THE VALUE OF *e* - CUSTOMER SATISFACTION TO INTERNET COMPANIES

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ABSTRACT

The objective of the present work is to analyse Internet-based Company customer satisfaction with the purpose of incorporating a measurement of this intangible asset to the value of the company. This analysis begins with the relation of attributes of greater presence or importance in the generation of satisfaction for the average customer. A fuzzy treatment to the assigned valuations of importance for a concrete list of attributes in a selected company is applied, with the purpose of determining the value of the competitive advantages of this company with respect to other companies of similar activity.

KEY WORDS

Economics; Client Satisfaction ; FuzzyNumbers.

JEL CLASSIFICATIONS

M3 - Marketing and Advertising

1.- INTRODUCTION

For an Internet-based company, the fact that the innovation, and in short, the development process of a new product somehow guarantees the values and attributes of satisfaction required by *e*-customers is of great importance. Under this perspective, it is considered that the customer's satisfaction is a fundamental intangible asset in the valuation, which can be carried out by an Internet-based company. Therefore the greater satisfaction generated in the customer, the greater the managerial value.

The starting point for the evaluation of this intangible asset will be to discover what the characteristics of an Internet-based product or service offered are which satisfy the customer. This will imply a process of identification of attributes concerning the product or service, which allows us to discover the reason why, in what form and to what extent they satisfy the customer who carries out a purchase. Therefore, it is a question of knowing the motivational forces that correspond to each attribute in the decision of the customer's purchase, and the level of their presence.

Once the attributes that have a greater influence on the customer's decision as generators of satisfaction at the time of purchase have been determined, we will proceed with the *fuzzy* treatment, in which, starting from *fuzzy* intervals, we establish a valuation of the competitive priority of a selected company regarding its competitors.

2.- THE CUSTOMER´S SATISFACTION OF AN INTERNET-BASED COMPANY.

It is considered that a customer is satisfied with a product or with the benefit of a service when his /her necessities have been perfectly covered and the obtained results of the purchase overcome his/her expectancies [*Rust,R.T;Oliver,R.L,1994*][1]. The necessities (which are usually easily stated in a clear and objective way) are frequently referred to the functional benefits of the product and to its quality and price that justify the purchase and define the minimum standard that the customer will accept. Other necessities can refer to those implicit elements, which are not specified by their own evidence and correspond to those necessities that, without doubt, the customer hopes to see satisfied but does not feel the necessity to express.

By their own nature, expectations are basically subjective and more changeable than necessities; although the customer does not make them

explicit, his/her satisfaction greatly determines the perception of quality by the customer. It is in fact the existence of expectations, which makes each customer different from the rest.

It is necessary to bare in mind that, as a human being, the customer will rarely be fully satisfied - which constitutes a constant and permanent challenge to be overcome by the supplier. The difficulty lies in the fact that many companies do have systems to control the products they sell but do not have any systems to control their customers' satisfaction.

The managerial results are a logical consequence of the level of the customers' satisfaction. On the other hand this satisfaction is achieved by means of the leadership of the Total Quality with a personnel management with its principles and values and also with an appropriate administration of the resources, as well as the system of quality guided to the processes of the company - everything inside an appropriately planned strategy-. The perception which the customer has, of the satisfaction of his/her necessities and expectations can only define the quality achieved. Establishing and measuring such a perception is a difficult although not impossible task to undertake (due to the lack of technical knowledge). A further difficulty added to the studies of valuating customers satisfaction is the variety of experiences involved in the purchase, and the way in which the consumer uses some aggregation mechanisms in the trials of satisfaction to form a global feeling of satisfaction or dissatisfaction. The process can be additive or it can imply interactions among components constituting different dimensions of the satisfaction. The different dimensions of the service can also influence the global satisfaction.

Evidence exits which shows that many customers are not sure of how to define quality, although they do know how to perceive it. Since perception is subjective, the necessity of asking the customer to know his/her level of satisfaction always arises. For this reason we have started from the premise that there will always be an aim which the consumer wishes to reach, and the attainment of that aim (satisfaction) can only be judged by taking a standard of comparison as a reference. In this sense, the process of evaluation of the satisfaction implies, as a minimum, the intervention of two stimuli: a result and a reference or standard of comparison.

To satisfy their customer's demand, Internet-based companies must set two types of technical and personal abilities in motion:

1- The objective and implicit necessities are satisfied with a personnel's professional and technical performance which is frequently not noticed by the client, since in many cases he/she is not able to judge this internal quality because of the limitation of his/her technical knowledge. Satisfying this type of necessities, the supplier does what is required of him/her and there are no reasons why the customer feels loyal since they take the absence of mistakes for granted. On the other hand, the consumers of an Internet-based company

know that they are the axis and the motor of the business. This is why they not only demand the product or service at a basic level, but rather expect and demand a series of additional services, i.e. something that makes the product / service different to the rest. This is an inconvenience accentuated by the nature of the Net, since, once these additional services in the products have been obtained, the customer will get used to them and will end up incorporating them as something habitual in products. Thus, in a short time, will again demand those components in his/her purchase.

2. - **Expectations** (perception and emotions that each individual generates toward a product, service, web page or company), are subjective which is why they require effective abilities and positive attitudes on the part of the personnel who assists the consumer's demands through the Net.

We must stress another fundamental fact of the Net, which is the easiness by which a user of a page can accede to another with minimum cost. With only a click of a mouse, he/she can "jump" between companies, compare prices, payment systems and distribution of the product, financing forms and even know if the business is more or less reliable by consulting other pages which in turn give information on the financial state of the company that offers the service. The easiness with which the customer can leave an Internet-based Company, together with the non-existence of personal treatment (which can constitute an element of clear loyalty in the traditional company) means that the customer's loyalty has to be obtained with new strategies. Here the customer's satisfaction is the key to improve the perception that he/she has of the company, or in this case of the site e-commerce in question.

Another important strategic component of the Net not considered in the two previous points, is "effect of Net economy" which consists of the value that a customer grants to a product, not because of its specific contributions, but because of its demand. That is to say, a Web that generates a lot of traffic will have bigger revenues - for example, through the publicity it can put in its pages. In this case the publicity companies will not place their advertisements in other Webs since the cost associated to the change will be higher.

A direct relationship exists between the grade of satisfaction that is reached by a customer, and the final retention level that we will obtain on it. In this sense, different studies exist which show that gaining a new customer is about five or seven times more expensive than maintaining him/her. That is why the so-called economies of loyalty arise, based on increasing the issue barriers so that the customer does not leave a certain site are increased.

A clear example of these "*fidelity economies*" is the quantity of free services which a lot of web pages have such as free email membership, groups, or forums of interest, news related to specific topics, etc. These services are free due to the fact that if a customer sets up an email address for example, later he/she will probably return to the page periodically to read his/her

correspondence and /or sent messages. In this way, the customer's loyalty is achieved.

Some qualitative characteristics which can help us increase the customer's loyalty to a web page could be:

1 - Good content which can be quickly changed and updated.

2 - Easy access from any navigator or computer, which implies that our site is member of an efficient search engine, or that it is placed on pages related to our sector and is part of newsgroups, forums, etc which in this way will proportionate the customer in an indirect way the possibility of finding us from different places of the Net and not just by entering our home page from the beginning.

3 - Ease of use which implies easy navigation through the page.

4 -A well-designed web page, where, not only the aesthetics and the image we are going to show to the world, but also the perfect function of the different links of the page are taken into account. Therefore, this page must be able to be downloaded from any computer.

5 - High speed to enter and load a page. It is considered that waiting more than ten seconds implies the possibility that a customer can change the address to visit another web site. They will be prepared to wait a little longer if the required time of loading a page is displayed on the screen to the navigator.

6 – Promotional programmes combining those which have been made by traditional trade and those which are made by our company. Many companies have united and adhered to what is called the '*multisector system of fidelity'*, where a company puts at the disposal of others the appropriate infrastructure, and negotiates the web site. What these companies in a virtual way usually do, is to promote themselves from this site or from their own pages. This generates a greater volume of traffic, which allows consumers to enter from different pages in the Net and visit pages of other companies belonging to the same sector.

7 – Security. The most important attribute of a web site for the customer is security, especially if we are talking about commercial transactions. This uncertainty will have to be considered and minimized by means of good politics of loyalty and the use of security protocol, as well as certification stamps (with the use of digital signatures which endorse the integrity of the participants, etc.) which guarantee that the web is safe The characteristics previously mentioned as qualitative components to gain a customer's loyalty, such as the upgrade, content, design, security, etc, can be considered as the attributes of a page which can be evaluated. The importance that they have for the customer and

their presence in our web site, will determine the customer's final attitude towards it.

In order to carry out this study, we will identify the key elements and dimensions, which determine the formation of the satisfaction, starting from a survey handed to a group of customers within the sector of the evaluated company. Next, a *fuzzy* treatment will be carried out regarding the valuations of importance assigned by the customers to the selected attributes and the evaluation of the competitive priority of the company with regards to its competitors.

3.- SYSTEM TO MEASURE THE VALUE OF THE COMPANY ACCORDING TO THE SATISFACTION GENERATED TOWARD THE CLIENT.

The main characteristic of a system to measure the value of the company according to the satisfaction generated towards the customer is that it allows us to know the customer's opinion - through a group of attributes and necessities [AT's] - and take it to the different departments involved in the development of the product or service. The system of valuation that we will use in this empirical study has been carried out from the methodology followed in the QFD (quality functional deploys) in which a *fuzzy* treatment of the used variables has been carried out. The process used in the empirical study consists of four steps which we will describe in a synoptic way in **Figure 1**.

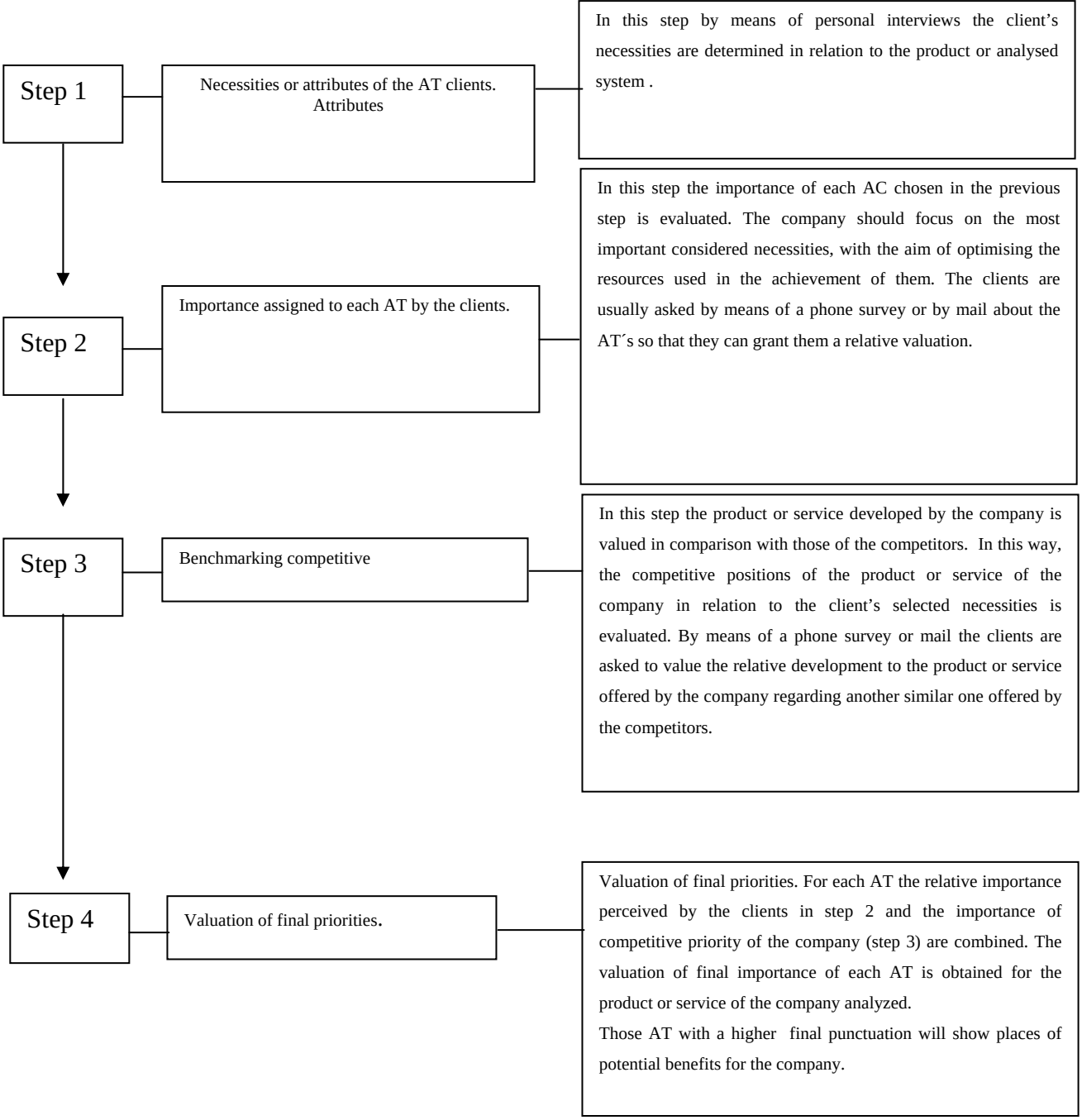

Figure 1. outline for the valuation of final priorities

The company will want to know its competitive advantages as for the grade of satisfaction reached with its customers. That is why it is necessary firstly to know the customers' opinion about a series of aspects related with the satisfaction reached in connection with the product or studied service *[Lambin, J.J. 1995*][2]. Once the most important attributes have been identified that define

the customer's satisfaction in the different companies of the studied sector, we will proceed to the *fuzzy* treatment of the data, which allows us to establish a valuation of the final and competitive priority of the selected company.

4.- VALUATIONS OF IMPORTANCE ASSIGNED BY THE CLIENTS

In the principal study from which this data is obtained, a group of attributes divided in three categories were taken into consideration by the customers, depending on the category they belonged to :contributions of the web site, security and practices peculiar to the business model to be used. In this article, we are going to concentrate on the group of elements, which characterize a web page or site, i.e. technical and non-technical features, although further descriptive studies were also carried out for the other two groups of attributes. More than 95% of the consumers consulted, determined that ease of use is fundamental, closely followed by up to date contents and high speed of reply. The answers obtained are presented in **Table 1.**

If we look at this average for each one of the attributes, we can obtain an ordination of the characteristics considered as main attributes and which make a web page very useful for an individual or not. Baring in mind that the grade of presence used in the calculation of each one has been simulated, as this ordination is only valid in this case and is not a generalization of the utilities associated to any web page - as we are not really confronting the customers to the concrete valuation of a certain web site.

Arriving at this classification of attributes indicative of the aspects which the customers have indicated as generators of satisfaction in their purchase, we outline a *fuzzy processing* in which from the significant valuations assigned by the customer to a concrete selection of the previous attributes, it is possible to determine the competitive priority of the company selected in the study with regards its competitors. Next we will present the *fuzzy* method used.

For a ***fuzzy* processing** we consider the AT's attributes, which are representative of the customer's requirements as generators of satisfaction in their purchase, and which will be structured and identified from the customer's point of view (P1, P2, P3…., Pm).

Once the survey has been handed out to *"q"* customers the *"q"* valuations are averaged for each customer:

$$\text{Pi: } Ii = AVERAGE\left(I1i, I2i, I3i..., Iqi\right). \qquad [1]$$

In this way, we will obtain the significant valuations assigned by each customer for all the AT's attributes with a level of presence m_{ij} **(Table 2)**

Let us suppose that there are (k-1) competitors of our company whose products/services can be considered similar to ours - C2, C3, C4, and C5…. Ck- with C1 being our company. The "q" customers of Step 2 are asked to value the products that they know and with which they are familiar for the "m" previous necessities. If "j" customers value the product offered by the company Ci for the "m" necessities, then the vector Xi=(x11i, x21i,….,xj1i) will denote the averages of the valuations which those "j" customers have made for the "m" necessities of that company, where for example; x1i= AVERAGE (x11i, x21i, …, xj1i) **(Table 3)**.

Based on the above-mentioned table, we will be able to fix the matrix X from the evaluated information of all the necessities for the products of the "k" company competitors **(Table 4)**

From this information, an evaluation of the competitive prioritiy for each AT will be obtained: I'= (I´1,I'2, and I'3…I'm). The final ratios of priority of each necessity I*=(I+. I2, I3…I*m) will be obtained by combining the results of I and I' of the previous steps by means of its product: I*=I.I' [*Hwang.C.L; Moon,K. 1981]*[3] [*Cohen, 1995]*[4], or by a ponderation of them (w and w'>=0), depending on the importance of the information:

$$I^*_j = w\, I_j .\, w' I'_j \qquad [2]$$

The example proposed for the study of the four previous steps is that of an Internet- Based Company denoted by "CI". This company will be the object of a valuation by comparables with regards to its competitors, for which its intangible assets must somehow be quantified. In this case, the *fuzzy logic* is proposed as an appropriate technique to prioritise the aspects that the customers consider outstanding as generators of satisfaction in their purchase. Therefore the obtained results will be taken as a starting point for the evaluation of the **competitive priority** of the studied company in that concrete intangible asset[5].

In this section we intend to use (NBT) triangular *fuzzy* numbers to represent the valuations of the importances assigned by the customers to each AT.

As the name shows, these numbers present a triangular form - being perfectly defined with three real numbers; one for the lowest level, another for the highest level and finally one that represents the maximum level of presumption. This indicates the abscissas of the vertexes; the ordinates are obtained by the own definition of the *fuzzy* number, the values of the extremes are zero and the central value will be one *[Dubois,D. ;Prade,H. 1978]*[6]. A

representative graph of a triangular *fuzzy* number can be presented such as the one in **Figure 2**.

Figure 2

Let us suppose that the "m" customers' necessities corresponding to Step 1 have already been gathered and identified (P1, P2, P3, P4…. P14). The customers are asked to assign to each Pj positive numbers as valuations (through values understood between 1 and 9 to express that the attribute ranges from *´not very important´* to *´very important´*) . In this sense, a small number is indicative of lesser importance and a larger one of greater importance. As the valuation of qualitative attributes is always subjective, imprecise, and referred to the linguistic terms that people use to express their feelings, to use precise numbers to represent such valuations does not seem to be the most appropriate method [*Kaufmann, A; Gil Aluja,J., 1990*][7]. A more rational focus would consist of assigning a *fuzzy* number to each linguistic term, so the imprecision associated to each term is gathered. With the obtained *fuzzy* numbers the *fuzzy* arithmetic could be used to work with them.

A representative sample of the C1 Company's customers are requested to indicate the importance they would grant to each one of the fourteen elected attributes (measured in *"crisps"* valuations between 1 and 9) after a simulation cast and whose nomenclature is presented in **Table 5.**

They will have to value them if, in the first place, they detect that these attributes are present in the web of the virtual business of the company "CI" and in second place, according to their own perception. In **Table 6** a sample of the data obtained[8] in this survey is presented.

The valuations of the assigned importance can then be obtained for each attribute averaging well the *crisps* (Ic), or *fuzzy* results (Ib) of each interviewed customer's perception. The valuations assigned on the average are presented in **Table 7.**

Once we have information concerning the importance and presence the interviewed clientele assigns on average to each one of the mentioned attributes, we can make a hierarchy based on the strengths and weaknesses of the company's attributes and compare them to the ideal profile of a company in which these attributes generated the maximum level of satisfaction to the clientele.

With this aim in mind the founding of an ordination among all fuzzy numbers is needed. There are many ordination methods but, because we think is the most appropriate, we choose the one of the "*relative distance*". This linear ordination put forward by *Kaufmann y Gupta, (1985*[9]*)*, and *Chen, S.J; Hwang,C.L. (1992)*[10] consider all shifts with regard to both sides, left and right of the fuzzy number A in relation to the real number k=0 (it is recomended to make a movement to a position which permits the calculation be positives in all cases). According to this method a linear ordination of the fuzzy number sets will be carry out with the same sift. This one will be calculated as follows:

$$D\{\{a,b,c\},"0"\} = (a+2b+c)/4. \qquad [3]$$

In the first attribute, the relative distance would be calculated in the following way **(Table 8):**

$$\frac{3.7 + 2 \cdot 4.7 + 5.65}{4} = 4.6875$$

So that the valuations are comparable, these can be standarized so the maximum valuation is the unit. This is achieved, in the *crisps* valuations, dividing all of them by the maximum (which is 7), and in the *fuzzy* ones by dividing the NBT corresponding to each attribute by the maximum of their superior limits (8) **(Table 9)**

It can be appreciated that although the ordination is similar, the *"crisps"* valuations are nearer to the superior limits than the corresponding *fuzzy* valuations. This suggests that the *fuzzy* valuations are more representative of the variations in the assignment of importance of the necessities.

5.- VALUATIONS OF THE COMPETITIVE AND FINAL PRIORITY

Next the competitive analysis of the "k" companies dedicated to the same activity and of similar size - that we will denominate C1, C2, C3, and Ck - will be carried out where C1 represents the company under study. A sample of customers who have made purchases in some or all the indicated companies

are asked to give their views and valuations on the fourteen attributes "m" pointed out in the study according to a scale of 9 points, where 1 is *"very low"; 2 "low"; 5 "medium"; 7 "good", 9 "very good".* Of the "q" interviewed customers, "j" clients value the product of the company "i" for the "m" indicated attributes, since only those customers have made purchases at some point from the considered companies for the comparative study. Averaging the valuations of those customers the vector of valuations of the company i Xi=(X!i,X2i,X3i,…Xmi) would be obtained, where for example: X1i= AVERAGE (X11i,X21i,…Xj1i) and Xj1i, would represent the valuation that the customers "j" gives to the attribute "1" for the company "i". In this way, by extending the process to all the companies, the valuation matrix of competitive achievement X *. [Torrecilla, J.M., 1999][11].*

Based on this matrix, a comparative valuation of the company C1 could be carried out regarding its competition, according to its clientele's satisfaction *(Cohen, 1995,cit.ant).* In this way, if it is determined that the company Ci possesses the best valuations as for execution of generating attributes of the clientele's satisfaction, we will be able to affirm that such a company has a value in this intangible superior to the rest. The group of weighs I'=(I'1,I'2,I'3,…I'm) will be called "valuations of competitive priority" of the customers' necessities, where a high value of I'j will denote a higher priority of the company Cj in relation to attribute j. For our example, we will consider that the company C1 (object of this study) has four main competitors C2, C3, C4. The sample used consisted of 10 customers, who at some time have carried out purchases from the 4 companies (they must know these companies and be familiar with them). The valuations granted to the 14 attributes pointed out in the 4 companies have been valued using a scale of nine points **(Table 10).**

In this chart it can be observed that client 6 gives his/her opinion about the companies 1 and 3 where he/she has carried out purchases, and in turn client 5 evaluates companies 2 and 3. The calculation of averages of the *"crisps"* results obtained for the 4 companies is shown in **Table 11**.

The entropy has been revealed as an important concept in social science, i.e. in the treatment of the information, where it is sought to measure the content of the expecting information of a certain message [*Gil Aluja, J., 1999][12].* It is an approach to find the quantity of information or uncertainty represented by a distribution of discrete probability (p1, p2, p3, pk) and it shows that a distribution with big variations in its *crisps* contains more information than one in which those variations are smaller *[Chan, L.K.1999][13].* Information presented by *[Shannon, C.E; Weaver,W. 1947*][14] as:

$$E(p1, p2, p3, ..., pk) = -\phi_k \sum_{i=1}^{k} Pi \cdot \ln(pi) \qquad [4]$$

Where Φ=1/ln (K) is a positive constant which guarantees that $0 \le E(p1, p2, p3,....pk) \le 1$. The greater the value of E (p1, p2, p3, pk) the less information will contain the distribution of probability (entropy zero will indicate the maximum information and entropy one the minimum information).

Next we will determine the value of the entropy for each mj, for which we will add the components of this vector:

$$X_j = \sum_{i=1}^{k} xji \, . \qquad [5]$$

For example, in this way for m1 we would obtain: X1=5,34+5,67+4,34+3,34=18,69. The standarized valuations pji=xji/Xj j=1,2,3…k, constitute a distribution of probability of Pj in the k companies. This is why we could define the entropy of Pj as:

$$E(Pj) = -\phi_k \sum_{i=1}^{k} pji \cdot \ln(pji) = -\phi_k \sum_{i=1}^{k} (xji / Xi) \cdot \ln(xji / Xj) \qquad [6]$$

and the distribution of the associated probability would equal to p11=X11/X1=5,34/18,69=0,28. Given a Φ=l/ln (14) =0,3789231, for each one of the mj, we would obtain the results shown in **Table 12.**

If the company C1 does not have the reason to think that one of the customer's necessities is more important than the others, the value of E (Pj) - after its corresponding normalization- can be adapted to establish the importance weighs of each attribute mj:

$$I'j = E(mj) / \sum_{i=1}^{m} E(mj) \cdots\cdots \; j = 1,2,3,.....m \, . \qquad [7]$$

The weigh groups I' = (I'1, I'2, I'3... I'm) is called *"competitive priority valuations" [Puente, J; Priore, P; Pino, R., 2000]*[15] of the customer' necessities where a high value of I'j will denote a greater priority on the attributes mj **(Table 13).**

Establishing the ranking of the competitive priority for the AT's in the company C1, the results are presented in **Table 14.**

In this way, the technical group who analyzes and values the company will be able to detect the companies´ strengths and weaknesses which generate the customer's satisfaction, (being able to introduce improvements) as well as the competitive advantages of the company in comparison to those of the same sector.

To obtain the final priorities for each mj, the product of the valuations assigned by the customers "i" must be made to show the competitive advantage

"I" of *the previous section [Hwang, C.L; Moon,K. 1981 cit. ant]; I* = I.I' where j=1,2,3,m.* Therefore by arriving at this point, we will be able to consider final crisps valuations "I* or *fuzzy* "I* in the way shown in **Table 15.**

The Relative Distance and the ranking of final priority appear in **Tables 16** and **17**. Although the ordination is similar, the *"crisp"* valuations are nearer to the superior limits than the corresponding *fuzzy* valuations , which suggest that the *fuzzy* valuations are more representative of the variations of total importance of the *necessities. It can be appreciated that in the table both in the "crisp" case and in the* fuzzy one, the resulting ordination coincides

In this way, the competitive analysis of our products comes from both the direct valuations of the importance, which the customers assign to certain aspects of the company, and from the valuation of similar products of the competitive companies (which allows us to carry out a competitive analysis of our products starting from the satisfaction generated in the customers) with the product of these two measures. The final valuations of priority of the customer's necessities are obtained.

Having determined the ranking of final priorities assigned to the AT's and the present attributes of the virtual business in the web which are able to generate a greater satisfaction to the customer - as well as the importance that these attributes occupy with regards to rival companies- we are in a position to incorporate to the value of the company, the contributing attribute to the customer's satisfaction in a more outstanding way, so that he/she can have a benefit of a competitive advantage which will be reflected in the valuation carried out of the company.

7.- CONCLUSION

The managerial results are a logical consequence of the level of the customers' satisfaction. The satisfaction the customer has of his/her necessities and expectations defines the reached level of managerial quality, as well as the method of how to obtain and measure such a perception, which is a difficult although not impossible task. In the present work the elements and key dimensions, which determine the formation of the satisfaction, have been identified, starting from a survey handed to a group of customers.

Once the company knows which part of its page or service they offer through the Net are more useful for its customers (and therefore should be improved and /or modified), we have established a *fuzzy* treatment that has allowed us to evaluate the competitive advantages of the considered company with regards to other companies within the same sector, reaching the conclusion that the *fuzzy* valuations carried out are more representative of the variations of total importance of the necessities than the "crisps" valuations.

By means of this empirical approximation, we have tried to corroborate that the fuzzy methodology is valid to calculate the final value of an Internet- based company.

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TABLES

Group Contributions	*1*	*2*	*3*	*4*	5	*6*	7	*8*	9	*10*	*% de 9-10*
Simplicity of Handling	0	0	1	0	0	2	4	6	2	8	***43.48%***
	0%	**0%**	**4.35%**	**0%**	**0%**	**8.70%**	**17.39%**	**26.09%**	**8.70%**	**34.78%**	
Up to Date Contents	1	0	0	0	1	2	4	6	5	4	***39.13%***
	4.35%	**0%**	**0%**	**0%**	**4.35%**	**8.70%**	**17.39%**	**26.09%**	**21.74%**	**17.39%**	
High Speed of response	0	0	1	0	2	1	2	9	4	4	***34.78%***
	0%	**0%**	**4.35%**	**0%**	**8.70%**	**4.35%**	**8.70%**	**39.13%**	**17.39%**	**17.39%**	
Useful Contents	0	0	0	1	2	3	4	7	4	2	***26.09%***
	0%	**0%**	**0%**	**4.35%**	**8.70%**	**13.04%**	**17.39%**	**30.43%**	**17.39%**	**8.70%**	
Own Page	0	0	1	1	5	2	3	5	3	3	***26.09%***
	0%	**0%**	**4.35%**	**4.35%**	**21.74%**	**8.70%**	**13.04%**	**21.74%**	**13.04%**	**13.04%**	
Quality Page Designs	0	0	0	2	3	5	4	6	1	2	***13.04%***
	0%	**0%**	**0%**	**8.70%**	**13.04%**	**21.74%**	**17.39%**	**26.09%**	**4.35%**	**8.70%**	
Others	21	0	0	0	1	0	0	0	0	1	***4,35%***
	91.30%	**0%**	**0%**	**0%**	**4,35%**	**0%**	**0%**	**0%**	**0%**	**4,35%**	
Page Set up	1	2	3	1	10	4	2	0	0	0	***0.00%***
	4.35%	**8.70%**	**13.04%**	**4.35%**	**43.48%**	**17.39%**	**8.70%**	**0%**	**0%**	**0%**	

Table 1

I = (I1,I2,I3....Im)	**P1**	**P2**	**..**	**Pm**
mI1	I11	I12	...	I1m
mI2	I21	I22	...	I2m
mI3	I31	I32	...	I3m
….	...	...	...	...
mIq	Iq1	Iq2	...	Iqm
Averages	**(I1**	**I2**	**…**	**Im)**

Table 2

	P1	**P2**	**.**	**Pm**
CI1	x11i	x12i	...	x1mi
CI2	x21i	x22i	...	x2mi
CI3	x31i	x32i	...	x3mi
….	...	...	...	...
CIj	xj1i	xj2i	...	xjmi
Averages	**(x1i**	**x2i**	**…**	**xmi)**

Table 3

	C1	C2	..	Cm
P1	x11	x12	...	x1k
P2	x21	x22	...	x2k
P3	x31	x32	...	x3k
….	...	...	...	...
Pm	xm1	xm2	...	xmk

Table 4

m1.- Useful Content
m2.- Ease of Use
m3.- High Response
m4.- Quality of Page Design
m5.- Updated contents
m6.- Security
m7.- Privacity
m8.- Certifications. - confidentiality
m9.- Confidentiality
m10 Clear on-line billing
m11.- Different payment options
m12.- Tracking of on-line orders
m13.- Cancellation of on-line orders
m14 After-sales service /reclamaciones

Table 5

AT´s	**Client 1**		**Client 2**		**Client 3**		**Client 4**	
	Crisp	Fuzzy	Crisp	Fuzzy	Crisp	Fuzzy	Crisp	Fuzzy
m1	5.8	(4.8,5.8,6.6)	4	(3,4,5)	5	(4,5,6)	4	(3,4,5)
m2	6	(5,6,7)	7	(6,7,8)	8	(7,8,9)	6	(5,6,7)
m3	2	(1,2,3)	8	(7,8,9)	9	(8,9,10)	2	(1,2,3)
m4	4	(3,4,5)	2	(1,2,3)	3	(2,3,4)	7	(6,7,8)
m5	3	(2,3,4)	4	(3,4,5)	4	(3,4,5)	9	(8,9,10)
m6	7	(6,7,8)	2	(1,2,3)	2	(1,2,3)	3	(2,3,4)
m7	9	(8,9,10)	6.2	(5.4,6.2,7.2)	7	(6,7,8)	5	(4,5,6)
m8	2	(1,2,3)	5	(4,5,6)	8	(7,8,9)	7.4	(6.4,7.4,8.0)
m9	3	(2,3,4)	7	(6,7,8)	4	(3,4,5)	3	(2,3,4)
m10	9	(8,9,10)	9	(8,9,10)	5	(4,5,6)	4	(3,4,5)
m11	2	(1,2,3)	3	(2,3,4)	6	(5,6,7)	7	(6,7,8)
m12	6	(5,6,7)	6	(5,6,7)	9	(8.9.10)	7	(6,7,8)
m13	5	(4,5,6)	5	(4,5,6)	1	(0,1,2)	4	(3,4,5)
m14	3	(2,3,4)	9	(8,9,10)	2	(1,2,3)	5	(4,5,6)

Table 6

Crisp (Ic)	**Fuzzy (If)**		
4.7	[3.7	4.7	5.65]
6.75	[5.75	6.75	7.75]
5.25	[4.25	5.25	6.25]
4	[3	4	5]
5	[4	5	6]
3.5	[2.5	3.5	4.5]
6.8	[5.85	6.8	7.8]
5.6	[4.6	5.6	6.5]
4.25	[3.25	4.25	5.25]
6.75	[5.75	6.75	7.75]
4.5	[3.5	4.5	5.5]
7	[6	7	8]
3.75	[2.75	3.75	4.75]
4.75	[3.75	4.75	5.75]

Table 7: Valuations assigned on the average

Crisp (Ic)	Fuzzy (If)			Relative Distance	Hierarchy
4.7	[3.7	4.7	5.65]	4.6875	m12
6.75	[5.75	6.75	7.75]	6.75	m7
5.25	[4.25	5.25	6.25]	5.25	m2 y m10
4	[3	4	5]	4	m8
5	[4	5	6]	5	m3
3.5	[2.5	3.5	4.5]	3.5	m5
6.8	[5.85	6.8	7.8]	6.8125	m14
5.6	[4.6	5.6	6.5]	5.575	m1
4.25	[3.25	4.25	5.25]	4.25	m11
6.75	[5.75	6.75	7.75]	6.75	m9
4.5	[3.5	4.5	5.5]	4.5	m4
7	[6	7	8]	7	m13
3.75	[2.75	3.75	4.75]	3.75	m6
4.75	[3.75	4.75	5.75]	4.75	

Table 8 Ranking of the valuations given by the clients to the AT´s

AT´s	Ic normalized	If normalized		
m12	1	[0.75	0.875	1]
m7	0.97142857	[0.73125	0.85	0.975]
m2	0.96428571	[0.71875	0.84375	0.96875]
m10	0.96428571	[0.71875	0.84375	0.96875]
m8	0.8	[0.575	0.7	0.8125]
m3	0.75	[0.53125	0.65625	0.78125]
m5	0.71428571	[0.5	0.625	0.75]
m14	0.67857143	[0.46875	0.59375	0.71875]
m1	0.67142857	[0.4625	0.5875	0.70625]
m11	0.64285714	[0.4375	0.5625	0.6875]
m9	0.60714286	[0.39375	0.53125	0.65625]
m4	0.57142857	[0.375	0.5	0.625]
m13	0.53571429	[0.34375	0.46875	0.59375]
m6	0.5	[0.3125	0.4375	0.5625]

Table 9: Normalization of the valuations

Companies	C1			C2			C3			C4		
Clients	1	2	6	3	4	5	6	7	5	8	9	10
AT´s												
m1	9	2	5	6	6	5	5	5	3	1	3	6
m2	8	4	6	7	5	4	5	7	4	6	5	5
m3	3	5	3	3	4	3	5	3	3	7	8	3
m4	5	3	6	2	5	6	4	4	4	6	4	8
m5	4	7	7	7	8	5	3	5	8	4	3	3
m6	5	6	7	4	8	5	4	6	9	5	7	1
m7	8	5	3	8	9	3	5	7	2	5	7	4
m8	9	0	2	7	6	5	7	8	4	6	7	2
m9	1	1	3	6		4	9	3	5	6	4	7
m10	2	4	5	6	7	9	7	2	5	5	3	1
m11	4	5	6	5	5	7	7	5	3	2	4	6
m12	6	7	7	4	7	5	6	7	1	1	2	7
m13	7	8	2	8	6	7	6	4	2	4	7	8

m14	6	4	1	5	4	6	4	6	4	7	8	9

Table 10: Main X of valuation of competitive achievements

	C1	C2	C3	C4
m1	5.34	5.67	4.34	3.34
m2	6	5.34	5.34	5.34
m3	3.67	3.34	3.67	6
m4	4.67	4.34	4	6
m5	6	6.67	5.34	3.34
m6	6	5.67	6.34	4.34
m7	5.34	6.67	4.67	5.34
m8	3.67	6	6.34	5
m9	1.67	3.34	5.67	5.67
m10	3.67	7.34	4.67	3
m11	5	5.67	5	4
m12	6.67	5.34	4.67	3.34
m13	5.67	7	4	6.34
m14	3.67	5	4.67	8

Table 11: Average of valuation of attributes for each company

	Entropy E(Pj)
m1	0.516533326
m2	0.539839466
m3	0.500940308
m4	0.521176168
m5	0.525442378
m6	0.537047461
m7	0.535156616
m8	0.525089697
m9	0.477917245
m10	0.5016471
m11	0.526560745
m12	0.521015111
m13	0.532901439
m14	0.516053023

Table 12: Valuation of the entropy

Attributes	$E(mj)$	$I'j = E(mj) / \sum_{i=1}^{m} E(mj)$
m1	0.516533326	0.070978509
m2	0.539839466	0.07418108
m3	0.500940308	0.068835822
m4	0.521176168	0.071616496
m5	0.525442378	0.07220273
m6	0.537047461	0.073797422
m7	0.535156616	0.073537595
m8	0.525089697	0.072154267
m9	0.477917245	0.065672148
m10	0.5016471	0.068932944
m11	0.526560745	0.072356408
m12	0.521015111	0.071594365

m13	0.532901439	0.073227704
m14	0.516053023	0.070912509
	$\sum_{i=1}^{m} E(mj) \cdots\cdots$	
	= 7.277320084	

Table 13: Entropy valuations and the competitive priority for each AT

	$I'j = E(mj) / \sum_{i=1}^{m} E(mj)$
m2	0.07418108
m6	0.073797422
m7	0.073537595
m13	0.073227704
m11	0.072356408
m5	0.07220273
m8	0.072154267
m4	0.071616496
m12	0.071594365
m1	0.070978509
m14	0.070912509
m10	0.068932944
m3	0.068835822
m9	0.065672148

Table 14

	I*c		I*f		I* c normalized		I* f normalized	
m1	0.333599	0.233599	0.333599	0.433599	0.66565293	0.38858002	0.55492492	0.72126982
m2	0.5007223	0.4007223	0.5007223	0.6007223	0.9991255	0.66658111	0.83292601	0.99927091
m3	0.3613881	0.2613881	0.3613881	0.4613881	0.72110237	0.43480577	0.60115067	0.76749557
m4	0.286466	0.186466	0.286466	0.386466	0.57160521	0.31017668	0.47652158	0.64286648

m5	0.3610137	0.261037	0.361037	0.461037	0.72035528	0.43422174	0.60056664	0.76691154
m6	0.258291	0.158291	0.258291	0.358291	0.51538569	0.26330901	0.42965391	0.59599881
m7	0.5000556	0.4000556	0.5000556	0.6000556	0.9977953	0.66547209	0.83181699	0.99816189
m8	0.4040639	0.3040639	0.4040639	0.5040639	0.80625638	0.50579479	0.67213969	0.83848459
m9	0.2791066	0.1791066	0.2791066	0.3791066	0.55692059	0.29793469	0.4642796	0.6306245
m10	0.4652974	0.3652974	0.4652974	0.5652974	0.92843974	0.6076536	0.7739985	0.9403434
m11	0.3256038	0.2256038	0.3256038	0.4256038	0.64969965	0.37528042	0.54162532	0.70797022
m12	0.5011606	0.4011606	0.5011606	0.6011606	1	0.6673102	0.8336551	1
m13	0.2746039	0.1746039	0.2746039	0.3746039	0.54793596	0.29044468	0.45678958	0.62313448
m14	0.3368344	0.2368344	0.3368344	0.4368344	0.67210879	0.39396195	0.56030685	0.72665175
Maximum :0.5011606								

Table 15: Final valuations of priority for the AT´s

Relative Distance	
m1	2.21969969
m2	3.33170404
m3	2.4046027
m4	1.90608633
m5	2.40226655
m6	1.71861562
m7	3.32726795
m8	2.68855876
m9	1.85711838
m10	3.09599398
m11	2.16650126
m12	3.3346204
m13	1.82715833
m14	2.24122739

Tabla 16: calculation of the Relative Distance

m12	3.3346204
m2	3.33170404
m7	3.32726795
m10	3.09599398
m8	2.68855876
m3	2.4046027
m5	2.40226655
m14	2.24122739
m1	2.21969969
m11	2.16650126
m4	1.90608633
m9	1.85711838
m13	1.82715833
m6	1.71861562

Table 17: Ranking of final priorities