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Recruitment of Personnel in a Bank Using AHP-FLP Model

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Abstract

For every organization, department of human resource plays very important role as it can select right personnel who can render quality service to the clients of organization thereby giving competitive advantage to it. Hence selection process should be designed by considering various criteria as per choice of employer for selecting best employee for particular post in an organization. In this paper, various selection criteria have been decided for the post of manager and cashier in private bank with the integration of AHP methodology and fuzzy multi-objective linear programming model; selection of best employee for these posts has been made. It was observed that AHP-FLP model is more relevant than AHP method for the selection of employee in bank.

Key words

Analytic hierarchy process, Fuzzy multi objective linear programming model, Human resource.

1. Introduction

Human resource is a base of any enterprise. In this competitive world, every organization has to strive really hard for survival. The success depends largely on the quality of service rendered to the clients, which depends on the competence and the quality of the employees of the organization [1]. This means that success of the organization depends on well trained, dedicated and quality employees. So selecting right personnel becomes an important function of HR department for meeting future survival demands. For recruiting the candidates, the organization has to map carefully the available human resources because they can provide the competitive advantage for the organization [14]. The practice has been already started in many of the organizations to select employee by evaluating their skills and capabilities. Successful recruitment depends upon finding people with the necessary skills, expertise and qualifications to deliver organizational objectives and the ability to make a great contribution to the values and aims of the organization for the achievement of goals.

Selection process is designed by considering various criteria for selection of the employee in an organization. For example, in a bank, various criteria or skills such as management skill, technical skill, banking knowledge or skill may be required which vary according to the type of roll being played there. Such multi-criteria decision-making problem can be solved using a well-known technique AHP i.e. Analytic Hierarchy Process. This paper contributes for integrated method called Analytic Hierarchy Process weighted Fuzzy Linear Programming model for selection of two posts i.e. manager and cashier in a bank.

2. Literature Review

Various research works have been proposed in this direction. New approach to the evaluation of the suitability of job applicants has been provided by [10] in 1999. In the year 2009, a fuzzy multiple criteria decision making model in employee recruitment is discussed to identify appropriate personality traits and key professional skills through the information statistics and analysis of analytic hierarchy process, in order to expect the recruitment process be more reasonable based on the fuzzy multiple criteria decision making model to achieve the goal of merit-based selection [11]. Turkay Dereli et al. in 2010 applied a fuzzy approach for personnel selection process which presents novel personnel selection framework for finding the best possible personnel for a specific job [15]. Fuzzy multi-objective linear programming problem where both the resources and the technological coefficients are fuzzy with linear membership function was studied by C. Veeramani et al. in the year 2011, in solving fuzzy multi-objective linear programming problems with linear membership functions [17].

In 2012, the process of making an optimal-preferential decision by application of fuzzy logic and a fuzzy system is proposed by Zvonko Saajfert et al. [18]. The paper presented on analytical hierarchy process approach – an application of engineering education aims at giving an application of analytical hierarchy process (AHP, a multi criteria decision making method) in the same year [9]. In 2013, Decision making and evaluation system for employee recruitment using fuzzy analytic hierarchy process by Ramadan Krebish Ablhamid et al. gives calculation of every single data on all participants as a number and compares it with fuzzy analytical hierarchy process weights calculated from pair matrix and showed a result in the form of rank which shows the fittest applicant to the available job vacancy [12]. Remica Aggarwal in 2013, provided hybrid multi-attribute AHP-FLP approach for selection of IT personnel [2]. Mohsen Varmazyar and

Behrouz Nouri in the year 2014, have suggested a fuzzy AHP approach for employee recruitment. They have developed a computer application where it receives the configuration of the employee selection problem, evaluates the candidates and ranks them using the appropriate voting system [16]. Role of recruitment & selection policies in central co-operative banks is studied by Dr. Rimjhim Gupta and Tanuja Jain in 2014 to identify general practices that organizations use to recruit and select employees and to determine how the recruitment and selection practices affect employee efficiency in central cooperative banks [5].

In the year 2015, a structured framework has been proposed using MCDM methods both in fuzzy as well as non-fuzzy environments where seven candidates under fifteen different sub criteria are evaluated and ranked by C. L. Karmaker and M. Saha, in teacher's recruitment process via MCDM methods: a case study in Bangladesh [7]. In the same year, fuzzy multi-objective linear programming, where problem is reduced to crisp using ranking function and then the crisp problem is solved by fuzzy programming technique by M. Kiruthiga et al., in their paper fuzzy multi-objective linear programming problem using fuzzy programming model [8]. Solving multi-objective fuzzy linear optimization problem using fuzzy programming technique is given by Beena T Balan in 2016, which presents solution procedure of multi objective fuzzy linear programming with triangular membership function with illustration of method using numerical example [4].

3. Methodologies

In this paper, selection of IT personnel through hybrid multi-attribute AHP-FLP approach [2] is modified by the researcher to apply for the recruitment of branch manager and cashier in the private bank of Maharashtra, India on the basis of various criteria suggested by them.

3.1 The Analytic Hierarchy Process(AHP)

It is a structured technique for organizing and analyzing complex decisions, based on mathematics and psychology and was developed by Thomas L. Saaty in 1980 [19]. He provides a comprehensive and rational framework for organizing a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. It decomposes decision problem into hierarchy elements which can relate to any aspect of the decision problem. Once the hierarchy is made, the decision makers systematically evaluate its various elements by comparing them to each other, two at a time, with respect to their impact on an element above them in the hierarchy and then weights coefficients for each element are determined where sum of the elements at each hierarchy level is equal to 1.

In making the comparisons, the decision makers can use concrete data about the elements, but they actually use their judgments about the elements' relative meaning and their importance. The pair wise comparisons using fuzzy scale was given by Satty that ranges from equally preferred to extremely preferred (1 = equally preferred; 3 = slightly more preferred; 5 = much more preferred; 7 = very much more preferred; 9 = extremely preferred). Through this comparison matrix of the elements is formed and then consistency ratio (CR) is calculated to check the consistency of responses. The reliability of responses is maintained if CR is less or equal to 0.10. This CR is given by CR=CI/RI where CI is consistency index and RI is random index. If CR is greater than 0.10 then judgment in the matrix would be considered as an inconsistent and in that case, we shall have to revise the matrix.

3.2 Analytical Hierarchy Process weighted Fuzzy Linear Programming (AHP-FLP)

Data related to selection is fuzzy in nature. This fuzziness can be handled using fuzzy set concept given by [20] to obtain optimal solution. Fuzzy linear programming problem in fuzzy environment is introduced by Zimmermann [6]. Fuzzy Multi-Objective Linear Programming is used for solving traveling salesman problem with vague and imprecise parameters by [3].

If there are 'm' number of criteria then vector E= {e_1, e_2,…...,e_n}, n being no of employees, which maximizes the employee performance using objective function is to be find out. The objective function is incorporated as a fuzzy constraint with a restriction level i.e. aspiration level k where k = 1,2,…..m.

So we can write,

$$\begin{aligned}
&\textit{Find } E\\
&\tilde{A}_K(E) = \sum_{i=1}^{n} c_{ki} e_i \,\tilde{\geq}\, A_K^0 \quad \forall k = 1,2,..m\\
&\textit{subject to} \qquad\qquad\qquad\qquad \ldots\ldots\ldots\ldots\ldots(M1)\\
&\sum_{i=1}^{n} a_{ri} e_i \leq b_r \qquad r = 1,2,\ldots\ldots\ldots m
\end{aligned}$$

c_{ki}, a_{ri} and b_r are crisp values. A_K^0 is the aspiration level to be reach. Every objective function value A_K changes linearly from minimum value A_K^* to maximum value A_K^0. The symbol ~ is used to denote the model in fuzzy environment. This model M1 can be solved using weighted additive model.

Maximization goals A_K can be given through linear membership function as

$$\mu_{A_K}(E) = \begin{cases} 1 & ;\ A_K(E) \geq A_K^0 \\ \dfrac{A_K^0 - A_K(E)}{A_K^0 - A_K^*} & ;\ A_K^* \leq A_K(E) < A_K^0 \\ 0 & ;\ A_K(E) < A_K^* \end{cases} \quad K = 1,2,..........m \qquad ....(M2)$$

To solve above weighted additive model M2, a single objective model M3 can be solved using standard mathematical programming approach.

$$\begin{aligned} & Maximize \sum_{K=1}^{m} w_K \alpha_K \qquad \qquad ....(M3) \\ & Subject\ to \\ & \mu_{A_K}(E) \geq \alpha_K \\ & \sum_{K=1}^{m} w_K = 1 \\ & \alpha_K \in [0,1], \quad w_K \geq 0 \quad \forall k = 1,2,....m, \qquad e_i \geq 0 \ \ \forall i = 1,2,....n \end{aligned}$$

Where w_K and $\mu_{A_K}(E)$ represents the weighting, coefficients stating relative importance of fuzzy goals and membership function.

4. Application

The above AHP-FLP model is modified to use in the selection of employee of one of the private banks in India. In this paper, two posts Branch manager and cashier have been taken into consideration for recruitment.

4.1 Determination of criteria for selection of both posts

Bank managers are in charge of all aspects of a bank, so they need a broad set of skills and knowledge such as detailed knowledge of the financial matter or banking knowledge, particularly in the areas of personal or commercial loans, mortgages, knowledge of the latest rules and laws governing the banking sector. Also, manager must have an understanding of marketing and sales techniques, the interpersonal skills needed to hire, train, and manage employees and to deal with customers properly. Similarly cashier who deals with cash plays very important role in the field of banking. The job of cashier includes many things and it is job of more responsibility as he/she has to deal with cash and interact with customer on daily basis for solving queries, handling money etc.

Following figure 1 represents the hierarchical structure for selection criteria for post A i.e. branch manager and post B i.e. cashier decided after discussion with experts.

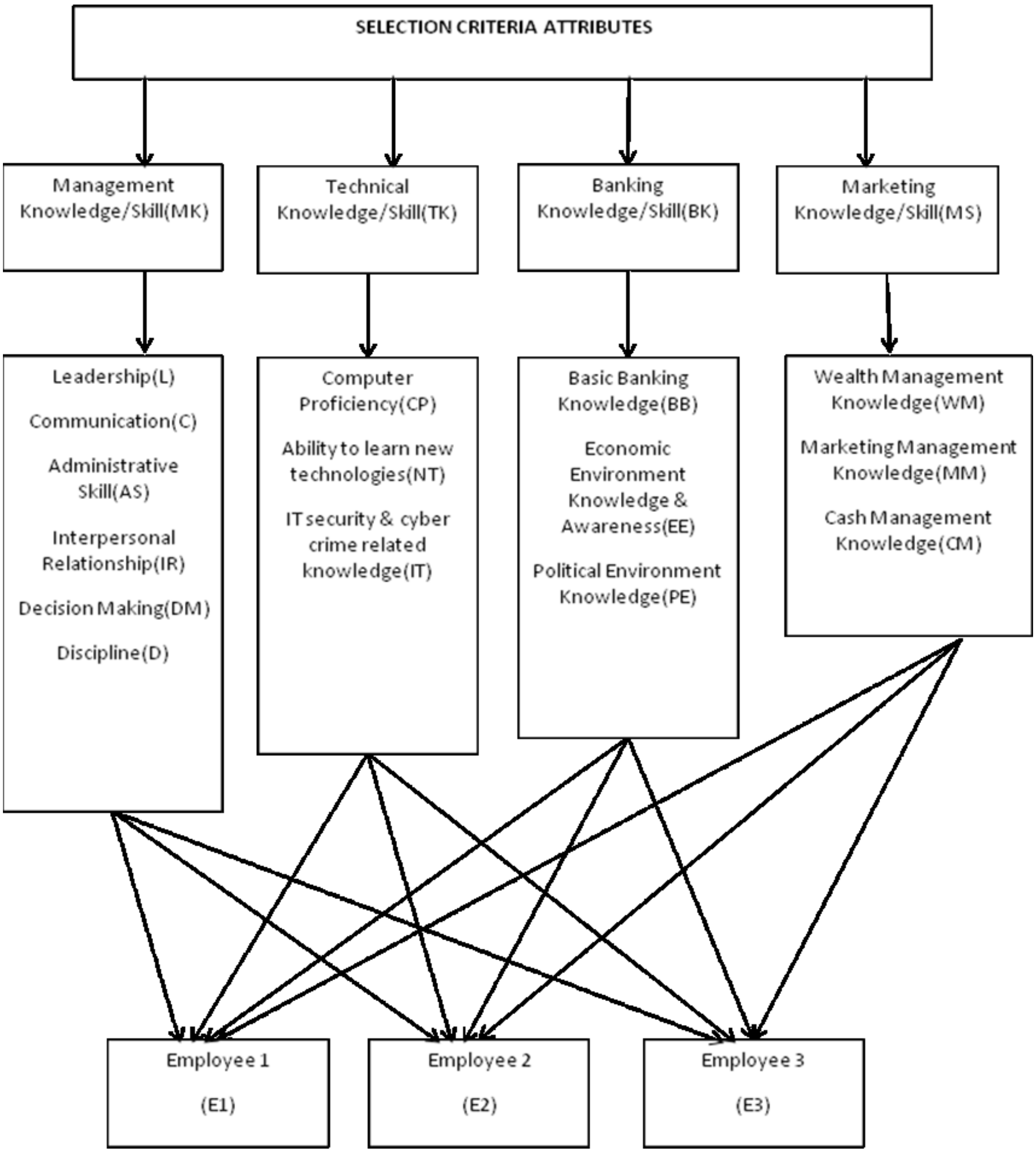

Figure 1. Hierarchical Structure of Selection Criteria

4.2 Calculating the weights of the criteria

After a discussion with the experts of bank, various criteria with their sub-criteria have been decided which are shown in figure 1. In this paper, 3 employees have been selected which are to be examined against these criteria and sub-criteria. For this purpose, pair wise comparison of sub-criteria and pair wise comparison of main selection criteria have been done to know the weights of each job using Satty's scale. Also pair wise comparison of employees with sub-criteria and criteria has been done to know the weights of employees given by table 6 for post A and table 12 for post B. Table 1 shows pair wise comparison of main selection criteria for post A.

Table 1. Inter Comparison of main criteria for post A

Criteria	MK	TK	BK	MS	Priority
MK	1	5	1	4	0.415511
TK	1/5	1	1/7	1/5	0.053272
BK	1	7	1	2	0.357976
MS	1/4	5	1/2	1	0.173241
		CR:	0.064403		1

Table 2 to table 5 show pair wise comparison of sub-criteria for the post A.

Table 2. Inter Comparison of sub-criteria with respect to main criteria MK for post A

MK	L	C	AS	IR	DM	D	PRIORITY
L	1	1/2	4	5	3	1/3	0.173763
C	2	1	5	7	4	½	0.26715
AS	1/4	1/5	1	2	1/3	1/6	0.0493
IR	1/5	1/7	1/2	1	1/4	1/8	0.032427
DM	1/3	1/4	3	4	1	¼	0.095422
D	3	2	6	8	4	1	0.381938
			CR	0.034748			1

Table 3. Inter Comparison of sub-criteria with respect to main criteria TK for post A

TK	CP	NT	IT	Priority
CP	1	4	3	0.614411
NT	1/4	1	1/3	0.117221
IT	1/3	3	1	0.268369
	CR:	0.07008		1

Table 4. Inter Comparison of sub-criteria with respect to main criteria BK for post A

BK	BB	EE	PE	Priority
BB	1	5	7	0.730645
EE	1/5	1	3	0.188394
PE	1/7	1/3	1	0.080961
	CR:	0.061857		1

Table 5. Inter Comparison of sub-criteria with respect to main criteria MS for post A

MS	WM	MM	CM	Priority
WM	1	¼	3	0.225536

MM	4	1	5	0.67381
CM	1/3	1/5	1	0.100654
	CR:	0.08176		1

Table 6 gives weights of employees against each sub-criteria for post A.

Table 6. Weights of employees for each sub-criteria for post A

Sub-criteria	Weight	Wt of E1	Wt of E2	Wt of E3
L	0.173763	0.11748	0.10673	0.77579
C	0.26715	0.09555	0.14408	0.76038
AS	0.0493	0.14882	0.78539	0.06579
IR	0.032427	0.64833	0.22965	0.12202
DM	0.095422	0.19981	0.11685	0.68334
D	0.381938	0.16920	0.44343	0.38737
CP	0.614411	0.16342	0.53961	0.29696
NT	0.117221	0.10473	0.25828	0.63699
IT	0.268369	0.72585	0.17212	0.10203
BB	0.730645	0.19192	0.17437	0.63371
EE	0.188394	0.18839	0.08096	0.73064
PE	0.080961	0.63371	0.19192	0.17437
WM	0.225536	0.33307	0.09739	0.56954
MM	0.67381	0.27895	0.64912	0.07193
CM	0.100654	0.16920	0.44343	0.38737

Similarly table 7 shows the pair wise comparison of main criteria for post B.

Table 7. Inter Comparison of main criteria for post B

Criteria	MK	TK	BK	MS	Priority
MK	1	1/5	1/8	1/3	0.049504
TK	5	1	1/4	4	0.251427
BK	8	4	1	5	0.596198
MS	3	1/4	1/5	1	0.10287
		CR:	0.080869		1

Table 8 to 11 give pair wise comparison of sub-criteria for the post B.

Table 8. Inter Comparison of sub-criteria with respect to main criteria MK for post B

MK	C	AS	IR	DM	D	Priority
C	1	6	3	4	1/3	0.264623
AS	1/6	1	1/5	1/3	1/7	0.038815
IR	1/3	5	1	3	¼	0.146636
DM	1/4	3	1/3	1	1/5	0.076065
D	3	7	4	5	1	0.473861
			CR	0.0652		1

Table 9. Inter Comparison of sub-criteria with respect to main criteria TK for post B

TK	CP	NT	PRIORITY
CP	1	4	0.8
NT	1/4	1	0.2
CR	0		1

Table 10. Inter Comparison of sub-criteria with respect to main criteria BK for post B

MS	WM	CM	PRIORITY
WM	1	1/7	0.125
CM	7	1	0.875
CR	0	SUM	1

Table 11. Inter Comparison of sub-criteria with respect to main criteria MS for post B

BK	BB	EE	PRIORITY
BB	1	5	0.833333
EE	1/5	1	0.166667
CR	0	SUM	1

Table 12 gives weights of employees against each sub-criteria for post B.

Table 12. Weights of employees for each sub-criteria for post B

Sub-criteria	**Weight**	**Wt of E1**	**Wt of E2**	**Wt of E3**
C	0.264623	0.13516	0.49795	0.36689
AS	0.038815	0.63371	0.19192	0.17437
IR	0.146636	0.65536	0.28974	0.05490
DM	0.076065	0.19388	0.74287	0.06325
D	0.473861	0.09649	0.10492	0.79860
CP	0.8	0.10473	0.63699	0.25828
NT	0.2	0.06325	0.19388	0.74287
BB	0.833333	0.28571	0.57143	0.14286
EE	0.166667	0.10473	0.25828	0.63699
WM	0.125	0.53961	0.29696	0.16342
CM	0.875	0.33252	0.52784	0.13965

Table 13 and table14 give final weights of each of the 3 employees for both positions for main selection criteria i.e. management skill, technical skill, banking knowledge/skill and marketing skill.

Table 13. Final weights of employees for each main criteria for post A

Criteria	Weight	Wt of E1	Wt of E2	Wt of E3
MK	0.42	0.158	0.284	0.558
TK	0.05	0.307	0.408	0.285
BK	0.36	0.227	0.158	0.615
MS	0.17	0.280	0.504	0.216
FINAL WEIGHT		0.212	0.284	0.505

Table 14. Final weights of employees for each main criteria for post B

Criteria	Weight	Wt of E1	Wt of E2	Wt of E3
MK	0.05	0.217	0.288	0.495
TK	0.25	0.096	0.548	0.355
BK	0.60	0.256	0.519	0.225
MS	0.10	0.358	0.499	0.143
FINAL WEIGHT		0.224	0.513	0.263

4.3 Multi-objective linear programming model

In this application there are four main criteria so there will be four objective functions namely A_1 to A_4. For position A of branch manager multi-objective linear programming model can be written as

$$Maximize \begin{Bmatrix} A_1 = 0.158e_1 + 0.284e_2 + 0.558e_3 \\ A_2 = 0.307e_1 + 0.408e_2 + 0.285e_3 \\ A_3 = 0.227e_1 + 0.158e_2 + 0.615e_3 \\ A_4 = 0.280e_1 + 0.504e_2 + 0.216e_3 \end{Bmatrix} \text{.................}(M4)$$

$Subject\ to$

$e_1 + e_2 + e_3 = 1;$

$e_1, e_2, e_3 \in \{0,1\}$

Similarly for the position B of cashier, multi-objective linear programming model can be written as

$$Maximize \begin{Bmatrix} A_1 = 0.217e_1 + 0.288e_2 + 0.495e_3 \\ A_2 = 0.096e_1 + 0.548e_2 + 0.355e_3 \\ A_3 = 0.256e_1 + 0.519e_2 + 0.225e_3 \\ A_4 = 0.358e_1 + 0.499e_2 + 0.143e_3 \end{Bmatrix} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (M5)$$

Subject to

$e_1 + e_2 + e_3 = 1;$

$e_1, e_2, e_3 \in \{0,1\}$

4.4 Limitations of main criteria

Table 15 gives limitations for each of the main criteria i.e. bounds for them. Minimum value A_K^* & maximum value A_K^0 for each of the main criteria are given for both posts A & B

Table 15. Upper & Lower bounds for each criterion

		A_1	A_2	A_3	A_4
Post A	A_K^* (Min)	0.158	0.285	0.158	0.216
	A_K^0 (Max)	0.558	0.408	0.615	0.504
Post B	A_K^* (Min)	0.217	0.096	0.225	0.143
	A_K^0 (Max)	0.495	0.548	0.519	0.499

4.5 Fuzzy multi-objective Linear Programming Model

From M4, the fuzzy multi-objective linear programming model for post A is given as follows

Find E

$$Maximize \begin{Bmatrix} \tilde{A}_1 = 0.158e_1 + 0.284e_2 + 0.558e_3 \geq A_1^0 \\ \tilde{A}_2 = 0.307e_1 + 0.408e_2 + 0.285e_3 \geq A_2^0 \\ \tilde{A}_3 = 0.227e_1 + 0.158e_2 + 0.615e_3 \geq A_3^0 \\ \tilde{A}_4 = 0.280e_1 + 0.504e_2 + 0.216e_3 \geq A_4^0 \end{Bmatrix} \ldots\ldots\ldots\ldots\ldots\ldots (M6)$$

Subject to

$e_1 + e_2 + e_3 = 1;$

$e_1, e_2, e_3 \in \{0,1\}$

From M5, the fuzzy multi-objective linear programming model for post B is stated as

Find E

$$\text{Maximize}\begin{Bmatrix} \tilde{A}_1 = 0.217e_1 + 0.288e_2 + 0.495e_3 \geq A_1^0 \\ \tilde{A}_2 = 0.096e_1 + 0.548e_2 + 0.355e_3 \geq A_2^0 \\ \tilde{A}_3 = 0.256e_1 + 0.519e_2 + 0.225e_3 \geq A_3^0 \\ \tilde{A}_4 = 0.358e_1 + 0.499e_2 + 0.143e_3 \geq A_4^0 \end{Bmatrix} \text{..................}(M7)$$

Subject to

$e_1 + e_2 + e_3 = 1;$

$e_1, e_2, e_3 \in \{0,1\}$

For above 4 objective functions, membership functions can be written as follows:

For Post A:

$$\mu_{A_1}(E) = \begin{Bmatrix} 1 & ;\ A_1(E) \geq 0.558 \\ \dfrac{0.558 - A_1(E)}{0.558 - 0.158} & ;0.158 < A_1(E) < 0.558 \\ 0 & ;A_1(E) \leq 0.158 \end{Bmatrix}$$

$$\mu_{A_2}(E) = \begin{Bmatrix} 1 & ;\ A_2(E) \geq 0.408 \\ \dfrac{0.408 - A_2(E)}{0.408 - 0.285} & ;0.285 < A_2(E) < 0.408 \\ 0 & ;A_2(E) \leq 0.285 \end{Bmatrix}$$

$$\mu_{A_3}(E) = \begin{Bmatrix} 1 & ;\ A_3(E) \geq 0.615 \\ \dfrac{0.615 - A_3(E)}{0.615 - 0.158} & ;0.158 < A_3(E) < 0.615 \\ 0 & ;A_3(E) \leq 0.158 \end{Bmatrix}$$

$$\mu_{A_4}(E) = \begin{Bmatrix} 1 & ;\ A_4(E) \geq 0.504 \\ \dfrac{0.504 - A_4(E)}{0.504 - 0.216} & ;0.216 < A_4(E) < 0.504 \\ 0 & ;A_4(E) \leq 0.216 \end{Bmatrix}$$

Similarly for post B:

$$\mu_{A_1}(E) = \begin{Bmatrix} 1 & ;\ A_1(E) \geq 0.495 \\ \dfrac{0.495 - A_1(E)}{0.495 - 0.217} & ;0.217 < A_1(E) < 0.495 \\ 0 & ;A_1(E) \leq 0.217 \end{Bmatrix}$$

$$\mu_{A_2}(E) = \begin{Bmatrix} 1 & ;\ A_2(E) \geq 0.548 \\ \dfrac{0.548 - A_2(E)}{0.548 - 0.096} & ;0.096 < A_2(E) < 0.548 \\ 0 & ;A_2(E) \leq 0.096 \end{Bmatrix}$$

$$\mu_{A_3}(E)=\begin{cases}1 & ;\ A_3(E)\ge 0.519\\ \dfrac{0.519-A_3(E)}{0.519-0.225} & ;0.225<A_3(E)<0.519\\ 0 & ;A_3(E)\le 0.225\end{cases}$$

$$\mu_{A_4}(E)=\begin{cases}1 & ;\ A_4(E)\ge 0.499\\ \dfrac{0.499-A_4(E)}{0.499-0.143} & ;0.143<A_4(E)<0.499\\ 0 & ;A_4(E)\le 0.143\end{cases}$$

4.6 AHP-FLP model construction

From M3, we can write crisp single objective programming model equivalent to Fuzzy multi-objective models M6 and M7 for the post A and post B respectively.

$$\begin{aligned}
&\textit{Maximize}\\
&0.42\alpha_1+0.05\alpha_2+0.36\alpha_3+0.17\alpha_4\\
&\textit{Subject to}\\
&\alpha_1\le\frac{0.558-(0.158e_1+0.284e_2+0.558e_3)}{0.558-0.158}\\
&\alpha_2\le\frac{0.408-(0.307e_1+0.408e_2+0.285e_3)}{0.408-0.285}\\
&\alpha_3\le\frac{0.615-(0.227e_1+0.158e_2+0.615e_3)}{0.615-0.158}\quad\ldots\ldots\ldots\ldots\ldots(M8)\\
&\alpha_4\le\frac{0.504-(0.280e_1+0.504e_2+0.216e_3)}{0.504-0.216}\\
&\alpha_1,\alpha_2,\alpha_3,\alpha_4\in[0,1]\\
&e_1+e_2+e_3=1;\\
&e_1,e_2,e_3\in\{0,1\}
\end{aligned}$$

$$\begin{aligned}
&\textit{Maximize}\\
&0.05\alpha_1+0.25\alpha_2+0.60\alpha_3+0.10\alpha_4\\
&\textit{Subject to}\\
&\alpha_1\le\frac{0.495-(0.217e_1+0.288e_2+0.495e_3)}{0.495-0.217}\\
&\alpha_2\le\frac{0.548-(0.096e_1+0.548e_2+0.355e_3)}{0.548-0.096}\quad\ldots\ldots\ldots\ldots\ldots\ldots\ldots(M9)\\
&\alpha_3\le\frac{0.519-(0.256e_1+0.519e_2+0.225e_3)}{0.519-0.225}\\
&\alpha_4\le\frac{0.499-(0.358e_1+0.499e_2+0.143e_3)}{0.499-0.143}\\
&\alpha_1,\alpha_2,\alpha_3,\alpha_4\in[0,1]\\
&e_1+e_2+e_3=1;\\
&e_1,e_2,e_3\in\{0,1\}
\end{aligned}$$

It is important to note that weights taken with all α_K are taken as weights of each of the main criteria calculated using AHP in comparison matrix.

Model M8 is solved to get optimal solution for post A.

We get, e_1= 1, e_2= 0, e_3= 0. This means that employee 1 is suitable for selection of the post of branch officer. We can also get the values of objective functions and membership functions.

A_1= 0.158, A_2= 0.307, A_3= 0.227, A_4=0.280

$\mu_{A_1}(E) = 1$, $\mu_{A_2}(E) = 0.82$, $\mu_{A_3}(E) = 0.74$, $\mu_{A_4}(E) = 0.78$

From these membership functions we can say that achievement levels of A_1 & A_2 are more than the achievement levels of A_3 & A_4.

Similarly, model M9 is solved to get optimal solution for post B.

We get, e_1= 1, e_2= 0, e_3= 0. This means here also employee 1 is suitable for selection of the post of Cashier.

A_1= 0.217, A_2 =0.096, A_3=0.256, A_4=0.358

$\mu_{A_1}(E) = 1$, $\mu_{A_2}(E) = 1$, $\mu_{A_3}(E) = 0.89$, $\mu_{A_4}(E) = 0.40$

The achievement levels of A_1 & A_2 are more than the achievement levels of A_3 & A_4.

5. Results and Discussion

Table 16 and table 17 shows comparison of AHP and AHP-FLP results for three employees for post of branch manager and post of cashier.

Table 16. Comparison of AHP and AHP-FLP for post of Branch Manager

Approach	E_1	E_2	E_3
AHP	0.212	0.284	**0.505**
AHP-FLP	**1**	0	0

Table 16 shows that through AHP-FLP approach employee E1 is the best choice for the post A with score of one as compare to the AHP approach which suggests that employee E_3 is the best choice with overall score of 0.505. So the sensitivity of AHP-FLP method is analyzed by considering various skills used in the model according to the requirement of organization where under this approach, criteria management skill and banking skill are considered as most important as compared to other two, technical skill and marketing skill for the post A.

Table 17. Comparison of AHP and AHP-FLP for post of Cashier

Approach	E_1	E_2	E_3
AHP	0.224	**0.513**	0.263
AHP-FLP	**1**	0	0

From table17 we observed that, under AHP approach, employee 2 is best suitable for the post of cashier with overall score of 0.513. Here banking and technical skill are found to be more important than other two under this approach, whereas under AHP-FLP approach employee 1 is best for this post. Also views of HR heads are matching with the results of AHP-FLP approach. This hybrid model AHP-FLP is applied in IT company in paper [2] but in this paper, it is applied in a banking sector.

Conclusion

Selection of employee in any corporate with complex expectations of the decision maker has become very tough due to the overwhelming competition amongst the candidates seeking job. Fuzzy decision making is observed more significant tool as compared to the direct recruitment method. AHP methodology with the fuzzy multi-objective linear programming model is integrated and employed instead of applying conventional AHP method as an alternative. AHP method and AHP-FLP model are used separately. Through AHP-FLP approach employee E_1 is the best choice for the post of branch manager and for post of cashier employee 1 is suitable whereas under AHP approach, employee E_3 is the best choice for the post of branch manager and for post of cashier employee 2 is suitable. Fuzziness and vagueness involved in the problem may contribute to imprecise judgment in AHP but AHP-FLP model allows decision makers to consider the vagueness and uncertain conditions concluding that AHP-FLP model is more relevant than AHP method for the selection of bank employee for the post of manager and cashier. Findings of the study show that the weights of employee selection criteria calculated by AHP-FLP model are better than the actual personnel selection decision of the bank.

Recommendations

The hybrid model AHP-FLP can be used on large scale for selection of the employee with complex requirement skills as per the need of the organization of other sectors. The study can also be implemented by restructuring the selection criteria & requirement time to time and used in a specific way depending on the needs of organization for all kind of requirements in that organization. Future research on employee selection using integrated model of AHP and FLP can be concentrated on application of different methods for evaluating multiple attributes in employee selection and a comparison of relative effectiveness of the results.

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