

**MODEL OF HIERARCHICAL ANALYSIS:  
SCORE FOR THE POST-OCCUPANCY EVALUATION OF BUILDINGS OF OFFICES <sup>1</sup>**

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**ABSTRACT**

This study presents an instrument of qualitative analysis of the acting of the buildings of offices derived of the Model of Hierarchical Analysis COPPETEC-COSENZA (MAH-CC), developed for the analysis of the space hierarchy in the process of industrial location. Your objective principal is to demonstrate the usefulness of a tool that forms an alliance great flexibility with the possibility of formal representation of the inherent subjetivismo to the processes of decision in more than two apuração levels or apprenticeships comportamentais, with base in the logic fuzzy and in linguistic variables. Basically, MAH-CC is an operation with head offices that, starting from a listing of attributes of nature acting common to a group of buildings, it confronts the demand of different organizations or users' groups for space and for property resources, with the offer of a group of buildings. The attributes are classified according to common entails and, for each acting attribute, they are identified the variables for your mensuração. The values or indexes of acting resultants, expressed through a head office of possibilities, they allow to identify, for the visual observation of the nested group of the possibilities, the points where certain organization or users' group finds better adaptation to the conditions specified in the demand and mapped in the group of buildings. When confronting demand and it presents considering eventual excess situations or offer shortage to assist the certain demand, MAH-CC it allows (the) larger agility in the electric outlet of decisions, (b) to systematize the operative procedures that they involve the conception, the production or the evaluation of buildings, (c) to confirm or to already monitor situations established, and (d) to investigate which profile of building offer favored certain location or acquisition well happened.

**INTRODUCTION**

This study has as objective presents an instrument of qualitative analysis of the acting of the buildings of offices derived of the Model of Hierarchical Analysis COPPETEC-COSENZA (MAH-CC), developed starting from the theses of SWEET ORANGE (1994), of RHEINGANTZ (2000), of the Program of Engineering of Production of COPPE/UFRJ and of ROCK'S dissertation (2000), of PROARQ/FAU-UFRJ. These studies evidenced the great flexibility of MAH-CC, especially with relationship to the possibility of formal representation of the inherent subjetivismo to the evaluation of acting of the built atmosphere (AC), with base in the logic fuzzy and in linguistic variables.

The study (the) it considers subsets fuzzy and you varied linguistic and, to proceed, it analyzes your applications in the evaluation of acting of the built atmosphere, and (b) it presents the report, the description and the adaptation of MAH-CC as analysis instrument for evaluation of the acting of office buildings. For best to illustrate your application, a group of acting attributes is presented and of head offices developed (RHEINGANTZ 2000) to simulate the evaluation of 6 buildings of offices starting from 8 different typologies organizacionais (users).

**SUBSETS FUZZY, LINGUISTIC VARIABLES AND YOUR APPLICATIONS IN THE EVALUATION OF THE ACTING OF THE BUILT ATMOSPHERE:**

*“In the measure in that increases the complexity of a system, our capacity of doing propositions necessary and simultaneously significant about your behavior it decreases until reaching a limit besides*

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<sup>1</sup> Resumo publicado in *EDRA 32 Proceedings. Philadelphia: EDRA, 2002.*

*which precision and the significância (or relevance) they become almost mutually characteristics exclusive.”*

#### **[Beginning of the Incompatibility] Lotfi ZADEH (1973)**

The beginnings of the hazy mathematics [“fuzzy”] they were formalized by Lotfi ZADEH, with the intention of processing “the subjective information, of nature wander and uncertain, of the natural language.” (YEE 1997: 3) the application of the logic fuzzy in the evaluation of the acting of the built atmosphere (AC) it makes possible to solve several problems related to our compound and ambiguous interaction process with the “real world.” According to YEE, “the importance of the theory of hazy system” it resides in the possibility of considering the supposition in the resolution of problems in situations where the knowledge is incomplete or uncertain—“as it happens in the medical diagnoses, analysis and electric outlet of decision in engineering, administration, etc.” (YEE 1997)

#### **Hazy groups [Fuzzy]**

The word fuzzy (vague, imprecise, hazy) it was introduced in the mathematics by ZADEH (1965), to work with amounts of contours a little clear or badly defined and that cannot be described in terms of distributions of probability. When defining hazy group [fuzzy] as a class of objects for which a very defined border doesn't exist among the objects that belong her/it that class, ZADEH (1965) it threw the bases for the mathematical modelling of the approximate reasoning, that works with possibility and with uncertainty, overcoming the limits imposed by the methods mechanics' adaptation for the resolution of problems of complex systems: “in essence,... the conventional quantitative techniques of analysis of systems are inadequate intrinsecamente to work with alive systems or, in the case, any system whose complexity is comparable to the one of the alive systems.” (ZADEH 1965)

A decision based on the focus fuzzy–group fuzzy of alternatives resultant of the intersection of objectives and restrictions—and in the intuitive process of decision—basically, a choice or a group of extracted choices of the group of the possible alternatives—they are plenty similar thanks to the capacity of they generate procedures similar to the structure of the human thought.

#### **Linguistic variables**

He/she/you idealizes central of the logic fuzzy it is the possibility to accomplish ‘operations with words’, where the Hazy Groups are the ‘values’ of the words.” (PANTY, BARRETO and I AX s/d: 6) According to ZADEH, in a language L, each word x can be seen as a summarized description of a subset M(x) of an universe of the speech U, where M(x) it represents the meaning of x. He/she/you is considered the language as a “system to attribute atomic and composed labels (p.ex., words, sentences, sentences) for the subsets of U” (ZADEH 1973). If we consider the word room as subset fuzzy M (room), and the gray adjective as subset fuzzy M (ash), the meaning of the expression gray room is given by the intersection of M (ash) with M (room). If the color of an object or atmosphere be considered a variable, your values (red, yellow, blue, etc.) they can be labels of subsets fuzzy of an universe of objects or atmospheres, and the attribute color, a variable fuzzy whose values are labels of groups fuzzy—the gray variable is more imprecise than the numeric value of your wavelength. The values of the variable can be atomic terms, such as the one of the variable color, or sentences in a specific language—for that the variable is linguistic—, such as the values of the linguistic variable [fuzzy] heat–hot, very hot, very much hot, an amount hot, quite hot, not very hot, not hot, more or less hot—formed by composed sentences by the hot label, for the negative not, for the conectivos and and but, and the modifiers a lot, very much, an amount, plenty and more or less.

The employment of the linguistic variables is reinforced by MATURANA and VARELA (1995: 250), when they affirm that the mental act of knowing produces, in your essence, a world conditioned by the “to operate recursivo of the human language.” In other words, the semantic quality of the sentences linguistic reaproxima the mathematics of the mental processes. The premise “that the element-key of the human thought is not numbers, but labels of hazy groups, that is, classes of objects us which the transition of pertinent member to the group for of member non pertinent it is gradual instead of being adrupta” (ZADEH, 1973: 4) it justifies the use of linguistic variables in the definition of degrees (labels) attributed to the observed elements—in this study, physical atmospheres confronted in function certain attributes and your respective weights. When being treated as category fuzzy, the subjectivity and the uncertainty in the determination of these attributes of ordinal scale, he/she becomes cardinal, receiving a degree in a scale of [0, 1].

### **Function of Pertinence (I)**

The group fuzzy, when recognizing the possibility of a transition with relative ambiguity close to the dichotomy belong-no pertinence/verdadeiro-false of the classic group, he/she forces the one that he/she is considered the largest or smaller pertinence—sense or meaning of the variável/operação fuzzy—of the value of the variable. According to YEE (1997), the values of the pertinence function are indicative of tendencies attributed subjectively for somebody, and they depend on the context in which you/they are inserted. In opposition to the 1 (verdadeiro/pertinence) or 0 (falso/não belongs) of the classic groups, in the groups fuzzy: (the) when the value of the variable goes same to 1 (a), she is quite pertinent; (b) the more close of 1 (a) it goes the value of the variable, adult it is your pertinence; (c) the more close of 0 (I zero) it goes the value of the variable, minor it is your pertinence; (d) when the value of the variable goes 0 (I zero), she doesn't belong to the analyzed group.

### **Because to use the logic fuzzy?**

JANG & GULLEY (1997) they answer the this subject with the following arguments: (the) because the naturalness of your approach turns her/it conceitualmente easy to understand; (b) because it is flexible; (c) because it is tolerant with imprecise data; (d) because it can model the no-lineal functions of the arbitrariedade of the complexity; (and) because it can be built with base in the specialists' experience; (f) because it can be integrated into the conventional techniques of control; (g) because in many cases, it simplifies or it enlarges the possibilities and resources of the conventional methods of control; (h) because it is based on the natural language, base of the human communication.

### **Approach fuzzy in the valiação of acting of the built atmosphere**

The limitations of the traditional techniques are quite evident in the evaluations of acting of the buildings. In a general way, the studies of acting evaluation analyze separately some aspects of the buildings (I comfort higrotérmico, I comfort lumínico, acoustic comfort, I comfort aeróbico, functionality, constructive quality, etc.). In spite of your importance for the development of academic researches, the usefulness of these studies has been little satisfactory for the users of the buildings, that notice him/it as an unique system and integrated. Recognizing these limitations, more recent studies try to relate and to integrate some blocks of information. In spite of your undeniable progress in relation to the previous practice, few of them have been efficient in the attendance to the users' needs, once they treat, basically, of data and numeric measurements and they are based in norms and laws. In common these two practices disrespect the subjectivity and the imprecision of several subjects that interfere in the sensation of the users' comfort, such as habits, faiths and cultural values, culture of the organization, psychological aspects, etc.

The construction of instruments based on the logic fuzzy it makes possible to represent the subjectivity of subjects “colored” for emotions, feelings and behaviors, instead of necessary quantitative values. These new qualitative instruments allow to evaluate conceitualmente the built atmosphere, analyzing the intensity of the images, of the values and of the users' expectations in the perception process, necessary for the understanding of the absolute and relative importance of the perceptive fenômenos/valores and for your representation—the aleatoriedade concepts are substituted by concepts of cloudiness treated by the logic Fuzzy. The construction of the labels, that so much can be words as narrative sentences, makes possible the mental configuration of multiple sceneries or image-key. Like this, the approach fuzzy is configured as an important step in the sense of lessening the difficulty for a detailed definition of the simultaneous and fast unfoldings of these several schematic mental constructions, that can be noticed easily.

### **THE MODEL OF HIERARCHICAL ANALYSIS COPPETEC-COSENZA (MAH-CC)**

Developed with the purpose of allowing more dynamic studies in the location of industrial enterprises, MAH-CC is an operation with head offices “whose analysis algorithm is based in concatenations of the territorial offer with the industrial demand, for a series of location factors studied” (SWEET ORANGE 1993: V). The great flexibility of this model made possible your application in location studies and of evaluation of acting of industrial buildings—study of environmental space parameters (COSENZA and PORT 1997, 1998)—and in the evaluation of acting of the Building of Services of BNDES (COSENZA et al 1997). MAH-CC was also adapted as instrument of aid to electric outlet of architectural decisions (ROCK 2000) and in the construction of a tool for the evaluation of the acting of buildings of offices, confronting projects of buildings of offices with requirements (acting attributes) of the organizations that can in them to settle (RHEINGANTZ 2000). Such confrontation bases on the offer—I marry of the buildings—and it disputes—I marry of the organizations—of a condicionantes group previously certain.

## Historical

MAH-CC was inspired in Modelo MASTERLI'S presuppositions (I Model di Assento Territoriali and di Localizzazione Industriale) [1971-1974], developed by the consortium of the institutions SOMEA (Italy), SEMA (France), with the subsequent participation of COPPE-UFRJ in the construction of the Program of Information for Industrial Location. The Modelo MASTERLI was applied in the Program of Information for Industrial and Commercial Location, developed by the CONCISE (Consultoria of Applied social sciences Ltd.) for the Government of the State of Rio Grande do Sul, not incorporating a mathematical structure conventional.

In 1974, in the project Alternatives of Industrial Location for the Metropolitan Area of Rio de Janeiro, developed by COPPE/UFRJ for FUNDREM (Foundation for the Development of the Metropolitan Areas of RJ), COSENZA introduces substantial modifications in the structure and in Modelo MASTERLI'S operation: (the) possibility to operate with personal computer-areas for industrial location; (b) detalhamento of the offer profiles and it disputes that, in your operation matricial, they start to consider intermediate situations, before contained in only two levels; (c) possibility of consideration of eventual excess of offer of factors locais; (d) possibility of penalização of eventual shortage of offer of factors locais.

In 1981, COSENZA consolidates the bases for the Modelo Cosenza of Industrial Location (current MAH-CC). Already incorporating Lógica Fuzzy beginnings and using linguistic variables, MAH-CC was used by COPPE in the Project of Industrial Location for the Zona Oeste of the Metropolitan Area of Rio de Janeiro, developed for the Clerkship of Planning of the Municipal district of Rio de Janeiro and in the Projeto COPPE - FEEMA - IBAM of Revision of the Industrial Zoning of the Metropolitan Area of Rio de Janeiro—unfolding of the project developed for FUNDREM (1975). In 1993, SWEET ORANGE revised the applied concepts to the offer mensuração and it disputes, and operacionalizou the model in system C.A.D. associated to database.

In 1997 MAH-CC was applied as tool to evaluate the acting of the internal atmosphere and the quality of the services condominiais in APO of the Building of Services of BNDES, (COSENZA et al 1997; RHEINGANTZ et al 1977). Used as complement to the classic procedures of APO—analysis walkthrough, questionnaire and interviews with the users—the model evidenced the possibility to outline the limitations of the mensuração processes based on the traditional binary logic.

In 2000, ROCK'S dissertation and the thesis of RHEINGANTZ, adaptando the concepts originally elaborated for industrial location, they demonstrate the aplicabilidade of MAH-CC for: (the) to check larger agility in the electric outlet of decisions, (b) to systematize the operative procedures that they involve the conception, the production or the evaluation of buildings, (c) to confirm or to already monitor situations established, and (d) to investigate which profile of building offer favored certain location or acquisition well happened.

## Description of the Model

MAH-CC is, basically, an operation with head offices that represent, when applied to the study of buildings, the demand for space and for property resources of office on the part of (h) types or groups of organizations, or users, expresses through (n) acting attributes, and the offer of the (n) acting attributes represented for (m) projects or alternatives of buildings of offices, where:

**$a_{ij}$  (resulting coefficient of the degree of importance of the attribute  $j$  with relationship to the user  $i$ ;**

**$b_{jk}$  (resulting coefficient of the level of the attribute  $j$  with relationship to the project or alternative  $k$**

Your algorithm consists of the comparison of the head offices of Demand and of Offer:

### Attributes of Acting

The comparison between offer and demand has as base a group of requirements e/ou present restrictions in the considered buildings, that are also necessary to the users' satisfaction. To this requisitos/restrições group we denominated acting attributes, that can be mensurados in several ocorrência/exigência levels.

### Head office of Demand [ $a_{ij}$ ] $h \times n$

The Head office of Demand (Table 1) it relates the demand for space e/ou property resources, expresses through a group (n) of attributes of acting of the buildings (columns), with the (h) different tipos/grupos of organizations or users (lines) considered in the study.

**Table 1: Head office of Demand (of the Users)**

<b>h x n</b>	<b>Acting attributes</b>
<b>Types of Users</b>	<i>possible values of the element</i> $a_{ij} = \text{THE, B, C or D}$

This head office formalizes the levels of demand of property acting reasonable to each organization according to the acting of your functions. The values attributed to each element  $a_{ij}$  they are classified in function of the demand noticed the users e/ou of the specialists' opinion close to, represented by scale of values. Although the scale of values can be modified in the largest's function or smaller precision wanted in the gauging of the results (Illustration 1), this study considers a scale of 4 values [THE, B, C and D], corresponding the:

(The) crucial—the absence of the attribute makes unfeasible the success of the enterprise, characterizing an expectation that should be assisted prioritariamente.

(B) condicionante—the absence of the attribute commits the success of the enterprise but it doesn't make unfeasible him/it, characterizing an expectation that should be assisted with some priority.

(C) little condicionante—the absence of the attribute doesn't commit the success of the enterprise, but it turns him/it less attraction, characterizing an expectation that is without priority, for being just desirable.

(D) irrelevante—the absence of the attribute doesn't commit the success of the empreendimento, characterizing a total demand absence.

**Head office of Offer [bik] n x m**

The Head office of Offer (Table 2) it relates readiness of the (n) acting attributes (lines) with the (m) projects or alternatives of buildings (columns) considered in the study.

**Table 2: Head office Of Offer (of Buildings)**

<b>n x m</b>	<b>Projetos/Alternativas of Buildings</b>
<b>Acting attributes</b>	<i>possible values of the element</i> $b_{jk} = \text{THE, B, C or D}$

To example of the Head office of Demand, the elements  $b_{jk}$  are classified by the operator (or for a group of specialists) in a scale of 4 values [THE, B, C and D], corresponding the:

(The) excellent: attribute found in full conditions of operacionalidade, reflecting the state of the art in reliability terms, quality and regularity; characterizing a privileged situation.

(B) good: attribute found in desirable conditions of operacionalidade in reliability terms, quality and regularity, characterizing a normality situation.

(C) precarious: attribute found in conditions a little acceptable of operacionalidade in reliability terms, quality and regularity, characterizing a situation of relative precariedade.

(D) ruim/inexpressivo: attribute found in small intensity or it is not found, characterizing a situation of shortage.

**Head office of Priorities of Occupation [cik] h x m = [aij] h x n ([bjk] n x m)**

The Head office of Priorities of Occupation (Table 3) it is resulting of the operation multiplication matricial (I compare) among the demand head offices and of offer and it confronts the types of users e/ou organizations with construction alternatives. As in an operation classic matricial, the confrontation of the element line of the demand head office with the element column of the offer head office determines the calculation to be made among the values THE, B, C and D.

**Table 3: Head office of Priorities of Occupation**

<b>h x m</b>	<b>Projects or Alternatives of Buildings</b>
<b>Types of Users</b>	<i>possible values of the element</i> $c_{ik}$ : to see comparison table

The operation matricial ( $a_{ij}$  ( $b_{jk}$ ), it obeys the rule of suitable operation in the Table of Comparison (Table 4), where [n] it is the number of attributes considered in the model, and the values adopted during the comparison they represent, when close to 1, a balance among offer and it disputes. In the measure in that the offer tends to be smaller than the demand, the compared value tends the [0]; when the offer tends to be superior to the demand, this value tends the  $[1+x/n]$ .

**Table 4: Cotejo Demanda (Offer)**

aij (bjk)	Offer			
	D	C	B	A
D	1	1 + 1/n	1 + 2/n	1 + 3/n
C	1 - 1/n	1	1 + 1/n	1 + 2/n
B	1 - 2/n	1 - 1/n	1	1 + 1/n
A	0	1 - 2/n	1 - 1/n	1

**Mathematical interpretation of the operator (Table 4)**

MAH-CC considers the possibility certain edificio/tipologia of buildings to present attributes more or less than demanded them by an user tipo/grupo. The mathematical representation of the combination Presents x it Disputes, it obeys the suitable formulations (Table 4):

$$1 \pm X/n$$

where,

**X = value attributed in function of the amount of oferta/demanda levels considered in the study**

**n = number of acting attributes considered**

**X/n = value acrescído/subtraído to the number 1, indicates offer excesso/carência in relation to the demand of a determining attribute, in other words, the possibility to obtain value larger or smaller than 1 for an attribute of the building whose offer is, respectively, larger or smaller than the demanded need.**

**Picture 1: Mathematical Interpretation of the Table 4**

Se linha de A for	Se coluna de B for	Então C será	Comentários
A	A	1	Primeiro Caso
A	B	1-1/n	
A	C	1-2/n	
A	D	0	
B	A	1+1/n	Demais Casos
B	B	1	
B	C	1-1/n	
B	D	1-2/n	
C	A	1+2/n	
C	B	1+1/n	
C	C	1	
C	D	1-1/n	
D	A	1+3/n	
D	B	1+2/n	
D	C	1+1/n	
D	D	1	

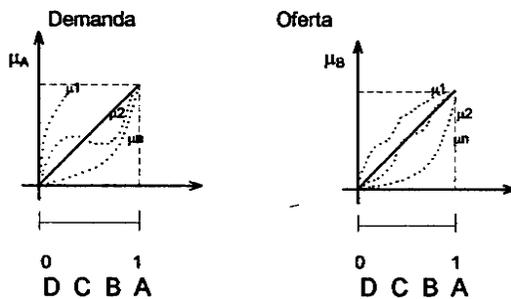
Onde n é igual ao número de fatores gerais demandados

*First Case: If it represents HER/IT demanded factors of CRUCIAL nature for the users' groups, and your offer in certain building it be considered EXCELLENT, the value numeric resultant of the operation will be same to 1 (adaptation condition among Offer x Disputes). For the other situations of a certain factor with CRUCIAL demand, a progressive factor of correction is implemented (debit) in the table, representing to growing discrepancy between demand need and offer capacity. In the case of a factor with CRUCIAL demand and it presents RUIM/INEXISTENTE, the resulting numeric value it will be considered null.*

*Other Cases: they represent situations of buildings where the offer of an or more attribute goes superior to your demand on the part of an or more*

*organization. In way similar to the of demand excess (first case), a progressive factor of correction is implemented (credit) representing to growing superiority of the offer capacity with relationship to the demand needs.*

**Figura 1**



**Observation fuzzy: there are not limits for the inference degrees attributed for the Offer and for the Demand.** The infinite number of reasonable intervals among 0 [I zero] and 1 [a] it makes possible to check larger or smaller precision to the result of the confrontation it Presents x it Disputes. In the same way, they are countless the functions fuzzy ((x) continuous and growing reasonable among them, and not just the lineal, checking subjectivity to the intermediate values of the ends 0 and 1. The applications of MAH-CC are not just restricted to the scale of 4 values (THE, B, C, D) adopted in this study.

Diagonal head office [eij] h x h

The Diagonal Head office (Table 5) it gathers two important characteristics considered in the methodological process of MAH-CC. Being a square head office, it possesses the number of lines same to the number of columns, that is same to the number of users' groups. Your main diagonal is composed by the inverse of the

somatório of elements disputed by each organization. At the same time that the operation with the Diagonal Head office preserves the resulting structure of the Head office of Priorities of Occupation (Table 3), her “it embeds” for each one of your elements, a divisor  $1/n$  ( $n =$  in the one of factors disputed by each organization, making possible an instantaneous capacity of interpretation of the resulting final head office, call of Head office of Occupational Indexes (Table 6).

Under the aspect of the punctuation in the Head office of Priorities of Occupation (Table 3), a situation that doesn't present nor excess and nor offer shortage, it is represented for:

$$1 \times n = n$$

where

$l =$  it is the punctuation “adjusted”, according to the previous picture, where the offer is same to the demand (AA, BB,...)

$n =$  it is the number of repetitions of the operation, represented by the number of combinations oferta/demanda, in other words, the number of attributes.

**Table 5: Diagonal Head office**

$h \times h$	l columnas
i linhas	valores possíveis de $e_{il}$ : 0: se $i \neq l$ $1/n$ : se $i = l$

**Head office of Occupational Indexes  $[dlk]h \times m = [eil]h \times h \times [cik]h \times m$**

Finally, through the ordinary product of the Head office of Priorities of Occupation (Table 3) for the Diagonal Head office (Table 5), they are obtained the occupation indexes in the form of a Head office of Occupational Indexes (Table 6), of size  $(h) \times (n)$ :

**Table 6: Head office of Occupational Indexes**

$h \times n$	Atributos de desempenho
Tipo de Usuários	valores possíveis de $d_{lk}$ : $[e_{il}]_{h \times h} \times [c_{ik}]_{h \times m}$

The final result admits a generic interpretation (independent of the value  $n$  or of the purpose of the application), summarized in the following way:

- for values of superior  $dlk$  to 1 (indication of offer excess)
- for  $dlk$  values same to 1 (indication of an ideal situation, perfectly adjusted)
- for values of inferior  $dlk$  to 1 (indication of offer shortage).

**AN EXAMPLE OF APPLICATION OF MAH-CC IN THE EVALUATION OF ACTING OF AC**

With the objective of illustrating an application of MAH-CC, to follow a simulation of acting evaluation it is presented (RHEINGANTZ 2000) of a hypothetical group of 6 buildings (e1, e2, e3, e4, e5 and e6), your nested second offer possibilities by the occupational needs (demands) specific of 8 different profiles organizacionais.

For the best characterization of the acting attributes, 6 general attributes were used:

- (a1) Corporate Attributes–Location, relationship with the neighborhood, imaginabilidade, cost of the installation, operational cost and real estate value.
- (a2) Attributes of Infrastructure–Conditions of the land, access of vehicles, terrestrial transport, transport aerial and nets of telecommunications, of electric power, of water, of sewers, of drainage and of public illumination.
- (a3) Constructive Attributes–it Forms, constructive quality, garage, technological flexibility, maintenance easiness.
- (a4) Attributes of Space–useful Area, flexibility of the lay-out, center of conventions, support spaces, complementary spaces.
- (a5) Attributes of Ambiência Intern–Accessibility, circulation interns and comforts: aeróbicos, thermal, visual, auditory and tactile.
- (a6) Attributes of Resources and Property Services–property Administration, systems of safety and property resources.

The organizations were contained according to a level of common demand, or “general scenery of demands”:

- (1) Traditional demands or Conservatives: psychological clinic (h2), advocacy company (h4).
- (2) demands Revitalizadoras or of Balance: consultoria of RH (h5), clinic of managerial administration (h7), administration of real estate assets (h8).
- (3) demands Innovative or Renovating: internet provider (h1), televendas (h3), I support aerial agency (h6).

The simulation of the general attributes produced the following results (Tables 7, 8 and 9):

Table 7: Head office of Demand

USERS	ATTRIBUTES >	a1	a2	a3	a4	a5	a6
h1	Provider Internet	C	A	B	D	A	A
h2	Clinic of Psychology	B	B	C	C	A	D
h3	Televendas	D	C	D	C	D	B
h4	Advocacy (medium load)	B	A	C	D	C	C
h5	Consultoria in RH	B	A	B	A	A	A
h6	I support–Aerial Agency	B	C	B	B	B	A
h7	Consultoria Discharge Managerial Administration	B	A	A	A	A	A
h8	Administration of Real estate Assets	A	A	A	B	B	A

Table 8: Head office of Offer

ATTRIBUTES	BUILDINGS >	e <sub>1</sub>	e <sub>2</sub>	e <sub>3</sub>	e <sub>4</sub>	e <sub>5</sub>	e <sub>6</sub>
a1	Corporate	C	B	C	A	A	B
a2	Infrastructure	C	B	B	B	B	B
a3	Constructive	B	B	C	B	A	A
a4	Space	D	B	D	A	B	A
a5	Ambiência Interns	C	B	B	C	A	A
a6	Property Recursos/Serviços	D	C	D	B	A	A

Table 9: Head office of Occupational Indexes

USERS	BUILDINGS >	e <sub>1</sub>	e <sub>2</sub>	e <sub>3</sub>	e <sub>4</sub>	e <sub>5</sub>	e <sub>6</sub>
h1	Provider Internet	0	0,99	0	1,08	1,13	1,13
h2	Clinic of Psychology	0,90	1	0,93	1,16	1,22	1,21
h3	Televendas	1,05	1,22	1,08	1,30	1,36	1,36
h4	Advocacy (medium load)	0,94	1,11	0,96	1,19	1,24	1,24
h5	Consultoria in RH	0	0,88	0	0,96	1	1
h6	I support–Aerial Agency	0	0,99	0	1,08	1,14	1,14
h7	Consult. High Managerial Administration	0	0,85	0	0,88	0,93	0,99
h8	Gerenciam. Of Real estate Assets	0	0,88	0	0,96	1	1
<b>AVERAGE FOR BUILDING</b>		<b>0,36</b>	<b>0,99</b>	<b>0,37</b>	<b>1,08</b>	<b>1,13</b>	<b>1,13</b>

The results obtained with this simulation they present, in a first analysis, the expected consistence, once any enterprise direcionamento was not detected to an inadequate building. The alternatives that, for knowledge factual, they would be already discarded, they punctuated with value 0, while the alternatives that possuim offer excess punctuated above the value 1. These conclusive observations are based on RHEINGANTZ (2000), that details the profile of the buildings and of the enterprises considered in this exemplificação, and he/she brings larger considerations on the mechanisms of analysis of results.

## FINAL CONSIDERATIONS

This work tries to evidence that, looking for instruments consecrated in other knowledge areas, it is possible to attribute a new meaning for the process of acting evaluation. The adaptation of an instrument of acting analysis, whose modelling is based in the use of the logic fuzzy and of linguistic variables, it made possible the comparison among different buildings in function of the users' expectations.

Great part of the success that one hope to obtain during the development of applied MAH-CC to the acting evaluation rests in the discerning conceituação of the attributes that they will be considered in each case study, and in the mechanisms that will allow to confront with that level each one of these attributes will be presented or disputed. Only the knowledge factual of the architecture of office buildings, ally to the domain of the reasoning fuzzy, they will allow that initiatives in this sense are well happened. The employment of methodologies that you/they organize and they classify the information, it seems us more appropriate than the electric outlet of

restricted decision just to the accumulated knowledge in an aleatory way. The alternative of employment of variables linguísticas and logic fuzzy comes to check a more scientific character to the activities that, for your nature, they do without of some subjectivity degree.

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