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**Bachelor of Technology**

In

**Computer Science and Engineering**

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Submitted by

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**Andhra Pradesh – 522 240**

**[December, 2022]**

# Certificate

Date: 14-Dec-22

This is to certify that the work present in this Project entitled “**Hotel Ranking using Fuzzy AHP**” has been carried out by **Sarika Sumanth** under my/our supervision. The work is genuine, original, and suitable for submission to the SRM University – AP for the award of Bachelor of Technology in **School of Engineering and Sciences**.

**Supervisor**

(Signature)

Prof. / Dr. Sushil kumar tiwari

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**ABSTRACT:**

World is full of places to experience, with a rapid growth in population day by day.

There are many people around the world who want to experience nature, cultures, wonders and many other. Traveling has become a very common and interesting part of everyone’s life. People travel long distances to visit and feel the amazing wonders of the world. In this process, the main part is the residence they choose to stay. It is important to choose a good hotel, which gives us good hospitality. Due to lack of communication or knowledge most of the tourists find it very difficult and annoying to get a hotel of their liking. The main goal of this model is to facilitate people who want to select a hotel according to their need and liking. We now live in a digital era where everything is available instantaneously. Innovations in technology have touched many facets of our daily lives, both personal and professional; they have reached into every corner of the business world; they have reshaped the expectations of customers and changed the way we communicate, shop, travel etc. It enables them to choose their rooms at the time of booking, and more advanced systems even allow customers to select extras such as wine, flowers, fruit or other niceties to be placed in their room at the time of arrival (or later).

In recent times in this fast-moving world, technological advancements had made the work simpler. But people are still facing the problems in selecting the hotel to stay. according to Wikipedia on an average.

Over 17.9 million foreign tourists arrived in India in 2019 and they visit various tourist places on their holidays and one of the major problems faced by them was booking hotels. Many foreigners are getting scammed by the fraudsters in case of hotel booking.

keywords: fuzzy AHP-hotels-ranking-software-criteria’s-attributes

**Abbreviations:**

AHP-Analytic Hierarchy Process

COA- Centre of Area

GM- Geometric Mean

B – Budget

HP – Hospitality

H – Health

HL – Hotel Location

HA – Hotel Amenities

TM – Testimonials

BS - Booking Service

FTD - Fun Things to Do

M - Meals

BR - Branding

PR - Preferences

S - Service

S&S – Safety and Security

HF - Hidden Fees

# 

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**Introduction:**

Our model is used to rank the hotels according to the criteria’s ranking makes it easier for travellers to find the right property for them, and helps you attract the right kind of guests. It also gives an overview of the hotel without having to check the hotel by themselves. this paper is an attempt to propose an innovative method, based on fuzzy logic to assign the rank to hotels based on the criteria or attributes.

This model is used to help the people who are in need of hotel selection according to their preferences. In this model we are using one of the decision-making techniques known as fuzzy AHP.

Hotel star rating system is one of the main ways hotels are assessed and rated. This is important, because potential customers may look at the star ratings of a hotel before deciding whether to book a room there. Fuzzy AHP was proposed by Berkley.

The techniques are categorised by the four aspects of developing a fuzzy AHP model:

(i) representation of the relative importance for pairwise comparison

(ii) aggregation of fuzzy sets for group decisions and weights/priorities

(iii) defuzzification of a fuzzy set to a crisp value for final comparison

(iv) consistency measurement of the judgements. These techniques are discussed in terms of their underlying principles, origins, strengths and weakness.

**CRITERIA’S:**

BUDGET: It is the important aspect to take care while selecting hotel.every one wants to go with budget friendly that satisfies the requirement.

Hospitality: Hospitality matters because it feeds the most basic human need that we all have, to feel loved and accepted.

* behaviour of staff
* Guiding customers from check-in to check-out

Health: Good hygiene practices of staff helps to prevent bacteria from spreading to food.

* Sanitized rooms and staff
* pest control
* Thermal scanning

Hotel Location: location is the most significant aspect determining the development of the hotel business and accessibility to the common and important needs.

* Distance from Airport
* Distance from Railway station
* Distance from shopping mall
* Distance from Tourist places
* Distance from hospital

Hotel Amenities: Amenities are required to facilitate the costumers and can be the reason they leave positive feedback or even choose to book in the first place.

* Free Wi-Fi
* geyser
* Air conditioner
* parking facility
* Television
* Elevator
* Attached wash room
* power sockets

Testimonials or Reviews: Helps the customers to have a quick view of previous customers experience.

Booking system: enables guests to schedule dates and length of stay, room selection, extras, and payment all in one place.

* Website booking
* Offline booking

Fun things to do: It allows customers to have a good break from work and gives relief from the stress.

* Indoor games
* club
* children play ground

Meals: The Hotel food & beverage is widely recognized as a key contributor to a hotel's positioning within its market.

Branding: Branding helps to create a lasting impression on your target audience

* name and looks of the hotel
* location of the hotel

Preference: Giving choice to customers to choose their preference will helps them to choose according to their need.

* room and bed preference
* food preference

Service: an excellent customer service will improve the relationship between your guests and your establishment

* Laundry service
* Doctor on call
* Water service
* Electric service
* Daily house keeping

Safety and security: protect guests from any mishap leading to their death and loss of baggage.

* CCTV
* Fire Extinguishers
* First aid kits
* power back

Hidden fees: Paying more than Customer originally intended to pay will make him frustrating.

* Paid On-site Parking
* Late checkout
* early checking
* Room service

Other benefits:

* spa
* saloon
* Bar
* Conference room
* Banquet hall

**METHODOLOGY:**

FUZZIFICATION:

Fuzzification is the process of converting a crisp input value to a fuzzy value that is performed by the use of the information in the knowledge base.

converting linguistic terms into membership function.

**Equally moderately strongly very strongly Extremely**

μM (x)

**0.5**

**0 1 2 3 4 5 6 7 8 9 11**

Figure:1 Fuzzy scale of relative importance.

there are others membership functions like trapezoidal membership function and bell-shaped member ship function.

the fuzzy value is represented as μ(x).

**1**

0 1 2 3

Figure: 2 Membership function

the triangular part in the diagram is called membership function.

* the number associated with membership function is called fuzzy numbers.
* these three numbers are the lower, middle, upper ends of the triangle on the x-axis.
* it is seen that assigning a single number to any term was not justified

example: moderate=3 intermediate=4 but what about 2.5 or 3.5

* to solve the above problem fuzzy numbers are used.

### µÃ(x)= Ã= (1,2,3)

Fuzzy Number

Equation 1

* IN fuzzy AHP scale of relative importance the crisp numbers are replaced with fuzzy numbers.
* Fuzzy analytic hierarchy process:

1)CREATION OF PAIR WISE COMPRISION TABLE

It gives the relative importance of various attributes with respect to the goal. ->pair wise comparison matrix is created with the help of scale of relative importance.

* the values in the scale are crisp numeric values
* the size of the pair wise matrix is equivalent to the number of criteria used in decision making process.
* -the value in the pair wise matrix depends on the decision maker.

2)Fuzzification

replacing the crisp numeric values in the matrix with fuzzy numbers.

replacing the reciprocal numbers with fuzzy number.

Ã = (l, m, u)-1=(1/u,1/m,1/l)

Equation 2

3)Fuzzy Geometric mean is used for calculating the weights

Ã1 ⊗Ã2 = (l1, m1, u1) ⊗ (l2, m2, u2) = (l1\*l2, m1\*m2, u1\*u2)

Equation 3

4)Fuzzy weights

ῶi = r̃i ⊗ (r̃1 ⊗ r̃2 ⊗ …⊗ r̃n)-1

Equation 4

5)DE-FUZZIFICATION

DE-FUZZIFICATION is the process to get crisp numeric values.

Centre of Area (COA) wi = (l+m+u)/3

Equation 5

6)FAHP

weights are normalized to get sum as 1 by dividing the weights with total weights.

Example:

|  |  |  |
| --- | --- | --- |
|  | weights | Normalized weight |
| price | 0.633 | 0.633/1.508=0.601 |
| location | 0.145 | 0.145/1.058=0.138 |
| amenities | 0.207 | 0.207/1.508=0.197 |
| service | 0.068 | 0.068/1.058=0.065 |
| Total | 0.633+0.145+0.207+0.068=1.058 | 0.601+0.138  0.19+0.065=1 |

TABLE (1): Example of normalized weight.

|  |  |  |
| --- | --- | --- |
| Importance | Scale | Fuzzy numbers |
| Equal | 1 | (1,1,1) |
| Moderate | 3 | (2,3,4) |
| Strong | 5 | (4,5,6) |
| Very strong | 7 | (6,7,8) |
| Extremely strong | 9 | (9,9,9) |
| Intermediate values | 2  4  6  8 | (1,2,3)  (3,4,5)  (5,6,7)  (7,8,9) |

TABLE (2): Scale of relative importance with fuzzy numbers

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B | HP | H | HL | HA | TM | BS | FTD | M | BR | PR | S | S&S | HF |
| B | 1 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 5 | 3 | 5 | 3 | 5 |
| HP | 1/3 | 1 | 3 | 3 | 3 | 5 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 5 |
| H | 1/3 | 1/3 | 1 | 5 | 7 | 7 | 5 | 7 | 5 | 5 | 5 | 5 | 3 | 7 |
| HL | 1/5 | 1/3 | 1/5 | 1 | 5 | 5 | 3 | 5 | 3 | 5 | 3 | 3 | 4 | 3 |
| HA | 1/3 | 1/3 | 1/7 | 1/5 | 1 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 4 |
| TM | 1/3 | 1/5 | 1/7 | 1/5 | 1/4 | 1 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 |
| BS | 1/3 | 1/3 | 1/5 | 1/3 | 1/3 | 1/2 | 1 | 2 | 3 | 4 | 3 | 3 | 2 | 4 |
| FTD | 1/3 | 1/5 | 1/7 | 1/5 | 1/3 | 1/3 | 1/2 | 1 | 2 | 3 | 4 | 2 | 2 | 2 |
| M | 1/3 | 1/3 | 1/5 | 1/3 | 1/3 | 1/3 | 1/3 | 1/2 | 1 | 2 | 2 | 4 | 3 | 3 |
| BR | 1/5 | 1/3 | 1/5 | 1/5 | 1/3 | 1/2 | 1/4 | 1/3 | 1/2 | 1 | 3 | 2 | 2 | 2 |
| PR | 1/3 | 1/3 | 1/5 | 1/3 | 1/4 | 1/3 | 1/3 | 1/4 | 1/2 | 1/3 | 1 | 2 | 3 | 2 |
| S | 1/5 | 1/3 | 1/5 | 1/3 | 1/3 | 1/2 | 1/3 | 1/2 | 1/4 | 1/2 | 1/2 | 1 | 3 | 3 |
| S&S | 1/3 | 1/3 | 1/3 | 1/4 | 1/3 | 1/2 | 1/2 | 1/2 | 1/3 | 1/2 | 1/3 | 1/3 | 1 | 5 |
| HF | 1/5 | 1/5 | 1/7 | 1/3 | 1/4 | 1/2 | 1/4 | 1/2 | 1/3 | 1/2 | 1/2 | 1/3 | 1/5 | 1 |

TABLE (3): Pair-wise comparison matrix.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B | HP | H | HL | HA | TM | BS | FTD | M | BR | PR | S | S&S | HF |
| B | (1,1,1) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) |
| HP | (1/4,1/3,1/2) | (1,1,1) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) |
| H | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1,1,1) | (4,5,6) | (6,7,8) | (6,7,8) | (4,5,6) | (6,7,8) | (4,5,6) | (4,5,6) | (4,5,6) | (4,5,6) | (2,3,4) | (6,7,8) |
| HL | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1,1,1) | (4,5,6) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (3,4,5) | (2,3,4) |
| HA | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1,1,1) | (3,4,5) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (3,4,5) | (2,3,4) | (2,3,4) | 4 |
| TM | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1/5,1/4,1/3) | (1,1,1) | (1,2,3) | (2,3,4) | (2,3,4) | (1,2,3) | (2,3,4) | (1,2,3) | (1,2,3) | (1,2,3) |
| BS | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (2,3,4) | (3,4,5) | (2,3,4) | (2,3,4) | (1,2,3) | (3,4,5) |
| FTD | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (2,3,4) | (3,4,5) | (1,2,3) | (1,2,3) | (1,2,3) |
| M | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (1,2,3) | (3,4,5) | (2,3,4) | (2,3,4) |
| BR | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (2,3,4) | (1,2,3) | (1,2,3) | (1,2,3) |
| PR | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1,1,1) | (1,2,3) | (2,3,4) | (1,2,3) |
| S | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/3,1/2,1) | (1,1,1) | (2,3,4) | (2,3,4) |
| S&S | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/3,1/2,1) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1,1,1) | (4,5,6) |
| HF | (1/6,1/5,1/4) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/3,1/2,1/1) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1,1,1) |

TABLE (4) : Pair wise comparison matrix with fuzzy numbers.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B | HP | H | HL | HA | TM | BS | FTD | M | BR | PR | S | S&S | HF | Fuzzy  GMV |
| B | (1,1,1) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2.32,  3.21,  4.07) |
| HP | (1/4,1/3,1/2) | (1,1,1) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (4,5,6) | (1.9  ,2.64  ,3.41) |
| H | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1,1,1) | (4,5,6) | (6,7,8) | (6,7,8) | (4,5,6) | (6,7,8) | (4,5,6) | (4,5,6) | (4,5,6) | (4,5,6) | (2,3,4) | (6,7,8) | (2.61  ,3.21  ,3.9) |
| HL | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1,1,1) | (4,5,6) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (4,5,6) | (2,3,4) | (2,3,4) | (3,4,5) | (2,3,4) | (1.44  ,1.9  ,2.4) |
| HA | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1,1,1) | (3,4,5) | (2,3,4) | (2,3,4) | (2,3,4) | (2,3,4) | (3,4,5) | (2,3,4) | (2,3,4) | (3,4,5) | (1.06  ,1.43  ,1.85) |
| TM | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1/5,1/4,1/3) | (1,1,1) | (1,2,3) | (2,3,4) | (2,3,4) | (1,2,3) | (2,3,4) | (1,2,3) | (1,2,3) | (1,2,3) | (0.63  ,0.94  ,1.27) |
| BS | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (2,3,4) | (3,4,5) | (2,3,4) | (2,3,4) | (1,2,3) | (3,4,5) | (0.74  ,1.06  ,1.47) |
| FTD | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (2,3,4) | (3,4,5) | (1,2,3) | (1,2,3) | (1,2,3) | (0.52  ,0.76  ,1.05) |
| M | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (1,2,3) | (1,2,3) | (3,4,5) | (2,3,4) | (2,3,4) | (0.54  ,0.76  ,1.08) |
| BR | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1,1,1) | (2,3,4) | (1,2,3) | (1,2,3) | (1,2,3) | (0.41  ,0.58  ,0.83) |
| PR | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1,1,1) | (1,2,3) | (2,3,4) | (1,2,3) | (0.37  ,0.52  ,0.74) |
| S | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/3,1/2,1) | (1,1,1) | (2,3,4) | (2,3,4) | (0.37  ,0.5  ,0.76) |
| S&S | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/3,1/2,1) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/4,1/3,1/2) | (1,1,1) | (4,5,6) | (0.36  ,0.48  ,0.74) |
| HF | (1/6,1/5,1/4) | (1/6,1/5,1/4) | (1/8,1/7,1/6) | (1/4,1/3,1/2) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/5,1/4,1/3) | (1/3,1/2,1) | (1/4,1/3,1/2) | (1/3,1/2,1) | (1/3,1/2,1/1) | (1/4,1/3,1/2) | (1/6,1/5,1/4) | (1,1,1) | (0.25  ,0.33  ,0.48) |

TABLE (5): Pair wise comparison matrix with fuzzy geometry mean.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Fuzzy  Geometry  Mean value | Fuzzy weights | COA  (Centre  of Area) | After  Normalization |
| B | (2.32, 3.21, 4.07) | (0.09, 0.16, 0.28) | (0.18) | 0.17 |
| HP | (1.9, 2.64, 3.41) | (0.08, 0.13, 0.24) | (0.15) | 0.14 |
| H | (2.61, 3.21, 3.9) | (0.1, 0.16, 0.27) | (0.18) | 0.17 |
| HL | (1.44, 1.9, 2.4) | (0.06, 0.1, 0.17) | (0.11) | 0.1 |
| HA | (1.06, 1.43, 1.85) | (0.04, 0.07, 0.13) | (0.08) | 0.08 |
| TM | (0.63, 0.94, 1.27) | (0.03, 0.05, 0.09) | (0.06) | 0.06 |
| BS | (0.74, 1.06, 1.47) | (0.03, 0.05, 0.1) | (0.06) | 0.06 |
| FTD | (0.52, 0.76, 1.05) | (0.02, 0.04, 0.07) | (0.04) | 0.04 |
| M | (0.54, 0.76, 1.08) | (0.02, 0.04, 0.08) | (0.05) | 0.05 |
| BR | (0.41, 0.58, 0.83) | (0.02, 0.03, 0.06) | (0.04) | 0.04 |
| PR | (0.37, 0.52, 0.74) | (0.01, 0.03, 0.05) | (0.03) | 0.03 |
| S | (0.37, 0.5, 0.76) | (0.01, 0.03, 0.05) | (0.03) | 0.03 |
| S&S | (0.36, 0.48, 0.74) | (0.01, 0.02, 0.05) | (0.03) | 0.03 |
| HF | (0.25, 0.33, 0.48) | (0.01, 0.02, 0.03) | (0.02) | 0.02 |
|  |  |  | SUM=1.60 | SUM=1 |

TABLE (6): Pair wise comparison matrix with fuzzy geometry mean, COA.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Hotel 1 | Hotel 2 | Hotel 3 |
| B | 0.17 | 0 | 0 |
| HP | 0 | 0.14 | 0.14 |
| H | 0.17 | 0.17 | 0 |
| HL | 0.1 | 0 | 0.1 |
| HA | 0.08 | 0 | 0.08 |
| TM | 0 | 0 | 0.06 |
| BS | 0.06 | 0.06 | 0.06 |
| FTD | 0.04 | 0 | 0 |
| M | 0.05 | 0.05 | 0 |
| BR | 0.04 | 0 | 0.04 |
| PR | 0.03 | 0.03 | 0 |
| S | 0 | 0 | 0.03 |
| S&S | 0.03 | 0.03 | 0.03 |
| HF | 0 | 0.02 | 0 |
| SUM | 0.77 | 0.50 | 0.54 |

Table (7): Hotels with total criteria weights.

From the above table, since Hotel 1 having higher weightage of criteria. We conclude the hotel ranking as 1st Hotel 1 ,2nd Hotel 3 and then Hotel 2.

**DISCUSSION:**

AHP is an effective problem-solving and multi criteria decision making methodology and a structured technique for organizing and analysing complex problems based on mathematics and psychology. It chooses the factors that are important for making that decision. The AHP is insufficient in dealing with the fuzziness and insufficient, uncertain Data, insignificant human judgement and the fuzzy environment. The fuzzy AHP is an advanced analytical hierarchal method developed from the AHP (Analytical hierarchy process). As an extended version of AHP Technique, Fuzzy AHP use is considered when inaccuracy in decision- making must be removed.

In making the decision to a problem the pair-wise comparison tables are important. In classical AHP, directly the numerical values as 1,2,3 etc, are used as weights for evaluation of these criteria If the problem where the decision-making process taking place is fuzzy, then the fuzzy numbers are used for evaluation of the criteria with the alternatives via pair wise comparisons. In AHP, the priority calculations are conducted with respect to the alternatives criteria and extended analysis is conducted in Fuzzy AHP to make the final decision.

In the classic AHP method, the weights in the pair wise comparison table cannot be zero, if the criteria weight is less than the other criteria weight then this criteria weight would be near to zero but not equal to zero. In the Fuzzy AHP method, the weights of pair wise comparison can be zero, if it is less important than the other criteria’s which has no importance in making final decision. The fuzzy AHP will totally neglects the criteria which is less important than the alternative criteria whereas the classical AHP uses this criterion with small weight instead of zero.

This is an advantage of Fuzzy AHP to present the important information which is used to make the right decision. So that the decision makers can focus on more important criteria rather than less important criteria. The more important criteria should be taken into consideration to take the fuzziness into account in order to decrease the risk of making the wrong decisions. The main point is, if the data/information/evaluation are certain/correct, classical AHP is preferred; if the data/information/evaluation are correct/certain, Fuzzy ahp Method should be preferred.

**CONCLUDING RECORDS:**

The paper proposed is the Fuzzy Multi-criteria decision making AHP to select the best hotel for the users or tourists. This is a real-world problem where we use Fuzzy AHP technique to find a solution. For this kind of problems, we can use AHP also but we use Fuzzy because the information/data is uncertain. According to the results of our research the users/tourists are much concerned about the Budget or the cost to stay in hotel (0.17), Health (0.17), Hospitality (0.14). The health and hospitality have same weight, that means both has equal importance. Everyone wants to safe and the cost should be under the budget. From the results lest importance has hidden fees (0.2) and all are not concern about that.

Based on criteria weights the hotel ranking is given. The hotel which satisfies their customers will be numbers top in ranking. The total purpose of this study is to develop a scientific framework for the evaluation of criteria for selected hotels. Aside from the user’s hotel management can also benefit from this paper. According this paper the hotel management can maintain their good factors and improve the remain factors. During these days in all the country’s tourism is increased, so this paper may be worth doing some more research.

**FUTURE WORK:**

we will strive to come up with implementation which will decide the best hotel for the customer like an extension or add on for this project using fuzzy AHP In which we are finding the best hotel according to our criteria or attribute and we also seek to implement ranking system in more real time cases using fuzzy AHP which is decision-maker to evaluate the preferences of the customer within a reasonable interval with precise and reliable result