>Female</b>	<b>40,7765</b>	<b>21,44112</b>	<b>130</b>
	<b>Male</b>	<b>46,1080</b>	<b>20,82762</b>	<b>134</b>
	<b>Total</b>	<b>43,4826</b>	<b>21,26009</b>	<b>264</b>

### **Age.**

Table 8 examined the effect of age to the hotel attributes. It could be deduced that the consumers of all ages apart the 65+ consider the following attributes as the most important.

Room Service

Sound-Proof Windows

Location

While the 65+ consumers prefer:

Sauna/Spa

Jacuzzi

Quality of Mattress and Pillows

*Table 8: Descriptive Statistics Age*

	Age	Mean	Std. Deviation	N
<b>Number of rooms</b>	18-24	4,8742	3,83293	44
	25-34	4,0695	2,84158	91
	35-44	3,4121	2,37847	75
	45-54	3,3622	3,22713	33
	55-64	4,4829	4,04310	20
	65+	2,4690	.	1
	Total	3,9537	3,08360	264
<b>Location</b>	18-24	5,3839	3,75853	44
	25-34	5,9201	4,65817	91
	35-44	6,6312	4,85107	75
	45-54	5,9722	3,89441	33
	55-64	6,7987	4,37352	20
	65+	3,5898	.	1
	Total	6,0970	4,45244	264
<b>Soundproof Windows</b>	18-24	6,5833	5,06207	44
	25-34	7,1729	5,31119	91
	35-44	7,2262	5,10485	75
	45-54	7,6947	5,06967	33
	55-64	7,3527	4,76866	20
	65+	1,2096	.	1
	Total	7,1461	5,11616	264
<b>Room Decoration</b>	18-24	3,0546	2,72384	44
	25-34	3,4976	3,00935	91

	35-44	3,1317	3,44949	75
	45-54	3,1276	2,26456	33
	55-64	3,7018	4,26309	20
	65+	5,0461	.	1
	Total	3,2949	3,10746	264
<b>Jacuzzi</b>	18-24	4,8928	4,20587	44
	25-34	3,2066	2,95516	91
	35-44	2,7910	2,99093	75
	45-54	2,9968	3,35982	33
	55-64	1,9098	2,03506	20
	65+	11,2972	.	1
	Total	3,2758	3,31252	264
<b>Quality of mattress Pillows</b>	18-24	4,0141	3,60874	44
	25-34	3,5307	2,81984	91
	35-44	3,7443	2,69827	75
	45-54	4,2302	3,02291	33
	55-64	2,6024	2,53488	20
	65+	8,3760	.	1
	Total	3,7074	2,95158	264
<b>Cable TV</b>	18-24	2,0980	1,61539	44
	25-34	2,6816	2,32716	91
	35-44	2,5656	1,91641	75
	45-54	2,7875	2,69079	33
	55-64	4,0378	3,15111	20
	65+	2,2912	.	1
	Total	2,6659	2,26141	264
<b>Safe Locker</b>	18-24	2,4526	1,93731	44
	25-34	2,6596	2,33479	91
	35-44	2,1570	2,13171	75
	45-54	2,1798	2,31299	33
	55-64	2,6369	2,65497	20
	65+	1,7947	.	1
	Total	2,4173	2,22933	264
<b>Bathroom Amenities</b>	18-24	2,3342	1,57209	44
	25-34	2,0896	1,73712	91
	35-44	1,9257	1,63766	75
	45-54	1,8375	1,43639	33
	55-64	2,1507	2,54154	20
	65+	2,5653	.	1
	Total	2,0587	1,71314	264
<b>Type of Bathroom Amenities</b>	18-24	2,2848	1,99649	44
	25-34	2,0836	1,65120	91
	35-44	2,1733	1,61499	75

<b>Room Service</b>	45-54	1,7180	1,26610	33
	55-64	1,7480	1,21150	20
	65+	,3786	.	1
	Total	2,0650	1,63241	264
	18-24	7,5619	3,95816	44
	25-34	8,4498	5,02758	91
	35-44	8,2238	5,13960	75
	45-54	9,9919	6,62052	33
	55-64	7,0743	3,49835	20
	65+	4,0496	.	1
Total	8,3095	5,05011	264	
<b>Sauna Spa</b>	18-24	4,9424	4,92334	44
	25-34	4,0765	4,40796	91
	35-44	3,3577	2,64791	75
	45-54	2,6935	2,41001	33
	55-64	1,9763	1,66506	20
	65+	15,6253	.	1
	Total	3,7284	3,83740	264
<b>Gym</b>	18-24	2,7067	2,13819	44
	25-34	2,4963	1,95640	91
	35-44	1,7293	1,71563	75
	45-54	1,8179	1,12876	33
	55-64	1,7080	1,34333	20
	65+	4,5820	.	1
	Total	2,1769	1,83443	264
<b>Bar Restaurant</b>	18-24	6,7527	6,72214	44
	25-34	5,3068	4,41325	91
	35-44	5,4548	4,79254	75
	45-54	6,0412	4,31147	33
	55-64	4,4771	4,17778	20
	65+	5,8414	.	1
	Total	5,6208	4,94131	264
<b>Summed Pricing Attribute</b>	18-24	40,0639	23,21786	44
	25-34	42,7586	20,80000	91
	35-44	45,4762	20,21298	75
	45-54	43,5487	22,62557	33
	55-64	47,3428	21,55060	20
	65+	30,8841	.	1

**Country of origin.**

The majority of counties give importance on the existence of Room Service, sound-proof windows, location and the existence of Bar/Restaurant.

*Table 9: Descriptive Statistics Country of Origin*

<b>Country</b>	<b>Important Attributes</b>		
<b>Italy</b>	Room Service	Bar/Restaurant	Location
<b>Belgium</b>	Room Service	Bar/Restaurant	Sound-Proof Windows
<b>Northern Ireland</b>	Sauna/Spa	Room Service	Jacuzzi
<b>USA</b>	Room Service	Sound-Proof Windows	Location
<b>Austria</b>	Sound-Proof Windows	Room Service	Bar/Restaurant
<b>Germany</b>	Room Service	Sound-Proof Windows	Location
<b>France</b>	Room Service	Sound-Proof Windows	Bar/Restaurant
<b>Spain</b>	Room Service	Sound-Proof Windows	Location
<b>Greece</b>	Location	Room Service	Sound-Proof Windows
<b>Holland</b>	Location	Room Service	Satellite TV
<b>Scotland</b>	Bathroom Amenities	Room Service	
<b>Turkey</b>	Room Service	Sound-Proof Windows	
<b>England</b>	Room Service	Sound-Proof Windows	Location

### **Income.**

Respondents of all ranges of income give preference to Room Service, sound-proof windows, location and the existence of Bar/Restaurant.

*Table 10: Descriptive Statistics Income*

<b>Income</b>	<b>Attributes</b>	
<b>0-500</b>	Room Service	Bar/Restaurant
<b>501-1000</b>	Room Service	Location
<b>1001-1500</b>	Room Service	Sound-Proof Windows
<b>1501-2000</b>	Room Service	Bar/Restaurant
<b>2001-2500</b>	Room Service	Sound-Proof Windows
<b>2501-3000</b>	Room Service	Sound-Proof Windows
<b>3001-3500</b>	Room Service	Bar/Restaurant
<b>3501+</b>	Room Service	Location

### **Education.**

Respondents of the majority of education levels gave preference to the room service and sound-proof windows followed by a very small preference on bar/restaurant , Jacuzzi and sauna/spa.

*Table 11: Descriptive Statistics Education*

<b>Education</b>	<b>Attributes</b>	
<b>Primary</b>	Jacuzzi	Sauna/Spa
<b>Secondary</b>	Room Service	Sound-Proof Windows
<b>University</b>	Room Service	Sound-Proof Windows
<b>Post Grad</b>	Room Service	Sound-Proof Windows
<b>Other</b>	Room Service	Bar/Restaurant

### **Marital Status.**

Single, married and divorced people again found the room service as most important followed by sound-proof windows, and bar/restaurant and only the widowed preferred the location and bar/restaurant.

*Table 12: Descriptive Statistics Marital Status*

<b>Marital Status</b>	<b>Attributes</b>	
<b>Single</b>	Room Service	Sound-Proof Windows
<b>Married</b>	Room Service	Sound-Proof Windows
<b>Divorced</b>	Room Service	Bar/Restaurant
<b>Widow</b>	Location	Bar/Restaurant

### **Children.**

People with no children preferred the room service and sound-proof windows, while those with children had a mix preference of sound-proof windows, room service, location and bar/restaurant.

*Table 13: Descriptive Statistics Children*

<b>Children</b>	<b>Attributes</b>	
<b>0</b>	Room Service	Sound-Proof Windows
<b>1</b>	Sound-Proof Windows	Location
<b>2</b>	Sound-Proof Windows	Room Service
<b>3</b>	Room Service	Bar/Restaurant
<b>4+</b>	Room Service	

### **Occupation.**

Regardless of the occupation, room service ranked number one, followed by sound-proof windows and the location.

*Table 14: Descriptive Statistics Occupation*

<b>Occupation</b>	<b>Attributes</b>	
<b>Student</b>	Room Service	Sound-Proof Windows
<b>Domestic work</b>	Room Service	Location
<b>Employee</b>	Room Service	Sound-Proof Windows
<b>Self Employed</b>	Room Service	Location
<b>Unemployed</b>	Sound-Proof Windows	Room Service
<b>Retired</b>	Sound-Proof Windows	Location

Below the tables with the Wilks' Lambda sig are presented of each independent demographic variable.

*Table 15: Multivariate Tests Gender*

<b>Multivariate Tests</b>							
<b>Effect</b>		<b>Value</b>	<b>F</b>	<b>Hypothesis df</b>	<b>Error df</b>	<b>Sig.</b>	<b>Partial Eta Squared</b>
<b>Intercept</b>	Pillai's Trace	,900	160,705 <sup>b</sup>	14,000	249,000	,000	,900
	<b>Wilks' Lambda</b>	<b>,100</b>	<b>160,705<sup>b</sup></b>	<b>14,000</b>	<b>249,000</b>	<b>,000</b>	<b>,900</b>
	Hotelling's Trace	9,036	160,705 <sup>b</sup>	14,000	249,000	,000	,900
	Roy's Largest Root	9,036	160,705 <sup>b</sup>	14,000	249,000	,000	,900
<b>Gender</b>	Pillai's Trace	,073	1,391 <sup>b</sup>	14,000	249,000	,157	,073
	Wilks' Lambda	,927	1,391 <sup>b</sup>	14,000	249,000	,157	,073
	Hotelling's Trace	,078	1,391 <sup>b</sup>	14,000	249,000	,157	,073
	Roy's Largest Root	,078	1,391 <sup>b</sup>	14,000	249,000	,157	,073

a. Design: Intercept + Gender

b. Exact statistic

Table 16: Multivariate Tests Age

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,522	19,142 <sup>b</sup>	14,000	245,000	,000	,522
	Wilks' Lambda	,478	19,142 <sup>b</sup>	14,000	245,000	,000	,522
	Hotelling's Trace	1,094	19,142 <sup>b</sup>	14,000	245,000	,000	,522
	Roy's Largest Root	1,094	19,142 <sup>b</sup>	14,000	245,000	,000	,522
Age	Pillai's Trace	,372	1,430	70,000	1245,000	,013	,074
	<b>Wilks' Lambda</b>	<b>,674</b>	<b>1,443</b>	<b>70,000</b>	<b>1170,521</b>	<b>,011</b>	<b>,076</b>
	Hotelling's Trace	,419	1,455	70,000	1217,000	,010	,077
	Roy's Largest Root	,196	3,494 <sup>c</sup>	14,000	249,000	,000	,164

a. Design: Intercept + Age

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 17: Multivariate Tests Country of Origin

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,542	20,149 <sup>b</sup>	14,000	238,000	,000	,542
	Wilks' Lambda	,458	20,149 <sup>b</sup>	14,000	238,000	,000	,542
	Hotelling's Trace	1,185	20,149 <sup>b</sup>	14,000	238,000	,000	,542
	Roy's Largest Root	1,185	20,149 <sup>b</sup>	14,000	238,000	,000	,542
Country	Pillai's Trace	,801	1,272	168,000	2988,000	,012	,067
	Wilks' Lambda	,424	1,288	168,000	2206,953	<b>,009</b>	,069
	Hotelling's Trace	,924	1,299	168,000	2834,000	,007	,071
	Roy's Largest Root	,257	4,573 <sup>c</sup>	14,000	249,000	,000	,205

a. Design: Intercept + Country

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 18: Multivariate Tests Income

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,871	98,448 <sup>b</sup>	14,000	205,000	,000	,871
	Wilks' Lambda	,129	98,448 <sup>b</sup>	14,000	205,000	,000	,871
	Hotelling's Trace	6,723	98,448 <sup>b</sup>	14,000	205,000	,000	,871
	Roy's Largest Root	6,723	98,448 <sup>b</sup>	14,000	205,000	,000	,871
Income	Pillai's Trace	,508	1,179	98,000	1477,000	,118	,073
	Wilks' Lambda	,586	1,175	98,000	1305,455	,124	,074
	Hotelling's Trace	,563	1,169	98,000	1423,000	,131	,074
	Roy's Largest Root	,171	2,582 <sup>c</sup>	14,000	211,000	,002	,146

a. Design: Intercept + Income

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 19: Multivariate Tests Family

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,326	8,525 <sup>b</sup>	14,000	247,000	,000	,326
	Wilks' Lambda	,674	8,525 <sup>b</sup>	14,000	247,000	,000	,326
	Hotelling's Trace	,483	8,525 <sup>b</sup>	14,000	247,000	,000	,326
	Roy's Largest Root	,483	8,525 <sup>b</sup>	14,000	247,000	,000	,326
Family	Pillai's Trace	,169	1,063	42,000	747,000	,366	,056
	Wilks' Lambda	,839	1,062	42,000	733,486	,369	,057
	Hotelling's Trace	,181	1,060	42,000	737,000	,371	,057
	Roy's Largest Root	,096	1,716 <sup>c</sup>	14,000	249,000	,053	,088

a. Design: Intercept + Family

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 20: Multivariate Tests Children

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,465	15,270b	14,000	246,000	,000	,465
	Wilks' Lambda	,535	15,270b	14,000	246,000	,000	,465
	Hotelling's Trace	,869	15,270b	14,000	246,000	,000	,465
	Roy's Largest Root	,869	15,270b	14,000	246,000	,000	,465
<b>Children</b>	Pillai's Trace	,272	1,299	56,000	996,000	,073	,068
	Wilks' Lambda	,750	1,315	56,000	959,061	,064	,069
	Hotelling's Trace	,305	1,331	56,000	978,000	,056	,071
	Roy's Largest Root	,173	3,083c	14,000	249,000	,000	,148

a. Design: Intercept + Children

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 21: Multivariate Tests Occupation

Multivariate Tests							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	,690	38,870b	14,000	245,000	,000	,690
	Wilks' Lambda	,310	38,870b	14,000	245,000	,000	,690
	Hotelling's Trace	2,221	38,870b	14,000	245,000	,000	,690
	Roy's Largest Root	2,221	38,870b	14,000	245,000	,000	,690
<b>Occupation</b>	Pillai's Trace	,309	1,171	70,000	1245,000	,163	,062
	Wilks' Lambda	,723	1,178	70,000	1170,521	,156	,063
	Hotelling's Trace	,340	1,183	70,000	1217,000	,149	,064
	Roy's Largest Root	,142	2,534c	14,000	249,000	,002	,125

a. Design: Intercept + Occupation

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

*Table 22: Multivariate Tests for all Demographics*

<b>Independent Variables</b>	<b>Sig</b>
<b>Sex</b>	0,157
<b>Age</b>	<b>0,011</b>
<b>Country</b>	<b>0,009</b>
<b>Income</b>	0,124
<b>family</b>	0,369
<b>Number of Children</b>	0,064
<b>Occupation</b>	0,156

If we look at Table 21, it could be observed that only the independent variables of country and age have a sig value less than 0.05, so there are statistically important differences between them and the dependent variables. Therefore, it could be concluded, that weights of the hotel attributes are affected by the independent variables of age and country of origin. The rest of the demographic variables would not be analyzed further.

#### **Table of Univariate ANOVAs**

To determine how the dependent variables (the importance of the attributes), differentiate from the independent variables, the country of origin and the age, the table of “Tests of Between-Subjects Effects” should be examined. Since it is a very lengthy table, it is presented on Appendix C

Initially, it was observed that the age has a statistically important effect on the following attributes:

- Gym
- Sauna/Spa
- Jacuzzi

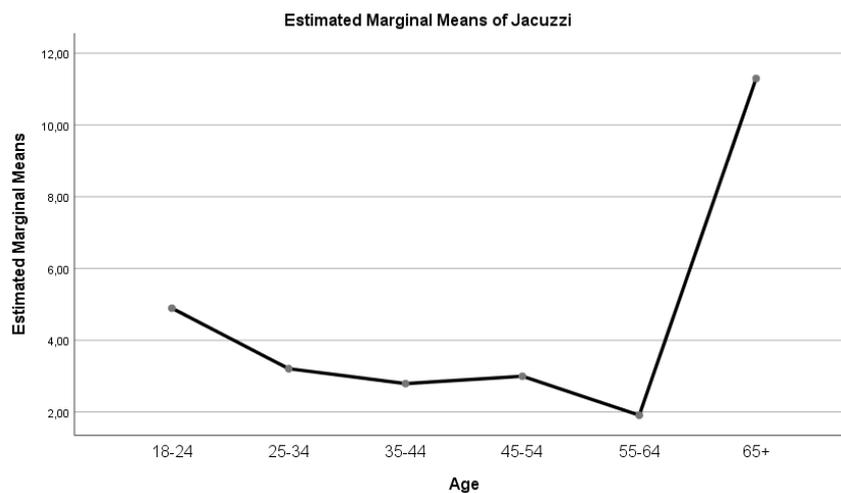
Then, following the second statistically important analysis it can be observed that the country of origin has a statistically significant importance on the following attributes:

- The quality of mattress and pillows
- To the type of bathroom amenities offered
- The existence of Sauna/Spa
- The existence of restaurant/bar

**Multiple Comparisons** From the “Multiple Comparisons” table, it could be deduced, that there are statistically important differences between the means of the attributes and the independent variables. These can be seen on the diagrams produced below:

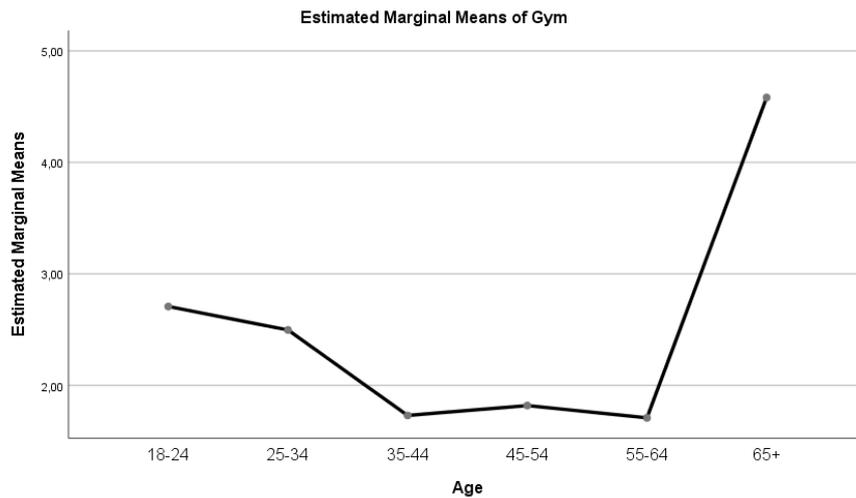
There are statistically important differences in the attributes of gym, sauna/spa, jacuzzi.

*Figure 11: Multiple Comparisons Table Jacuzzi and Age*



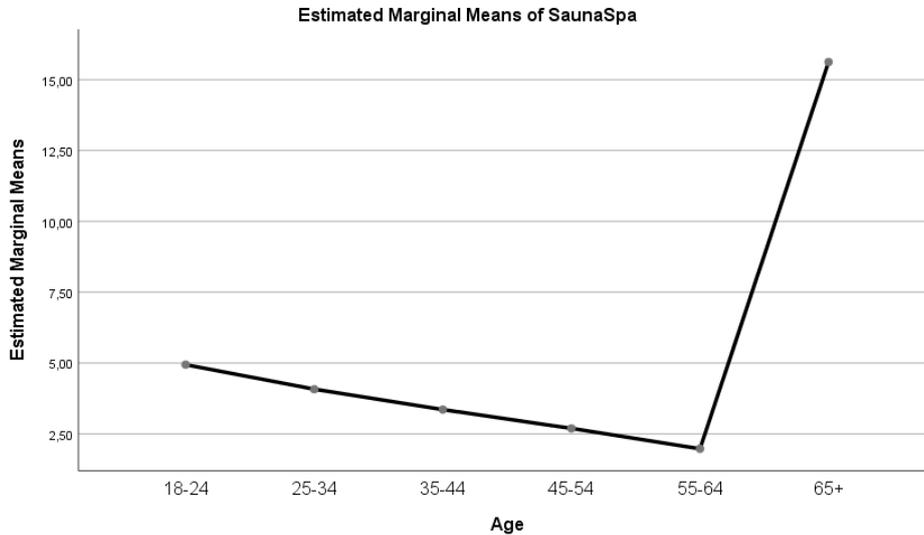
With respect to Jacuzzi, there is a statistically significant differentiation between customers that belong to the 55-64 age group and the 65+ age group.

Figure 12: Multiple Comparisons Table Gym and Age



With respect to the existence of a gym, there is a statistically significant differentiation between customers that belong to the 55-64 age group and the 65+ age group.

Figure 13: Multiple Comparisons Table Sauna/Spa and Age

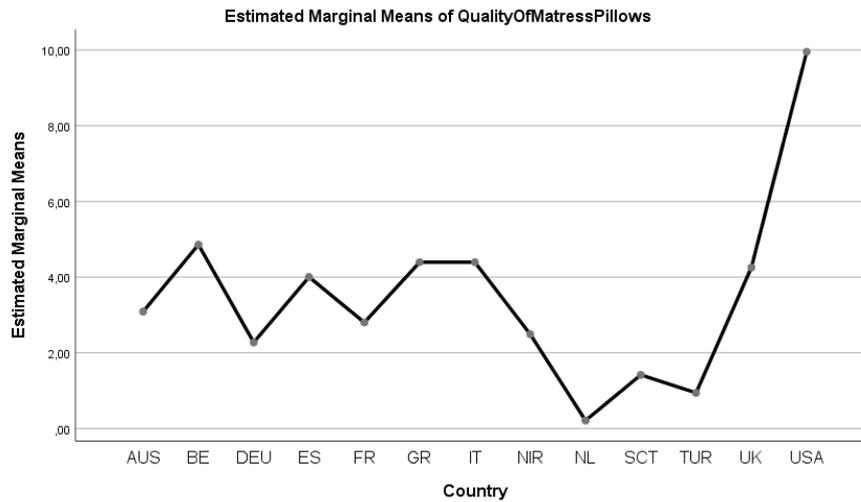


With respect to sauna/spa, there is a statistically significant differentiation between customers that belong to the 55-64 age group and the 65+ age group.

Examining the table analyzing the attributes with respect to the country of origin, we could observe that statistically significant differences are exhibited in the attributes of: Quality of mattress and pillows, type of

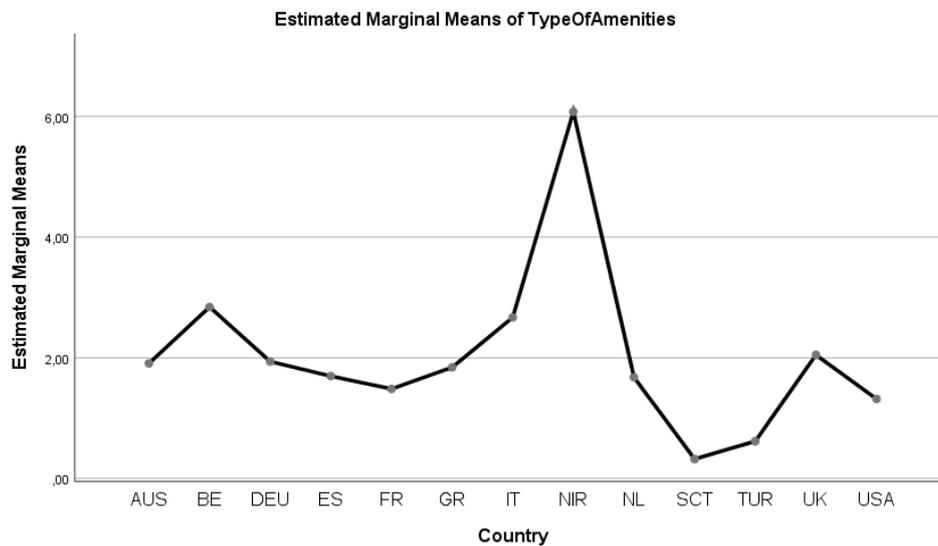
bathroom amenities and the existence of sauna/spa and bar/restaurant.

*Figure 14: Multiple Comparisons Table Quality of Mattress/Pillows and Country*



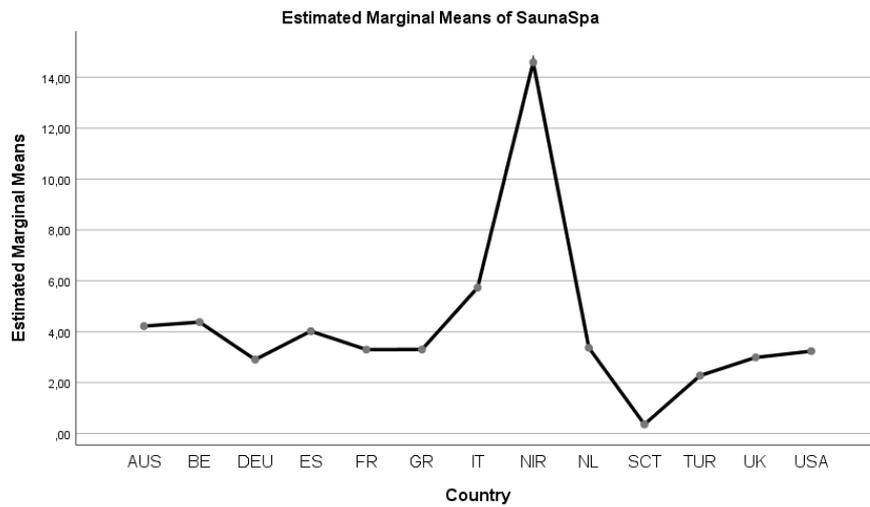
With respect to the quality of mattress and pillows, there is a statistically significant differentiation between customers coming from USA and Holland.

*Figure 15: Multiple Comparisons Table Type of Amenities and Country*



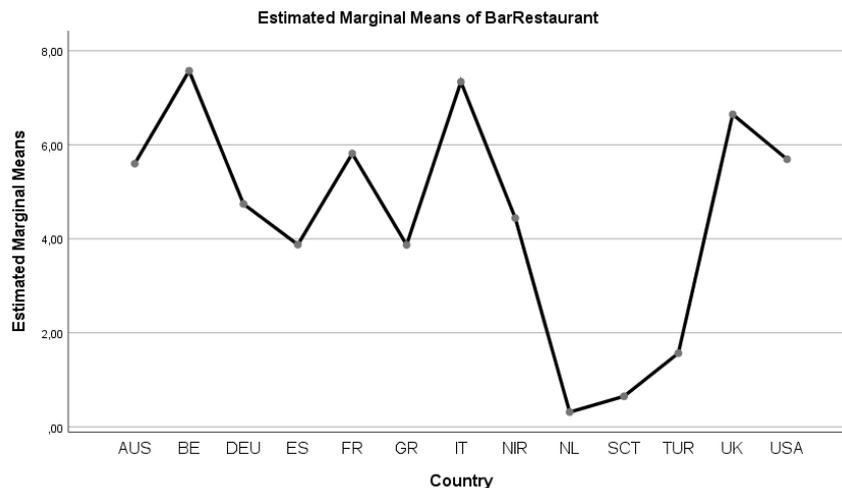
With respect to the type of bathroom amenities, there is a statistically significant differentiation between customers coming from Northern Ireland and Scotland.

Figure 16: Multiple Comparisons Table Type of Sauna/Spa and Country



With respect to the existence of sauna/spa there is a statistically significant differentiation between customers coming from USA and Holland.

Figure 17: Multiple Comparisons Table Type of Bar/Restaurant and Country



With respect to the existence of a bar/restaurant, there is a statistically significant differentiation between customers coming from Belgium and Holland.

#### 4.3.2. MANOVA between Attribute Levels and Demographics

It would have been ideal, to design a hotel based on the preferences of the respondents but since the sample was not as large as expected, it would not be easy to create a new product. Earlier on, it was concluded,

that the independent variables of age and country were affecting the dependent variables. Based on that, it was decided to conduct a MANOVA analysis between each independent variable and all the attribute levels. The only independent variable that was found to have any effect to the attribute levels was education.

*Table 23: Descriptive Statistics Education*

Descriptive Statistics			
Between Subjects Factors			
		Value Label	N
<b>Education</b>	1	<b>Primary</b>	4
	2	<b>Secondary</b>	63
	3	<b>University</b>	138
	4	<b>Postgraduate</b>	56
	5	<b>Other</b>	3

*Table 24: Multivariate Tests Education*

Multivariate Tests <sup>a</sup>							
Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Effect
<b>Intercept</b>	<b>Pillai's Trace</b>	,455	12,710 <sup>b</sup>	16,000	244,000	,000	,455
	<b>Wilks' Lambda</b>	,545	12,710 <sup>b</sup>	16,000	244,000	,000	,455
	<b>Hotelling's Trace</b>	,833	12,710 <sup>b</sup>	16,000	244,000	,000	,455
	<b>Roy's Largest Root</b>	,833	12,710 <sup>b</sup>	16,000	244,000	,000	,455
<b>Education</b>	<b>Pillai's Trace</b>	,316	1,326	64,000	988,000	,048	,079
	<b>Wilks' Lambda</b>	,718	1,323	64,000	957,493	,050	,080
	<b>Hotelling's Trace</b>	,348	1,318	64,000	970,000	,052	,080
	<b>Roy's Largest Root</b>	,138	2,137 <sup>c</sup>	16,000	247,000	,008	,122

- a. Design: Intercept + Education
- b. Exact statistic
- c. The statistic is an upper bound on F that yields a lower bound on the significance level.

The Wilks' Lambda is equal to 0,05 the data for education is statistically significant. To test if the dependent variables, the mean importance of the attributes differ from the independent variable of education, the table of "Tests of Between-Subjects Effects" must be examined.

It is initially observed that the education has a significant effect on the following attributes:

Number of rooms (21+) (p=0,03)

The existence of Sauna/Spa (p=0,04)

The Location (p=0,017)

The existence of Jacuzzi (p=0,03)

*Table 25: Tests of Between-Subjects Effects Education*

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Education	6-10	5428,489	4	1357,122	1,533	,193	,023
	11-20	4523,604	4	1130,901	1,964	,100	,029
	21+	16736,483	4	4184,121	2,721	,030	,040
	Old Town	29141,297	4	7285,324	3,069	,017	,045
	New Town	29141,297	4	7285,324	3,069	,017	,045
	Yes	5246,074	4	1311,518	,731	,571	,011
	No	5246,074	4	1311,518	,731	,571	,011
	Minimal	169,976	4	42,494	,038	,997	,001
	Sophisticated	169,976	4	42,494	,038	,997	,001
	Yes (Jacuzzi)	15404,043	4	3851,011	4,140	,003	,060
	No	15404,043	4	3851,011	4,140	,003	,060

	<b>Std</b>	102,927	4	25,732	,033	,998	,001
	<b>Deluxe</b>	102,927	4	25,732	,033	,998	,001
	<b>Yes</b>	909,766	4	227,441	,359	,838	,006
	<b>No</b>	909,766	4	227,441	,359	,838	,006
	<b>Small</b>	461,475	4	115,369	,189	,944	,003
	<b>Laptop</b>	461,475	4	115,369	,189	,944	,003
	<b>Local</b>	1977,804	4	494,451	1,251	,290	,019
	<b>Lux</b>	1977,804	4	494,451	1,251	,290	,019
	<b>Std</b>	1006,421	4	251,605	,650	,628	,010
	<b>Std+</b>	1006,421	4	251,605	,650	,628	,010
	<b>BD</b>	5608,725	4	1402,181	,825	,510	,013
	<b>B</b>	2757,746	4	689,437	,729	,573	,011
	<b>None</b>	12179,367	4	3044,842	1,204	,309	,018
	<b>y (sauna)</b>	20387,749	4	5096,937	4,018	,004	,058
	<b>n</b>	20387,749	4	5096,937	4,018	,004	,058
	<b>y</b>	2059,033	4	514,758	1,138	,339	,017
	<b>n</b>	2059,033	4	514,758	1,138	,339	,017
	<b>y</b>	6640,708	4	1660,177	,970	,425	,015
	<b>n</b>	6640,708	4	1660,177	,970	,425	,015

If table 26 of Multiple Comparisons is examined, then it could be observed that there are statistically significant differences on the following attributes:

The existence of Sauna/Spa (p=0,039)

The Location (p=0,01)

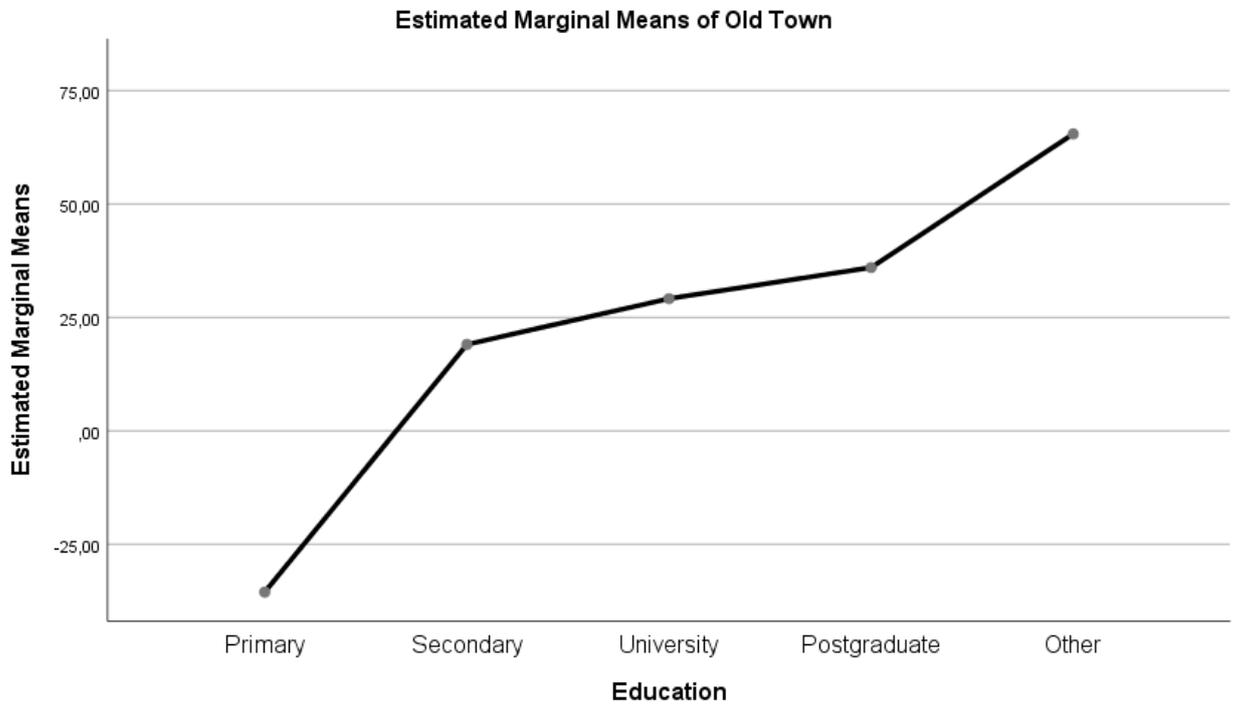
The existence of Jacuzzi (p=0,04)

Table 26: Multiple Comparisons Education

Multiple Comparisons							
Tukey HSD							
						95% Confidence Interval	
Dependent Variable	(I) Education	(J) Education	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
Old Town	Primary	Secondary	-54,5861	25,12350	,193	-123,6026	14,4305
		University	-64,6884	24,71255	,070	-132,5761	3,1992
		Postgraduate	-71,5434*	25,21707	,039	-140,8170	-2,2698
		Other	-100,9980	37,21357	,055	-203,2271	1,2311
	Postgraduate	Primary	71,5434*	25,21707	,039	2,2698	140,8170
		Secondary	16,9573	8,94854	,323	-7,6251	41,5398
		University	6,8550	7,71988	,901	-14,3522	28,0622
		Other	-29,4546	28,87449	,846	-108,7755	49,8663
New Town	Primary	Secondary	54,5861	25,12350	,193	-14,4305	123,6026
		University	64,6884	24,71255	,070	-3,1992	132,5761
		Postgraduate	71,5434*	25,21707	,039	2,2698	140,8170
		Other	100,9980	37,21357	,055	-1,2311	203,2271
	Postgraduate	Primary	-71,5434*	25,21707	,039	-140,8170	-2,2698
		Secondary	-16,9573	8,94854	,323	-41,5398	7,6251
		University	-6,8550	7,71988	,901	-28,0622	14,3522
		Other	29,4546	28,87449	,846	-49,8663	108,7755
Yes(jacuzzi)	Primary	Secondary	58,2777*	15,72584	,002	15,0774	101,4780
		University	59,6289*	15,46861	,001	17,1352	102,1226
		Postgraduate	60,1769*	15,78441	,002	16,8157	103,5382

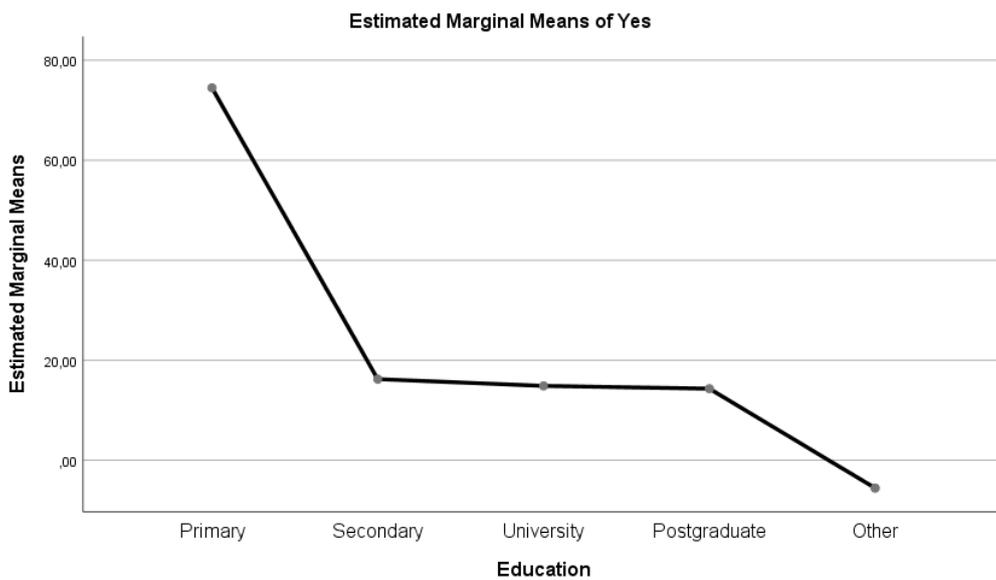
		Other	80,0660*	23,29352	,006	16,0765	144,0554
No (Jacuzzi)	Primary	Secondary	-58,2777*	15,72584	,002	-	-15,0774
						101,4780	
		University	-59,6289*	15,46861	,001	-	-17,1352
						102,1226	
		Postgraduate	-60,1769*	15,78441	,002	-	-16,8157
						103,5382	
		Other	-80,0660*	23,29352	,006	-	-16,0765
						144,0554	
Yes (sauna)	Primary	Secondary	66,0531*	18,36400	,004	15,6055	116,5007
		University	55,1403*	18,06362	,021	5,5178	104,7627
		Postgraduate	57,3094*	18,43239	,018	6,6739	107,9448
		Other	81,9368*	27,20123	,024	7,2126	156,6611
No (sauna)	Primary	Secondary	-66,0531*	18,36400	,004	-	-15,6055
						116,5007	
		University	-55,1403*	18,06362	,021	-	-5,5178
						104,7627	
		Postgraduate	-57,3094*	18,43239	,018	-	-6,6739
						107,9448	
		Other	-81,9368*	27,20123	,024	-	-7,2126
						156,6611	

Figure 18: Multiple Comparisons Table Old Town and Education



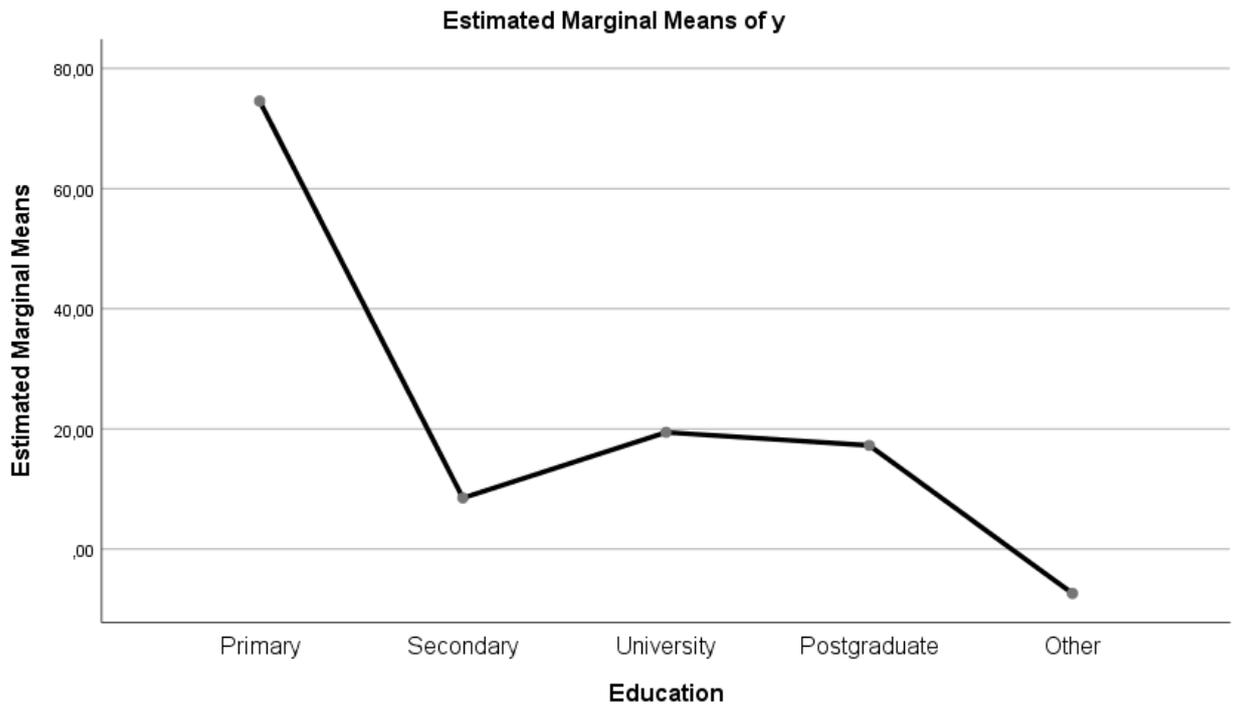
Regarding the Location of the hotel in the old town, there is a significant difference between those respondents that have stated “Other” as education level and those that have completed the primary education.

Figure 19: Multiple Comparisons Table Jacuzzi and Education



Similarly, when the existence of Jacuzzi is examined, there is a significant difference between those respondents that have stated “Other” as education level and those that have completed the primary education.

*Figure 20: Multiple Comparisons Table Sauna/Spa and Education*



Regarding the existence of a sauna/spa, there is a significant difference between those respondents that have stated “Other” as education level and those that have completed the primary education. There is also a significant difference between those of primary and secondary education.

## 5. Conclusions and Recommendations

The average utilities generated from the ACBC conjoint analysis determined that the following hotel attributes were the most significant in order of preference from highest to lowest:

- Sound-Proof Windows
- Room Service
- Bar/Restaurant
- Location

A K-means cluster analysis used the weights and importance of the hotel attributes that came out of the Sawtooth software to examine what was the relationship between the customer preferences and the demographics. Two cluster groups were eventually produced that separated the consumers into two groups of similar characteristics.

Cluster 1 consumers gave preference to the following attributes:

- Room Service
- Location
- Sound-Proof Windows
- Bar/Restaurant

Cluster 2 consumers gave preference to the following attributes:

- Room Service
- Sound-Proof Windows
- Bar/Restaurant
- Location

A one-way MANOVA analysis was conducted to examine if there was any correlation between the independent variables of demographics and the dependent variables of hotel attributes.

Regardless of the demographic, being gender, age, income, marital status, education and country of origin the two most important attributes were those of room service and sound-proof windows. To a lesser extent, the attributes of location, bar/restaurant and Spa-jacuzzi were considered by all demographic groups. It is worth noting that consumers above the age of 65, gave more preference to sauna/spa. Jacuzzi and the quality of mattress. One can deduce from the above

that older clients would give higher priority to luxury and comfort within the room rather than room service, sound-proof windows and location. The independent variables of country of origin and age exhibited a sig value less than 0.05 which signifies that these two demographic groups affect the hotel attributes more than any other.

Upon further examination, it was observed that the age had a significant effect on the attributes of:

- The existence of gym
- The existence of Sauna/Spa
- The existence of jacuzzi

It was observed that there was a statistically significant difference between the ages of 55-64 and those above 65 with respect to the above mentioned attributes.

While, the country of origin had an effect on the following attributes:

- The quality of mattress and pillows
- To the type of bathroom amenities offered
- The existence of Sauna/Spa
- The existence of restaurant/bar

There was a significant differentiation between various ethnicities with respect to the above mentioned attributes.

Finally, after further analysis we concluded that the only other independent variable that had any effect on the levels of attribute was that of education, and specifically, the location, the number of rooms and the existence of a Sauna/Spa.

It is highly recommended, that those involved in the hospitality business should consider as first priority while designing an urban hotel, to provide a room service to their clients and make sure while designing the hotel to install sound proof windows while at the same time being mindful of the location. Secondarily and depending on their target group, they should consider providing luxury services like a gym, a bar/restaurant, spa/sauna, jacuzzi and extra comfort within the rooms.

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# 7. Appendices

## A. ACBC SURVEY



The current survey is part of a postgraduate thesis.  
The aim of the survey is the determination of consumer preferences regarding Luxury hotels in cities-not seaside resorts.  
The questionnaire is anonymous and needs only a few minutes to be completed.

Thank you in advance for your valuable contribution!

Next

In the following screens you will have to assess different luxury city hotel descriptions (combination of features) for a double room during high season.  
The hotel descriptions differ in terms of **Hotel building, Room facilities, Room services, Transport,** and **Leisure**, as follows:

- Number of rooms:** 6-10, 11-20, 21+
- Location:** Old town, New town
- Sound proof windows:** Yes, no
- Room decoration:** Minimal, Sophisticated design
- Jacuzzi:** Yes, No
- Quality of mattress/pillows:** Deluxe, Standard
- Cable-satellite tv:** Yes, No
- Safe locker:** Small size, Laptop size
- Bathroom amenities:** Standard local brand, Luxurious/expensive brands
- Type of amenities:** Standard (soap, shower gel, shampoo, conditioner, hair dryer), Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
- Room service:** Breakfast + Dinner, Breakfast only, None
- Sauna-SPA:** Yes, No
- Gym:** Yes, No
- Bar/restaurant:** Yes, No

Please select the hotel you'd be most likely to stay. For each feature, select your preferred option.

Feature	Select Feature	Cost for Feature
Number of rooms	<input type="radio"/> 6-10 <input checked="" type="radio"/> 11-20 <input type="radio"/> 21+	€ 0
Location	<input checked="" type="radio"/> Old town (+ €28) <input type="radio"/> New town	€ 28
Sound proof windows	<input checked="" type="radio"/> Yes (+ €8) <input type="radio"/> No	€ 8
Room decoration	<input type="radio"/> Minimal <input checked="" type="radio"/> Sophisticated design (+ €20)	€ 20
Jacuzzi	<input checked="" type="radio"/> Yes (+ €25) <input type="radio"/> No	€ 25
Quality of mattress/pillows	<input type="radio"/> Standard <input checked="" type="radio"/> Deluxe (+ €8)	€ 8
Cable-satellite tv	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
Safe locker	<input type="radio"/> Small size <input checked="" type="radio"/> Laptop size (+ €8)	€ 8
Bathroom amenities	<input type="radio"/> Standard local brand <input checked="" type="radio"/> Luxurious/expensive brands (+ €8)	€ 8
Type of amenities	<input type="radio"/> Standard (soap, shower gel, shampoo, conditioner, hair dryer) <input checked="" type="radio"/> Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers (+ €5)	€ 5
Room service	<input type="radio"/> Breakfast + Dinner (+ €25) <input checked="" type="radio"/> Breakfast only (+ €8) <input type="radio"/> None	€ 8
Sauna-SPA	<input checked="" type="radio"/> Yes (+ €25) <input type="radio"/> No	€ 25
Gym	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
Bar/restaurant	<input type="radio"/> Yes (+ €8) <input checked="" type="radio"/> No	€ 0
<b>Total</b>		€ 233

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Next

0%  100%

Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.

(1 of 5)

<b>Number of rooms</b>	11-20	11-20	21+	11-20
<b>Location</b>	Old town	Old town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	No	Yes
<b>Room decoration</b>	Minimal	Sophisticated design	Sophisticated design	Minimal
<b>Jacuzzi</b>	No	Yes	Yes	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Deluxe	Deluxe
<b>Cable-satellite tv</b>	Yes	No	No	No
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Standard local brand	Luxurious/expensive brands	Standard local brand	Luxurious/expensive brands
<b>Type of amenities</b>	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast only	Breakfast only	Breakfast only	Breakfast + Dinner
<b>Sauna- SPA</b>	Yes	Yes	Yes	Yes
<b>Gym</b>	No	Yes	No	No
<b>Bar/restaurant</b>	No	Yes	No	No
<b>Summed pricing attribute</b>	€199	€188	€210	€292
	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me

Back

Next



Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.

(2 of 5)

<b>Number of rooms</b>	21+	11-20	11-20	6-10
<b>Location</b>	Old town	New town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes	No
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	Yes	No	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Standard	Deluxe
<b>Cable-satellite tv</b>	No	No	No	No
<b>Safe locker</b>	Small size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Standard local brand	Luxurious/expensive brands	Luxurious/expensive brands
<b>Type of amenities</b>	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast + Dinner	Breakfast only	Breakfast only	Breakfast only
<b>Sauna-SPA</b>	Yes	No	Yes	Yes
<b>Gym</b>	Yes	No	No	No
<b>Bar/restaurant</b>	No	Yes	No	No
<b>Summed pricing attribute</b>	€263	€137	€172	€291
	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me

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We've noticed that you've avoided hotels with certain characteristics shown below. Would any of these features be **totally unacceptable**? If so, mark the **one feature that is most unacceptable**, so we can just focus on hotels that meet your needs.

- Sound proof windows - No
- Cable-satellite tv - Yes
- Safe locker - Small size
- Number of rooms - 6-10
- Number of rooms - 21+
  
- None of these is totally unacceptable.

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Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.

(3 of 5)

<b>Number of rooms</b>	11-20	11-20	11-20	11-20
<b>Location</b>	New town	New town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	Yes	Yes	Yes
<b>Quality of mattress / pillows</b>	Deluxe	Standard	Deluxe	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes	Yes
<b>Safe locker</b>	Small size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Standard local brand	Luxurious/expensive brands
<b>Type of amenities</b>	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast only	Breakfast only	None	Breakfast only
<b>Sauna-SPA</b>	Yes	Yes	Yes	No
<b>Gym</b>	No	No	No	No
<b>Bar/restaurant</b>	Yes	No	No	No
<b>Summed pricing attribute</b>	€240	€212	€177	€198
	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me

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Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.

(5 of 5)

<b>Number of rooms</b>	21+	11-20	11-20	11-20
<b>Location</b>	Old town	New town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	No	Yes	No
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Standard	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes	No
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Luxurious/expensive brands	Standard local brand
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast only	None	Breakfast + Dinner	Breakfast only
<b>Sauna-SPA</b>	Yes	Yes	Yes	Yes
<b>Gym</b>	No	No	No	Yes
<b>Bar/restaurant</b>	No	No	No	Yes
<b>Summed pricing attribute</b>	€263	€193	€205	€242
	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input checked="" type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me

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0%  100%

Here are a few hotels you might like. For each one, indicate whether it is a possibility or not.

(5 of 5)

<b>Number of rooms</b>	21+	11-20	11-20	11-20
<b>Location</b>	Old town	New town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	No	Yes	No
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Standard	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes	No
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Luxurious/expensive brands	Standard local brand
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast only	None	Breakfast + Dinner	Breakfast only
<b>Sauna-SPA</b>	Yes	Yes	Yes	Yes
<b>Gym</b>	No	No	No	Yes
<b>Bar/restaurant</b>	No	No	No	Yes
<b>Summed pricing attribute</b>	€263	€193	€205	€242
	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me	<input type="radio"/> A possibility <input type="radio"/> Won't work for me	<input checked="" type="radio"/> A possibility <input type="radio"/> Won't work for me

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0%  100%

Among these three, which is the best option? (I've grayed out any features that are the same, so you can just focus on the differences.)

(1 of 4)

<b>Number of rooms</b>	21+	6-10	11-20
<b>Location</b>	Old town	New town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Minimal
<b>Jacuzzi</b>	Yes	Yes	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Deluxe
<b>Cable-satellite tv</b>	No	No	No
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Luxurious/expensive brands
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)
<b>Room service</b>	Breakfast only	Breakfast only	Breakfast only
<b>Sauna-SPA</b>	Yes	No	Yes
<b>Gym</b>	No	No	No
<b>Bar/restaurant</b>	No	No	No
<b>Summed pricing attribute</b>	€263	€201	€178
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Among these three, which is the best option? (I've grayed out any features that are the same, so you can just focus on the differences.)

(2 of 4)

<b>Number of rooms</b>	11-20	11-20	11-20
<b>Location</b>	Old town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	No	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Standard local brand	Luxurious/expensive brands
<b>Type of amenities</b>	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	Breakfast only	Breakfast only	Breakfast only
<b>Sauna-SPA</b>	Yes	Yes	No
<b>Gym</b>	No	Yes	No
<b>Bar/restaurant</b>	No	Yes	No
<b>Summed pricing attribute</b>	€233	€242	€198
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

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0%  100%

Among these three, which is the best option? (I've grayed out any features that are the same, so you can just focus on the differences.)

(3 of 4)

<b>Number of rooms</b>	11-20	11-20	11-20
<b>Location</b>	Old town	Old town	New town
<b>Sound proof windows</b>	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	No	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Standard	Deluxe
<b>Cable-satellite tv</b>	Yes	No	No
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Standard local brand	Luxurious/expensive brands	Standard local brand
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers
<b>Room service</b>	None	Breakfast only	Breakfast only
<b>Sauna-SPA</b>	Yes	Yes	No
<b>Gym</b>	No	No	No
<b>Bar/restaurant</b>	No	No	Yes
<b>Summed pricing attribute</b>	€177	€172	€137
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

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0%  100%

Among these three, which is the best option? (I've grayed out any features that are the same, so you can just focus on the differences.)

(4 of 4)

<b>Number of rooms</b>	21+	11-20	11-20
<b>Location</b>	Old town	Old town	Old town
<b>Sound proof windows</b>	Yes	Yes	Yes
<b>Room decoration</b>	Sophisticated design	Sophisticated design	Sophisticated design
<b>Jacuzzi</b>	Yes	Yes	Yes
<b>Quality of mattress/pillows</b>	Deluxe	Deluxe	Deluxe
<b>Cable-satellite tv</b>	No	No	Yes
<b>Safe locker</b>	Laptop size	Laptop size	Laptop size
<b>Bathroom amenities</b>	Luxurious/expensive brands	Luxurious/expensive brands	Standard local brand
<b>Type of amenities</b>	Standard (soap, shower gel, shampoo, conditioner, hair dryer)	Standard + Toothpaste/toothbrush, Make up cleansers, Shaving kit, Bathrobes, Slippers	Standard (soap, shower gel, shampoo, conditioner, hair dryer)
<b>Room service</b>	Breakfast only	Breakfast only	None
<b>Sauna-SPA</b>	Yes	Yes	Yes
<b>Gym</b>	No	No	No
<b>Bar/restaurant</b>	No	No	No
<b>Summed pricing attribute</b>	€263	€233	€177
	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

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The following demographic questions will be used only within the scope of the survey.

**Please provide your gender**

- Female
- Male

**Please provide your age**

- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+

**Please provide your country of residence**

**Please provide your monthly income (€/\$)**

- 0 – 500
- 501 – 1000
- 1.001-1.500
- 1.501-2.000
- 2.001-2.500
- 2.501– 3.000
- 3.001-3.500
- ≥ 3.501

**What is your education level?**

- Primary
- Secondary
- University
- Postgraduate
- Other

**What is your marital status?**

- Singled
- Married/ Long term relationship
- Divorced
- Widowed

**We want to check whether you are still reading the questionnaire. Please tick Disagree**

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

**How many children do you have?**

- 0
- 1
- 2
- 3
- 4 or more

**What is your occupational status?**

- Student
- Housework
- Employed
- Unemployed
- Self-employed
- Retired

0%  100%

## B. K-Means Coding

```
clc; clear all;
A=xlsread('Importances.xlsx');
[a,c]=kmeans(A,2,'distance','sqEuclidean');
[sil,h]=silhouette(A,a,'sqEuclidean');
mean(sil)

%Create Cluster Cell Arrays
%%Get the RESULTS
%Merge Index with Data
Merged=cat(2,a,A);
sz = size(Merged);
a_new=cast(unique(a),'uint8');
sz_ind=size(a,1);
no_of_clusters=size(unique(a_new),1);
disp('The number of clusters is:');
disp(no_of_clusters);

Ufirst = unique(Merged(:,1));
nval = length(Ufirst);
SeparatedData = cell(nval,1);
for K = 1:nval
    SeparatedData{K} =
Merged(Merged(:,1)==Ufirst(K),:);
end

for i=1:no_of_clusters
SeparatedData{i}(:,1)=[];
end
```

```
disp (SeparatedData) ;
```

```
%Demographic Analysis of clusters
```

```
demo=readtable ('demo.xlsx') ;
```

```
ClustInd=array2table (a) ;
```

```
ClustIndDemo=cat (2,ClustInd,demo) ;
```

```
DemoIDSorted=sortrows (ClustIndDemo) ;
```

### C. Tests of Between-Subjects Effects

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	NumberOfRooms	79,848 <sup>a</sup>	5	15,970	1,702	,135	,032
	Location	63,276 <sup>b</sup>	5	12,655	,634	,674	,012
	SoundProofWindows	60,512 <sup>c</sup>	5	12,102	,458	,808	,009
	RoomDecoration	15,581 <sup>d</sup>	5	3,116	,319	,902	,006
	Jacuzzi	237,336 <sup>e</sup>	5	47,467	4,624	,000	,082
	QualityOfMattressPillows	62,321 <sup>f</sup>	5	12,464	1,443	,209	,027
	CableSatTV	53,238 <sup>g</sup>	5	10,648	2,127	,063	,040
	SafeLocker	13,695 <sup>h</sup>	5	2,739	,546	,741	,010
	BathroomAmenities	6,793 <sup>i</sup>	5	1,359	,458	,807	,009
	TypeOfAmenities	11,864 <sup>j</sup>	5	2,373	,889	,489	,017
	RoomService	169,007 <sup>k</sup>	5	33,801	1,334	,250	,025
	SaunaSpa	324,461 <sup>l</sup>	5	64,892	4,718	,000	,084
	Gym	51,097 <sup>m</sup>	5	10,219	3,162	,009	,058
	BarRestaurant	99,453 <sup>n</sup>	5	19,891	,812	,542	,015
	SummedPricingAttribute	1316,932 <sup>o</sup>	5	263,386	,578	,717	,011
Intercept	NumberOfRooms	455,872	1	455,872	48,583	,000	,158
	Location	1043,339	1	1043,339	52,263	,000	,168
	SoundProofWindows	1230,123	1	1230,123	46,511	,000	,153

	RoomDecoration	412,299	1	412,299	42,144	,000	,140
	Jacuzzi	651,169	1	651,169	63,433	,000	,197
	QualityOfMattressPillows	622,811	1	622,811	72,092	,000	,218
	CableSatTV	240,376	1	240,376	48,010	,000	,157
	SafeLocker	170,905	1	170,905	34,091	,000	,117
	BathroomAmenities	147,681	1	147,681	49,802	,000	,162
	TypeOfAmenities	95,686	1	95,686	35,832	,000	,122
	RoomService	1824,408	1	1824,408	71,989	,000	,218
	SaunaSpa	946,862	1	946,862	68,846	,000	,211
	Gym	200,652	1	200,652	62,077	,000	,194
	BarRestaurant	1017,825	1	1017,825	41,537	,000	,139
	SummedPricingAttribute	55472,599	1	55472,599	121,745	,000	,321
Age	NumberOfRooms	79,848	5	15,970	1,702	,135	,032
	Location	63,276	5	12,655	,634	,674	,012
	SoundProofWindows	60,512	5	12,102	,458	,808	,009
	RoomDecoration	15,581	5	3,116	,319	,902	,006
	Jacuzzi	237,336	5	47,467	4,624	,000	,082
	QualityOfMattressPillows	62,321	5	12,464	1,443	,209	,027
	CableSatTV	53,238	5	10,648	2,127	,063	,040
	SafeLocker	13,695	5	2,739	,546	,741	,010
	BathroomAmenities	6,793	5	1,359	,458	,807	,009
	TypeOfAmenities	11,864	5	2,373	,889	,489	,017
	RoomService	169,007	5	33,801	1,334	,250	,025
	SaunaSpa	324,461	5	64,892	4,718	,000	,084
	Gym	51,097	5	10,219	3,162	,009	,058
	BarRestaurant	99,453	5	19,891	,812	,542	,015
	SummedPricingAttribute	1316,932	5	263,386	,578	,717	,011
Error	NumberOfRooms	2420,914	258	9,383			
	Location	5150,489	258	19,963			
	SoundProofWindows	6823,549	258	26,448			
	RoomDecoration	2524,021	258	9,783			
	Jacuzzi	2648,503	258	10,266			
	QualityOfMattressPillows	2228,891	258	8,639			
	CableSatTV	1291,743	258	5,007			
	SafeLocker	1293,394	258	5,013			
	BathroomAmenities	765,071	258	2,965			
	TypeOfAmenities	688,969	258	2,670			
	RoomService	6538,450	258	25,343			
	SaunaSpa	3548,382	258	13,753			
	Gym	833,931	258	3,232			

	BarRestaurant	6322,086	258	24,504			
	SummedPricingAttribute	117556,828	258	455,647			
Total	NumberOfRooms	6627,585	264				
	Location	15027,535	264				
	SoundProofWindows	20365,510	264				
	RoomDecoration	5405,695	264				
	Jacuzzi	5718,711	264				
	QualityOfMattressPillows	5919,872	264				
	CableSatTV	3221,210	264				
	SafeLocker	2849,784	264				
	BathroomAmenities	1890,800	264				
	TypeOfAmenities	1826,605	264				
	RoomService	24936,203	264				
	SaunaSpa	7542,697	264				
	Gym	2136,041	264				
	BarRestaurant	14762,168	264				
	SummedPricingAttribute	618028,273	264				
Corrected Total	NumberOfRooms	2500,762	263				
	Location	5213,765	263				
	SoundProofWindows	6884,061	263				
	RoomDecoration	2539,602	263				
	Jacuzzi	2885,839	263				
	QualityOfMattressPillows	2291,211	263				
	CableSatTV	1344,980	263				
	SafeLocker	1307,089	263				
	BathroomAmenities	771,865	263				
	TypeOfAmenities	700,833	263				
	RoomService	6707,457	263				
	SaunaSpa	3872,842	263				
	Gym	885,029	263				
	BarRestaurant	6421,540	263				
	SummedPricingAttribute	118873,760	263				

- a. R Squared = ,032 (Adjusted R Squared = ,013)
- b. R Squared = ,012 (Adjusted R Squared = -,007)
- c. R Squared = ,009 (Adjusted R Squared = -,010)
- d. R Squared = ,006 (Adjusted R Squared = -,013)
- e. R Squared = ,082 (Adjusted R Squared = ,064)
- f. R Squared = ,027 (Adjusted R Squared = ,008)
- g. R Squared = ,040 (Adjusted R Squared = ,021)
- h. R Squared = ,010 (Adjusted R Squared = -,009)
- i. R Squared = ,009 (Adjusted R Squared = -,010)

- j. R Squared = ,017 (Adjusted R Squared = -,002)
- k. R Squared = ,025 (Adjusted R Squared = ,006)
- l. R Squared = ,084 (Adjusted R Squared = ,066)
- m. R Squared = ,058 (Adjusted R Squared = ,039)
- n. R Squared = ,015 (Adjusted R Squared = -,004)
- o. R Squared = ,011 (Adjusted R Squared = -,008)

Age	NumberOfRooms	79,848	5	15,970	1,702	,135	,032
	Location	63,276	5	12,655	,634	,674	,012
	SoundProofWindows	60,512	5	12,102	,458	,808	,009
	RoomDecoration	15,581	5	3,116	,319	,902	,006
	Jacuzzi	237,336	5	47,467	4,624	,000	,082
	QualityOfMatressPillows	62,321	5	12,464	1,443	,209	,027
	CableSatTV	53,238	5	10,648	2,127	,063	,040
	SafeLocker	13,695	5	2,739	,546	,741	,010
	BathroomAmenities	6,793	5	1,359	,458	,807	,009
	TypeOfAmenities	11,864	5	2,373	,889	,489	,017
	RoomService	169,007	5	33,801	1,334	,250	,025
	SaunaSpa	324,461	5	64,892	4,718	,000	,084
	Gym	51,097	5	10,219	3,162	,009	,058
	BarRestaurant	99,453	5	19,891	,812	,542	,015
	SummedPricingAttribute	1316,932	5	263,386	,578	,717	,011