



GROUPING THE TOUR PACKAGES SERVICES OF HOTEL CHAINS APPLYING THE GALOIS LATTICES

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ABSTRACT

The aim of this work is to find what services could be offered through hotel establishments to determined collectives of customers. In order to do this, we have studied the current situation with the report of hotels established by official category from one to five stars for the last five years in Spain (2007-2012). Second, we analyzed different typologies of customers with characteristics and different travel motivations who are staying in hotels in order to take into account of the creation of new facilities and services. Third, with the application of the Theory of Affinities, through the Galois Lattices, be establishing what services or elements can be accompanied between one to another in order to achieve the generation of groupings of new tourist packages between different services and facilities offered by a hotel that result more attractive respect to the competition. Finally, this study has been possible because of the approach of the Galois Lattices that allows an overall vision for effective decision making. Thus, it is possible to find structure for types of customers could be attracted by the hotels in terms of the facilities or services which are offered to the companies.

Keywords: Hotels, tour packages, Decision making, Theory of affinities, Galois lattices

INTRODUCTION

The change in the global economic environment, the ease of moving place by different transports, the evolution of new technologies, knowledge of multi-cultural countries, which are factors that drive citizens engaged in travel. The people decide when to visit a city or country for leisure, business, vacations, personal pleasure, in short or long terms, as well as the conditions to stay. The hotels compete for money by offering differentiated quality and adequate price (Daniel Gat, 1998),

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since one of the main objectives is to attract and retain clients. The International Dictionary of Tourism that developed the International Academy of Tourism (1961) defines it as “an establishment where travelers can stay, and also, feed and have fun in the course of their travel by retribution. The hotels are classified into different categories according to their degree of luxury or comfort” (Lanquar, 2001). The hotel industry is one of the most important factors of the tourism industry in today’s world, since it generates a wide range of business activities such as accommodations, travel agencies, transports and restaurants, etc. Spain is one of the best-known tourist destinations in the world, which received a total of 56.7 million international tourists in 2011 and showed a favorable evolution grown by 7.6% more compared to the year 2010. Total expenditure realised by tourists increased by 7.9%, which resulted in an increase of the average expenditure per person (Instituto de Estudios Turísticos, 2011). According to these data, it is supposed the quantity of inputs of tourists or international visitors have used some different types of accommodation in order to stay overnight during their stays in cities or some places of Spain.

There are various types of hotels with the official category of one to five stars such as business hotels, spa hotels and apartment hotel, etc., which tend to provision specific markets (Likorish and Jenkins, 2010) and create different strategies in order to offer their own products and services that may interest to the hosting clients. However, not all hotels offer the same products and services, such as not the same tourist packages having specified characteristics of each hotel according to located area. For this reason the hotels are increasingly more and more the marketing as the engine of generation of profits and competitive advantages. According to Arcarons (2000), the success or failure of the companies depend on multiple factors such as the price, the location, the appearance, a good service, the type of establishment and varieties, among others. In this context, we analyze the types of resources, products and services that can create the hotels for clients in order to produce profits and generate competitive advantages in comparison with the competition. Also, the hotels can collaborate with the travel agencies and trading companies, such as tour operators, in order to create new complementary products for the offers and the promotions. Therefore, the aim of this study is to determine to what extent the hotels can strategically specialize in offer from the point of view of determined resources, products and services. In this case, we spotlight the grouping basing on own resources and products that have a hotel in order to create different types of appropriated tourist packages to the clients. To do so, we present a mathematical procedure which is based on the Theory of Affinities. This model helps us to group (Gil Aluja et al. 2011) each components of resources, products and services to create new packages, as well as to know what types of product packages can be attractive and appropriate to each different types of clients or guests in order to offer and promote it by they use or buy with satisfactions.

CURRENT STATUS OF HOTELS IN SPAIN

In Spain, the hotel industry has developed greatly last 15 years and the hotel plant has experienced a remarkable increase of quality in services and facilities. There are multiple types of hotels (tourist hotels, city hotels and boutique hotels, etc.) by category located in all parts of the Peninsula due to the existence of an extensive coastline, rural areas, mountains and the Balearic and the Canary Islands. The hotels have been increasing and diversifying more and more its facilities, which increased naturally the number of the places and the personnel occupancy. In the Table-1, we show clearly the growth and the evolution of establishments, places, occupancy rate and personal occupied in hotels during last 5 years (2007-2011) in Spain.

Table 1: Evolution of numbers of established, places, occupancy rate and personal occupied of hotels in Spain (2007-2011)

Year 2007-2011	Number of establishments*					Number of places*					Occupancy rate by places					Personal occupied*				
	year					year					year					year				
	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007	2011	2010	2009	2008	2007
Category																				
Five	251	238	222	208	188	81.375	79.647	75.214	69.467	64.684	52,47	48,37	43,62	46,62	49,36	23.408	22.809	21.493	22.623	21.452
Four	1.929	1.830	1.719	1.617	1.511	571.746	547.332	518.736	495.361	466.197	60,34	57,25	55,08	59,05	61,52	87.183	83.606	81.169	86.017	85.136
Three	2.515	2.466	2.397	2.342	2.268	426.629	424.473	418.023	419.039	417.870	60,66	57,84	56,78	60,82	63,26	51.752	52.048	53.033	56.655	57.083
Two	1.890	1.860	1.849	1.830	1.777	117.721	116.036	116.382	118.308	115.457	41,00	40,97	40,06	46,33	49,03	10.989	11.139	11.307	12.679	12.888
One	1.189	1.194	1.203	1.189	1.161	51.049	52.080	52.100	52.097	51.569	32,20	32,51	31,72	37,32	39,99	4.497	4.566	4.604	5.087	5.406
Total	7.774	7.588	7.390	7.186	6.905	1.248.520	1.219.568	1.180.455	1.154.272	1.115.777	49,33	47,38	45,45	50,02	52,63	177.829	174.168	171.606	183.061	181.965

* Annual average

Source: own elaboration, based on National Statistics Institute (INE)

In respect to motivation of the trip, the bulk of tourist arrivals have as main destination is for the leisure, recreations and vacations, such as the countryside and beach, cultural and sports tourism, among other types of leisure (Familiar³, 2011). It's worth pointing out the report of Frontur y Egatur⁴ (Instituto de Estudios Turísticos, 2011) in the year 2011 this collective accounted for 84.3% of arrivals and increased by 9.8%, after several consecutive years of increases, which were interrupted in 2008 and 2009. This favorable evolution has led to the leisure to gain ground to other

³ FAMILITUR is the statistical operation of the IET which collects data relating to travel that realize to the residents in Spain.

⁴ FRONTUR is the statistical operation of the IET which collects data concerning the entry into Spain of non-resident visitors in Spain. EGATUR is the statistical operation of the EIT which collects data relating to expenditure that realize to non-resident visitors in Spain.

reasons for the trip as the business and the personal situations. The business tourism has a weight of 7.2% and this travel motivation has lost weight in recent years. Personal reasons (family, health and shopping visit) encompass to 4.8% of arrivals. The tourists that traveling to Spain for these reasons have lost nearly two points percentage of weight in the last five years, accumulating important declines along this period. Finally, "other reasons" such as religious have evolved favorably with weighing close to 2%.

Respect to the procurement, the tourists within Spain acquired a package tour by staying mainly in hotels since this type of products includes, in the majority of cases, the accommodation service. All these reports help to learn about the current situation and the tendency of tourists who stay in hotels, with which we could take into account a strategic plan in order to commercialize to attract the different collectives giving satisfaction to their stay.

MARKETING FOR THE HOTEL COMPANIES

The success in the marketing of hospitality depends much of travel sector as a whole, since many clients of hotels buy tour packages that have designed by wholesalers and sold through the travel agencies. By agreeing to participate in packages prepared by wholesalers, the hotels bypass effectively to its competitors (Kotler et al. 2004). Arcarons, (2000) reveals that marketing is a set of activities that are aimed at satisfaction of the needs of consumers through an exchange. The purpose of marketing is to contribute to the relationship between consumers and companies achieve the maximum efficiency and satisfaction. The fundamental objective of tourism marketing has to be the satisfaction of the needs of the tourist through knowledge of their motivations and behavior, in such a way that it generates a profit for the organization that produces it (UNWTO, 1998). For Buzzelli (1994), the objective of all marketing action is the conquest of the potential buyer of a product or potential user of a service, configuring this to a consumer and acting in order to turn it into a client. The marketing exists due to the existence of goods and services to satisfy on the basis of supply and demand (Buzzelli, 1994). Although the hotel marketing is relatively new, the increase in competition obliges these companies to focus on the satisfaction of its clients and its employees through the application with success of the basic principles of marketing (González and Talón, 2003). However, there is no single model of business organization that is valid for all tourism companies (Arcarons, 2000), but that this varies depending on types of activities, the size, structure and approaches, and policy of the marketing of the company. Today's customers can check the booking through the internet thanks to the appearance and development of the CRS (Computerized Reservation System) in order to easily manage access to these personal behaviors. In general, the tourists or guests choose the hotels according to the location, the price, the quality of facilities, the images of rooms categorized, the types of services offered, recommendations of persons and travel agencies, etc. Buzzelli, (1994) reveals the combination with other three essential elements such as price, promotion, advertising and distribution so that the product is a good

tangible and is a successful product, exploration and segmentation of the market. These are the four variables called marketing mix, which product is the dynamic element that is positioned above the other.

Products of the tour packages and services of the hotel companies

A product is anything that can be offered to satisfy a need or a desire. However, the product concept is not limited to physical objects, but also includes the experiences, peoples, places, organizations, information and ideas (Kotler et al. 2004). There can be exists various tourism products within a same tourist destination and even within the same hotel, such as the meetings of congress, music festivals, play golf, etc. As well as the hotels offer the complementary products to catering and accommodation such as nightclubs, music halls, dancing, night clubs, mobile discos, road clubs, etc. (Lanquar, 2001). In addition, the hotels own or manage secondary establishments within the hotel, such as restaurants, shops and beauty salons, fitness centers and nightclubs (Kotler *et al.*, 2004).

We understand the definition of a package as the sale of one or more different products in a complete block. According to Middleton (1990), defines the product packages as “standardized repeatable offers comprising two or more elements of transport, accommodation, food, destination attractions, other facilities, and services (such as travel insurance). Product packages are marketed to the general public, described in print or other media, and offered for sale to prospective customers at a published, inclusive price, in which the costs of the product components cannot be separately identified”. For Serra (2002) is a combination of individual elements of the total tourism product, marketed under a brand denominated and offered to the consumer at a single price that includes all of the various services components. The companies have to invent new services and modify some of those who provide, so the ability is a value of upswing (Blasco, 2002). The hotels have to adapt current customers preferences in order to create new products and services, wherewith be able to do combine the products offered by the intermediary companies (tour operators) to implement a diversification strategy in order to have new opportunities to increase the profitability. In this sense, González and Talón, (2003) considered two options to obtain a new product: develop in own company (original products, improvements or modifications to existing ones or generation of new brands) and acquire some that already exist. The main aim of creating new products is to achieve maximum customer satisfaction that they enjoy with stability during their stay. As we propose the types of clients and the services of the hotels based on previous studies must be offered individually and complementary to customers so that the hotels can create new types of tourism products appropriate to the different types of customers. Thus, the customers may have interest in choosing a hotel to stay and take advantage of different products and services or tour packages offered tour packages.

Next, we classify the types of clients and travel motivations based on previous studies.

–Classification of *Types of customers and travel motivations*

- Type *Family*: These are families with an economic level middle/high and with one or two children.
- Type *Marriages and Couples*: People of marriages and couples both religious and also civilian have been increasing more and more.
- Type *3rd Age and Retirees*: It is a segment that is predisposed to travel in low season and tends to consider tourism activities as a necessity rather than a luxury.
- Type *Business and Congress*: These types of travel have grown considerably in recent decades due to the globalization of the economy. It can include two subtypes according to the activities: commercial and professional.
- Type *Children (school) and Young people*: Visitors in groups of young people for educational or playful reasons, such as travel of weekend courses or stays to learning languages.
- Type *Sports and Adventure*: Tourists who make a journey due to the practice of sports such as cycling, golf, mountaineering, water activities and skiing, surfing, sail boarding, flight, ballooning, parachuting, snowmobile rides, horseback riding, mountain biking, off-road driving, etc. (Buckley, 2007). The types of adventures are about the people with high activity dose, with much experience of traveling and symbolic needs.
- Type *Cultural and Religious*: These are people who travel to know different cultures and heritage visits of each region. As well as, this type of tourism is the most specialized from the point of view of the destinations and their specificity.

Continually, we propose the types of services offered by hotels. In this case, taking into account the products and services offered by a hotel depend on the category and size of hotels, as well as collaborate with intermediary companies (travel agencies).

–Classification of *Types of services offered by hotels*

Spa, Day nurse, Sports, Massage, Dance classes, Excursions, Cultural tours, City tours, Clubs, Casino, Music Halls, Shows, Car rental

METODOLOGY

In order to realize the classification process obtaining homogeneous groupings at a determined level, apply certain mathematical tools of topology (Klimova, 2009). Then, in order to understand the grouping (Gil Aluja, 1999), we briefly describe of the theory of affinities (Kaufmann and Gil Aluja, 1991).

The theory of affinities

The attempt to generate the concept of similarity in order to be able to address the treatment of relationships represented by rectangular matrices was developed by two professors Jaime Gil Aluja and Arnold Kaufmann in 1991. The result in these works resulted in a “Theory of Affinities” and so the word of affinity in the sense proposed stems from a paper presented at the *IX European Congress of Operations Research* (Gil Aluja, 1999). According to Gil Aluja (1999), defined the affinities as “those homogeneous groupings occurring at certain levels, and structured in an ordered manner, that link the elements of two distinctive sets, related by the essence of the phenomena that they represent” (Gil Aluja, 1999; Kaufmann and Gil Aluja, 1991). It is possible to observe the existence of three aspects configurable of the concept of affinities. The first one refers to the fact of which the homogeneity of each group is linked to the level chosen. According to the exigency of each characteristic (elements of one of the sets) a level will be assigned more or less high definer of the threshold from which homogeneity exists. The second expresses the need that the elements of each of the sets are linked together by certain rules of nature in some cases, or by human will on others. The third requires the construction of a structure constituting a certain order that allows the subsequent decision to be taken (Gil Aluja, 1999). In addition, you can find new solutions to this problem in extensive previous works such as financial analysis (Gil Lafuente, A.M., 2001), organizational management and business management (Gil Lafuente, 2001; Gil Aluja et al. 2011), as well as the sports management (Gil Lafuente, 2002).

Galois lattices

The maximum relationships of a vulgar relationship $R \subset E_1 \times E_2$ form between each other of Galois lattice (Barbut and Monjardet, 1970), if is added $\emptyset \times E_1$ and $E_2 \times \emptyset$ (Klimova, 2009). It considers the relationship of the order:

$$\forall X, X' \in E_1, \forall Y, Y' \in E_2:$$

$$(X, Y \leq (X', Y')) \Leftrightarrow (X \subset X', Y \supset Y')$$

Take the extreme superior ∇ of reticulum the relationship of previous order. In the same way, it is considered that the order relationship:

$$\forall X, X' \in E_1, \forall Y, Y' \in E_2:$$

$$(X, Y \leq (X', Y')) \Leftrightarrow (X \supset X', Y \subset Y')$$

It is associated to the lower extreme Δ of the same reticulum (the relationship of complementary order. In this case, we will consider that the symbols Δ and ∇ are not operators, but that represent the extremes or limits (Gil Aluja, 1999).

In a Galois lattice, if is done:

$$(U, V) = (X, Y) \nabla (X^{\wedge}, Y^{\wedge}) \\ \Rightarrow (U \supset X \cup X^{\wedge} \text{ and } V \subset Y \cap Y^{\wedge})$$

The same happens if is done:

$$(Z, T) = (X, Y) \Delta (X^{\wedge}, Y^{\wedge}) \\ \Rightarrow (Z \subset X \cap X^{\wedge} \text{ and } T \supset Y \cup Y^{\wedge})$$

If is fixed in conditions of the ordered relationship, it can be seen that the maximum sub-relations that have the figuration of a Galois lattice and the maximum sub-relations of similarity also have this configuration, even though this configuration result a trivial (in the partial order of the reticulum, they are not ordered among themselves, but only in relation to the extremes ∇ and Δ). In the treatment of subjectivity there are many problems in which the questions are raised through more diverse types of the relationships and sub-relations which exist in the sets: populations, financial placements, activities, selection of investment, security zones, distributions administrative, groupings by regions, etc. (Kaufmann and Gil Aluja, 1992).

Application of the algorithm to obtain the affinities of tour packages based on products and services offered by the hotel

In order to apply the model, we denominate “Types of Customers and Travel Motivations” by E_1

and “Types of Services offered by Hotels” by E_2 . We expose in the following Table 2.

$$E_1 = \{a, b, c, d, e, f, g\}$$

$$E_2 = \{A, B, C, D, E, F, G, H, I, J, K, L, M\}$$

Table 2: Types of customers and travel motivations (E_1) and Types of services offered by hotels

(E_2)

E_1	Customers and travel motivations
<i>a</i>	Family
<i>b</i>	Couples and Marriages
<i>c</i>	3rd Age and Retirees
<i>d</i>	Business and Congress
<i>e</i>	Children (school) and Young people
<i>f</i>	Sports and Aventure
<i>g</i>	Cultural and Religious

E_2	Services offered by hotels
A	Spa
B	Day nursey
C	Sports
D	Massage
E	Dance classes
F	Excursions
G	Cultural tours
H	City tours
I	Clubs
J	Casino
K	Music Halls
L	Shows
M	Car rental

In the following *Matrix 1*, we show the result of valuations of distances elaborated.

Matrix 1: Valuations between *Types of customers and travel motivations* (E_1) and *Types of Services offered by hotels* (E_2)

		Spa	Day nursey	Sports	Massage	Dance classes	Excursions	Cultural tours	City tours	Clubs	Casino	Music Halls	Shows	Car rental
		A	B	C	D	E	F	G	H	I	J	K	L	M
Family	<i>a</i>	0.8	1	0.7	0.2	0.4	0.8	0.8	1	0	0	0.7	0.9	0.9
Couples and Marriages	<i>b</i>	0.7	0.1	0.6	0.9	0.7	0.6	0.5	1	0.9	0.8	0.5	0.5	0.8
3rd Age and Retirees	<i>c</i>	0.1	0.1	0.1	0.8	0.1	0.7	0.5	0.9	0	0.4	0.7	0.4	0.1
Business and Congress	<i>d</i>	0.5	0	0.5	0.8	0	0	0	0.1	0	0.5	0	0	0.7
Children (school) and Young people	<i>e</i>	0	0	0.7	0.1	0.3	1	0.8	1	0.1	0	0.5	0.9	0.7
Sports and Aventure	<i>f</i>	1	0	1	0.7	0.3	0.2	0	0.3	0	0	0	0.2	0.6
Cultural and Religious	<i>g</i>	0.8	0	0	0.6	0	0.1	1	0.7	0	0	0.6	0.1	0.1

For each elements of the set E_2 are established θ_i levels. It is considered to the homogeneity existing for the grouping. Therefore, we obtain the corresponding Boolean matrix considering the corresponding threshold of each column to the level of:

$$\theta_A = 0.5 \quad , \quad \theta_B = 0.9 \quad , \quad \theta_C = 0.7 \quad , \quad \theta_D = 0.8 \quad , \quad \theta_E = 0.5 \quad , \quad \theta_F = 0.7 \quad , \quad \theta_G = 0.6$$

$$\theta_H = 0.8 \quad , \quad \theta_I = 0.6 \quad , \quad \theta_J = 0.6 \quad , \quad \theta_K = 0.6 \quad , \quad \theta_L = 0.7 \quad , \quad \theta_M = 0.7$$

With this be obtained a new Boolean matrix (*Matrix 2*) in which the cells will contain only one or zero.

Matrix 2: Valuation of the Boolean matrix

		Spa	Day nursey	Sports	Massage	Dance classes	Excursions	Cultural tours	City tours	Clubs	Casino	Music Halls	Shows	Car rental
		A	B	C	D	E	F	G	H	I	J	K	L	M
Family	<i>a</i>	1	1	1			1	1	1			1	1	1
Couples and Marriages	<i>b</i>	1			1	1			1	1	1			1
3rd Age and Retirees	<i>c</i>				1		1		1			1		
Business and Congress	<i>d</i>	1			1									1
Children (school) and Young people	<i>e</i>			1			1	1	1				1	1
Sports and Aventure	<i>f</i>	1		1										
Cultural and Religious	<i>g</i>	1						1				1		

It is realized the sum of products and services for each row:

- 1) The set with the number of elements is the qualities, characteristics and singularities.

$\{ a, b, c, d, e, f, g \}$

- 2) The “power set” is:

$\{ \emptyset, a, b, c, d, e, f, g, ab, ac, ad, ae, af, ag, bc, bd, be, bf, bg, cd, ce, cf, cg, de, df, dg, ef, eg, fg, abc, abd, abe, abf, abg, acd, ace, acf, acg, ade, adf, adg, aef, aeg, afg, bcd, bce, bcf, bcd, bde, bdf, bdg, bef, beg, bfg, cde, cdf, cdg, cef, ceg, cfg, def, deg, dfg, efg, abcd, abce, abcf, abcg, abde, abdf, abd, abef, abeg, abfg, acde, acdf, acdg, acef, aceg, adef, adeg, aefg, bcde, bcdf, bcdg, bcef, bceg, bdef, bdeg, befg, cdef, cdeg, defg, abcde, abcdf, abcdg, acdef, acdeg, acefg, bcdef, bcdeg, bdefg, cdefg, abcdef, abcdeg, abcefg, abdefg, acdefg, bcdefg, abcdefg \}$

The “power set” understands all possible combinations of qualities, characteristics and singularities of the combination of the seven elements. In our case, there have been 110 combinations. Combinations of “power set”:

\emptyset	\rightarrow	E_1	acg	\rightarrow	K	$abfg$	\rightarrow	\emptyset
a	\rightarrow	$BCFGHKLM$	ade	\rightarrow	M	$acde$	\rightarrow	\emptyset
b	\rightarrow	$DHLJM$	adf	\rightarrow	\emptyset	$acdf$	\rightarrow	\emptyset
c	\rightarrow	$DEFHK$	adg	\rightarrow	\emptyset	$acdg$	\rightarrow	\emptyset
d	\rightarrow	AD	aef	\rightarrow	C	$acef$	\rightarrow	\emptyset
e	\rightarrow	$CFGHLM$	aeg	\rightarrow	G	$adef$	\rightarrow	\emptyset
f	\rightarrow	AC	afe	\rightarrow	\emptyset	ade	\rightarrow	\emptyset
g	\rightarrow	AGK	bcd	\rightarrow	D	ae	\rightarrow	\emptyset
ab	\rightarrow	HM	bce	\rightarrow	H	$bcde$	\rightarrow	\emptyset
ac	\rightarrow	FHK	bcf	\rightarrow	\emptyset	$bcdf$	\rightarrow	\emptyset
ad	\rightarrow	\emptyset	bce	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
ae	\rightarrow	$CFGHLM$	bce	\rightarrow	\emptyset	$bcdf$	\rightarrow	\emptyset
af	\rightarrow	HM	bde	\rightarrow	\emptyset	bce	\rightarrow	\emptyset
ag	\rightarrow	GK	bde	\rightarrow	\emptyset	$bceg$	\rightarrow	\emptyset
bc	\rightarrow	DH	bdf	\rightarrow	\emptyset	$bdef$	\rightarrow	\emptyset
bd	\rightarrow	DM	bdf	\rightarrow	\emptyset	$bdeg$	\rightarrow	\emptyset
be	\rightarrow	HM	bfg	\rightarrow	\emptyset	bef	\rightarrow	\emptyset
bf	\rightarrow	\emptyset	bfg	\rightarrow	\emptyset	cd	\rightarrow	\emptyset
bg	\rightarrow	\emptyset	bfg	\rightarrow	\emptyset	cd	\rightarrow	\emptyset
cd	\rightarrow	D	bfg	\rightarrow	\emptyset	cd	\rightarrow	\emptyset
ce	\rightarrow	FH	bfg	\rightarrow	\emptyset	cd	\rightarrow	\emptyset
cf	\rightarrow	\emptyset	cdg	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
cg	\rightarrow	K	cdg	\rightarrow	\emptyset	$abcdf$	\rightarrow	\emptyset
de	\rightarrow	M	ceg	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
df	\rightarrow	A	ceg	\rightarrow	\emptyset	$abcdf$	\rightarrow	\emptyset
dg	\rightarrow	AK	cef	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
ef	\rightarrow	C	cef	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
eg	\rightarrow	G	def	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
fg	\rightarrow	A	def	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
abc	\rightarrow	H	deg	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
abd	\rightarrow	\emptyset	deg	\rightarrow	\emptyset	$abcde$	\rightarrow	\emptyset
abe	\rightarrow	HM	dfe	\rightarrow	A	$bcde$	\rightarrow	\emptyset
abf	\rightarrow	\emptyset	dfe	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
abg	\rightarrow	\emptyset	dfe	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
acd	\rightarrow	\emptyset	dfe	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
ace	\rightarrow	FH	dfe	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
acf	\rightarrow	\emptyset	dfe	\rightarrow	\emptyset	$bcde$	\rightarrow	\emptyset
			$abed$	\rightarrow	\emptyset	E_2		

With which, we show in Figure 1 the formation of the corresponding Galois lattices:

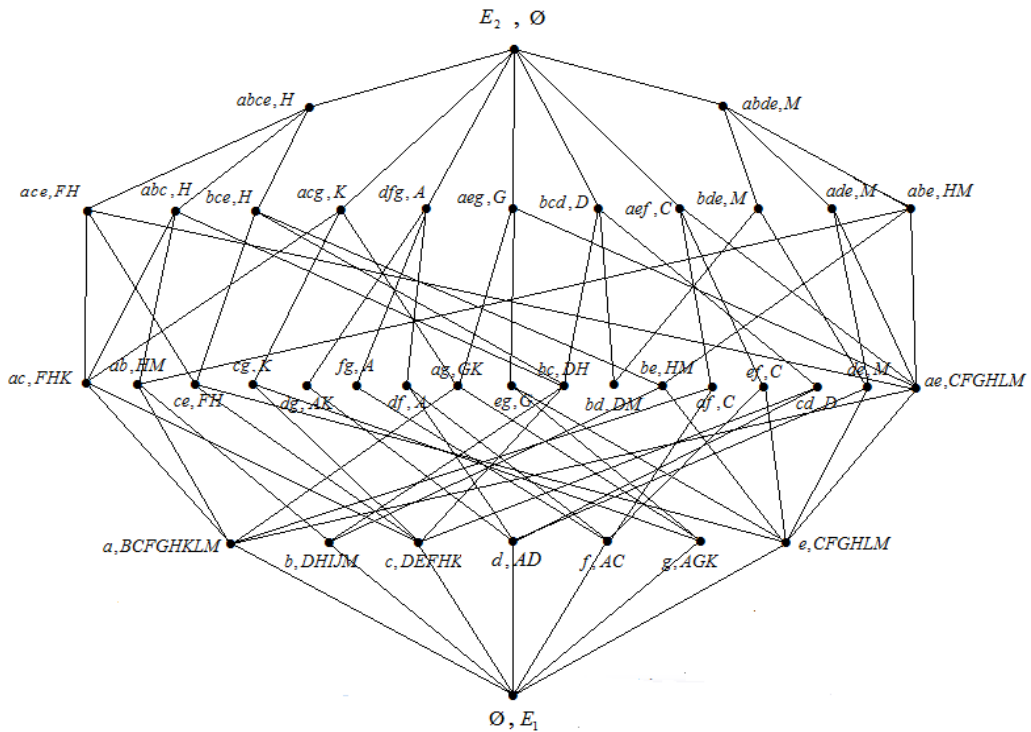


Figure 1: Galois lattices

This Galois lattices shows visually structured of the elements (types of clients and services offered) united of groups conserving the homogeneity to the desired levels. Through this study, can be found the relationship of affinity between the clients types $\{abce\}$ and $\{abde\}$, which groups corresponds to the service H (City tours) and M (Car rental). The Galois lattice presents all the possible range of possible alternatives, taking into account the minimum levels required, which constitutes the essential information for the adoption of decision-making. In addition, it reveals on a structured the existing affinities between different collectives in relation to compliance with the same grades. As well as, it allows to take decisions so that the characteristics that are considered priority in every moment.

CONCLUSIONS

One of the fundamental questions for the good management of a hotel establishment is the possibility to offer to different collectives a series of common services. In this sense, the proposal realized for the grouping of services through the use of the Galois lattices allows to improve the methodologies used until now in all studies. Firstly, this approach allows segmenting the susceptible collectives to be customers of a hotel establishment to reason of its facilities and services offered and, secondly, to design service packages by the hotel establishment to profitable its facilities as long as possible. All this is possible thanks to the approach of the Galois lattices that establishes mechanisms to adapt to the levels of demand in each situation and to redesign trade policy according to the variables that the environment imposes on an ongoing basis.

REFERENCES

- Arcarons, S. R. (2000). Administración, gestión y comercialización en la pequeña empresahostelera, Editorial Síntesis.
- Barbut, M. and B. Monjardet (1970). Ordre et classification. Algèbre el combinatoire, Francia: Hachette, Vol. II
- Blasco, P. A. (2002). La empresa y el producto turístico. Biblioteca Civitas Economía y Empresa, CivitasEdiciones.
- Buckley, R. (2007). Adventure tourism products: Price, duration, size, skill, remoteness. *Tourism Management*, Vol. 28, pp. 1428–1433
- Buzzelli, G. E. (1994). Manual de la industria hotelera: la gestión del hotel, Editorial Ceac.
- Familitur (2011). Annual Report 2011. Instituto de Estudios Turísticos. Encuesta de movimientos turísticos de los Españoles. (in Spanish). www.iet.tourspain.es/
- Frontur Edgatur (2011). Annual Report 2011. Instituto de Estudios Turísticos. Survey of tourist movements at borders (Frontur) and Tourism expenditure survey (Egatur). (in Spanish). www.iet.tourspain.es/

- Gat, D. (1998). Toward a theory of the intraurban market for Hotel Services. *Journal of Real Estate Finance and Economics*, Vol. 17, No. 2, pp. 199-211.
- Gil Aluja, J. (1999). Elementos para una teoría de la decisión en la incertidumbre, Editorial Milladoiro: Vigo.
- Gil Aluja, J. A. M Gil Lafuente and J. M Merigó (2011). Using homogeneous groupings in portfolio management. *Expert Systems with Applications*, Vol. 38, pp. 10950-10958
- Gil Lafuente, A. M. (2001). Nuevas estrategias para el análisis financiero en la gestión de empresas, Ariel Economía: Barcelona.
- Gil Lafuente, J. (2001). Algoritmos para la excelencia: Claves para el éxito en la gestión deportiva, Editorial Milladoiro: Vigo.
- González, L. and P. Talón (2003). Dirección hotelera: Operaciones y procesos, Editorial Síntesis: Madrid.
- INE (2012). Surveys of hotel occupancy. Prepared by Instituto Nacional de Estadística. <http://www.ine.es/jaxi/menu.do?type=pcaxis&path=%2Ft11%2Fe162eoh&file=inebase&L=0> Accessed 12 February 2013
- Kaufmann, A and J. Gil Aluja (1991). Selection of affinities by means of fuzzy relations and Galois lattices. Actas del Euro XI Congress O.R. Aachen, 16-19 June.
- Kaufmann, A and J. Gil Aluja (1992). Técnicas de gestión de empresa: Previsiones, Decisiones y Estrategias, Ediciones Pirámide: Madrid.
- Klimova, A. (2009). Agrupaciones económicas de las regiones de la Federación Rusa mediante métodos matemáticos en condiciones de incertidumbre, Ph.D. Thesis, University of Barcelona, Spain.
- Kotler, P., J. Bowen and J. Makens (2004). Marketing for tourism, Third Edition, Pearson Prentice Hall.
- Lanquar, R. (2001). Marketing Turístico: de lo global a lo local, Editorial Ariel.
- Likorish, L. and C. Jenkins (2010). Una introducción al turismo, Editorial Síntesis.
- Middleton, V. (1990). Marketing in Travel and Tourism. 3rd Edition, Butterworth-Heinemann: Oxford.
- Serra, A. (2002). Marketing Turístico, Pirámide: Madrid.
- UNWTO (1998). Introduction to tourism. *World Tourism Organization*. (in spanish).