Measurement Of Service Quality In The Banking Sector-The Case Of Bharateeya Mahila Bank

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Abstract: *Service industry is a rapidly developing industry in India with a rapid growth in population and technology and various other aspects. The objective of the study is to explore the aspects of the end consumer perceived service quality in the BHARATIYA MAHILA BANK.In order to categorize the customer needs into quality dimensions, Factor analysis (FA) has been carried out on customer responses obtained through questionnaire survey.Analytic Hierarchy Process (AHP) is employed to determine the weights of the banking service quality dimensions.Technique for order preference similarity to ideal solution (TOPSIS)is used to obtain final ranking of different branches.*

Keywords:*Service Quality, Factor analysis, Analytic Hierarchy Process, Technique for Order Preference Similarity to ideal solution.*

1.Introduction Banking sector in India is sound, adequately capitalized and well-regulated. It has always been one of the most preferred destinations for employment.A bank is a financial institution that provides banking and other financial services. **BharatiyaMahilaBank** (**BMB**) ,Indian financial service banking company based in New Delhi, India.Service quality is simply the customer perception of how well a service meets its expectations.This research work outlines the results of a study conducted on present service quality of the banking system.

1.1 Factor Analysis: Factor analysis is one of the very useful techniques to summarize a large amount of data in a manageable way.It is often used in data reduction to identify a small number of factors that explain most of the variance observed in a much larger number of manifest variables.This technique is applicable to identify the underlying dimensions or factors that explain the correlations among a set of variables. In this study, this technique is used to determine the factors that influence the quality of banking service.

1.2 Analytic Hierarchy Process*(AHP):*AHP is a structured technique for organizing and analyzing complex decisions.It is a multi-criteria decision making (MCDM) technique for measurement through pair wise comparisons and relies on the judgments of experts to derive priority scales.The comparisons are made using a scale of absolute judgments that represents, how much more one element dominates another with respect to a given attribute.The derived priority scales are synthesized to obtain the weights of the quality dimensions and branches.

1.3 Technique For Order Preferance Similarity to ideal solution*(TOPSIS):*In this technique, "n" different alternatives are evaluated by "m" different attributes, the attributes being common to all the alternatives. This method belongs to Multiple Criteria Decision Making group of methods.It is based on the concept that the chosen alternative should have the shortest geometric distance from the positive ideal solutionand the longest geometric distance from the negative ideal solution.Hence ranking of different alternatives can be done with the help of TOPSIS methodology.

2.Methodology: Data was collected through survey from customers for the features they need from a bank. Based on the questionnaire survey, Factor analysis is carried out from the responses data to establish the banking service quality dimensions.AHP method is used for calculating the weights of the attributes as well as the overall weights of the Banks in each attribute.Finally, TOPSIS is applied for the evaluation problem and the result shows the preference order of the different Banks.

2.1 Questionnaire Survey*:*A case study has been undertaken in 4 branches of Bharateeya Mahila Bank (Visakhapatnam, vijayawada, Kakinada, sivaouram).After several discussions made with the experts in the quality service, a questionnaire was developed on the expectations of the customers from 5 dimensions.The questionnaire was administrated to 140 customers from each branch. A total of 549 responses were received from all 4 branches were considered to carry out the factor analysis.

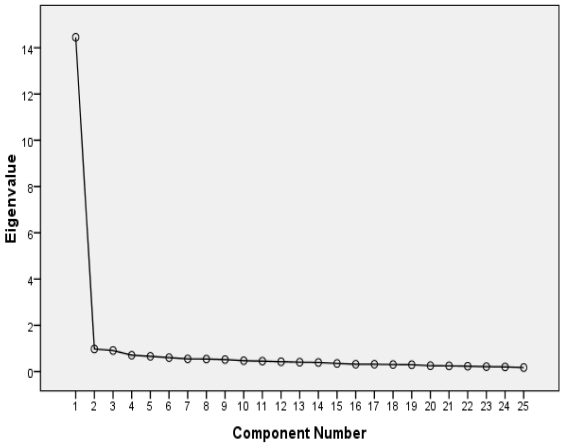
3.Performing Factor Analysis: Factor analysis is carried out with a view to reduce the list of customer attributes.It is performed using SPSS v16 (Statistical Package for the Social Sciences). It is a software package used for statistical analysis.The sample adequacy for the

response data is examined through KMO and Bartlett's tests.

Table 3.1: Result of KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of		0.973
Bartlett's Test of Sphericity	Approx. Chi-	4.451E3
	Df	300
	Sig.	.000

3.1 Scree Plot: A scree plot is a simple line segment plot that shows the fraction of total variance in the data.



3.2 Rotated Component Matrix: In "Rotated Component Matrix" table 5.4, the first column of this table lists the names of the variables that have entered into the analysis. The second column is titled "Component" The sub-columns of this column are numbered to match the components from the "Total Variance Explained" table that had Eigen values greater than one, these are called as factors. Each factor has a list of numbers associated with each of original variables. These values represent how well each of the original variables fits into each of the new factors. The values range from –1 to 1. The closer a number is to –1 or 1, the better that variable fits into that factor. A value of 1 means that factor explains 100% of the information from that variable. A value of –1 means that factor explains 100% of the information from that variable but explains the exact opposite of that variable. This will be important to remember when calculating the factor scores. A value of 0 means that factor does not explain the information contained in that variable. Generally, a value bigger than 0.5 or smaller than –0.5 means that variable fits well with thatfactor.

Table 3.2 Rotated component matrix

	Component				
Question	**1**	**2**	**3**	**4**	**5**
Q8	.709				
Q9	.703				
Q16	.697				
Q7	.608				
Q21	.573				
Q23	.521				
Q19		.723			
Q12		.704			
Q10		.635			
Q14		.630			
Q18		.618			
Q13		.598			
Q1			.856		
Q2			.683		
Q3			.611		
Q4			.547		
Q6				.834	
Q25					.911

From the table 3.2, the factors obtained through factor analysis are grouped from 1 to 5 are labeled as Physical features, Special features of BMB, Banking facilities, Customer service, System respectively and are summarized in the table 3.3

S.No	Variables in the Questionaire	Factors (Customer Needs)
1	Availability of safety lockers (Q8)	Physical features
	Facilities such as chairs, reception and air conditioning (Q9)	
	Provision of drinking water (Q16)	
	Provision of proper sanitary facilities (Q7)	
	Existence of note counting and fake note detector (Q21)	
	Availability of complaint box (Q23)	
2	Reasonable household and special loans (Annapurna) (Q19)	Special feature of BMB
	Provision of loans for small scale industries (Q12)	
	Provision of Nirbhaya form of insurance (Q10)	
	Availability of exclusive RD schemes for girl child (Nanhikali) (Q14)	
	Sending emails and SMS to specific	

	persons (Q18)	
	Modification for the time loan borrowing and repayment (Q13)	
3	Advantageous over savings account in women's bank (Q1)	Banking facilities
	Using of Mobile Banking (Q2)	
	Implementation of Green banking (Q3)	
	Availability of low interest rates (Q4)	
4	Considering the time of customer and reducing the waiting time (Q6)	Customer service
5	Efficient security system and customer information security policy (Q25)	System

4.Performing AHP Methodology:AHP method for decision-making involves four main steps such as :

1. Setup the pair-wise comparison.
2. Perform pair-wise comparisons of all the elements.
3. Estimation of Eigen values of the matrix.
4. Checking the consistency of pair-wise judgments.

This method is employed for calculation of weights for service quality attributes (Physical Features, Special Features of BMB, Customer service, Banking Facilities, System) and weights of different branches.

4.1.Customer Services: The brainstorming sessions conducted with the experts in the field of banking sector to prepare the pair-wise comparison matrix of different branches with respect to customer service perspective.

Intensity of importance	Interpretation
1	Requirement i and j are of equal value
3	Requirement i has a slightly higher value than j
5	Requirement i has a strongly higher value than j
7	Requirement i has a very strongly higher value than j
9	Requirement i has an absolute higher value than j
2,4,6,8	These are intermediate scales between two adjacent judgements
Reciprocals	If requirement i has lower value than j

Table 4.1: Pair-wise comparison matrix of different branches

	BI	BII	BIII	BIV	PRODUCT
BI	1	5	2	3	30
BII	1/5	1	1/3	1/2	1/30
BIII	1/2	3	1	3	9/2
BIV	1/3	2	1/3	1	2/9

$$(\text{Product})^{1/4} = \begin{bmatrix} 2.3403 \\ 0.4273 \\ 1.4565 \\ 0.6866 \end{bmatrix}$$

$$\text{Sum of (product)}^{1/4} = 4.9107$$

$$\text{Weight(W)} = \frac{(\text{Product})^{1/4}}{\text{Sum of (product)}^{1/4}}$$

$$W = \begin{bmatrix} 0.476 \\ 0.087 \\ 0.2966 \\ 0.1398 \end{bmatrix}$$

The weights of the customer services of different branches obtained through AHP are calculated and tabulated in the table 4.2

Table 4.2: Weights of the branches for customer service

	Branches	Weights
1	Branch I	0.476
2	Branch II	0.087
3	Branch III	0.2966
4	Branch IV	0.1398

The consistency index (CI) and consistency ratio (CR) are calculated using the procedure and the computations are given as follows

$$V = A*W$$

$$V = \begin{bmatrix} 1 & 5 & 2 & 3 \\ 1/5 & 1 & 1/3 & 1/2 \\ 1/2 & 3 & 1 & 3 \\ 1/3 & 2 & 1/3 & 1 \end{bmatrix} \times \begin{bmatrix} 0.476 \\ 0.087 \\ 0.2966 \\ 0.1398 \end{bmatrix}$$

$$V = \begin{bmatrix} 1.9236 \\ 0.3509 \\ 1.215 \\ 0.5713 \end{bmatrix}$$

$$\lambda = \frac{v}{W}$$

$$\lambda = \begin{bmatrix} 1.9236/0.476 \\ 0.3509/0.087 \\ 1.215/0.2966 \\ 0.5713/0.1398 \end{bmatrix}$$

$$\therefore \lambda = \begin{bmatrix} 4.0411 \\ 4.0333 \\ 4.0964 \\ 4.0865 \end{bmatrix}$$

$$\lambda_{max} = \frac{4.0411+4.0333+4.0964+4.0865}{4}$$

$$\lambda_{max} = \frac{16.2573}{4}$$

$$\lambda_{max} = 4.0643$$

$$\text{Consistency index (C.I)} = \frac{\lambda \text{ max} - n}{n-1} = \frac{4.0643-4}{4-1} = 0.0214$$

$$\text{Consistency ratio (C.R)} = \frac{0.0214}{0.90} = = 0.02377 \quad (< 0.10)$$

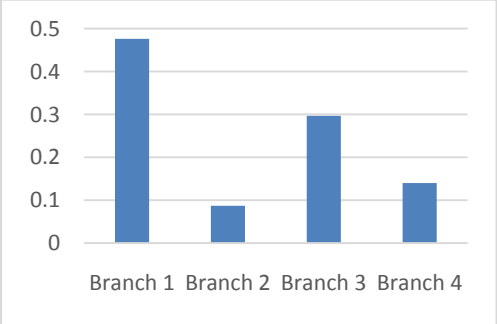


Figure 4.1 Weights of Branches for Customer Service

The values of Random Indices (RI) for matrices of order are given in table

N	RI
1	0
2	0
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49

Similarly, the overall weights obtained through pair wise comparison of Physical Features , special features of BMB, Customer Service, Banking Facilities and Systeof different branches are grouped together and are shown in the following table.

Table 4.3: Pair-wise comparison matrix of various branches and quality dimensions

	PF	SF	BF	CS	ST
B I	0.4509	0.3467	0.4409	0.476	0.4501
B II	0.1340	0.1279	0.1236	0.087	0.2599
B III	0.2254	0.3837	0.3118	0.2966	0.1837
B IV	0.1895	0.1415	0.1236	0.1398	0.1061

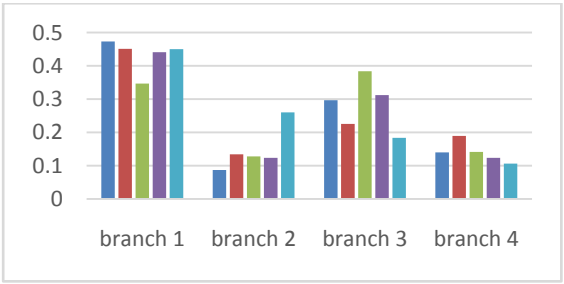


Figure 4.2: Weights of banches for different criteria

4.2Branch 1*:*

The pair-wise comparison matrices of the service quality dimension of respective branch are shown in Table:

Table 4.4: Pair-wise comparison matrix of different service quality dimensions

	PF	SF	BF	CS	ST	PROD
PF	1	2	2	3	5	60
SF	0.5	1	3	2	2	6
BF	0.5	0.33	1	2	3	1
CS	0.33	0.5	0.5	1	3	0.25
ST	0.2	0.5	0.33	0.33	1	0.011

$$(\text{Product})^{1/5} = \begin{bmatrix} 2.2679 \\ 1.4309 \\ 1.000 \\ 0.7578 \\ 0.4065 \end{bmatrix}$$

Sum of $(\text{product})^{1/5} = 5.8633$

$$\text{Weight(W)} = \frac{(\text{Product})^{1/5}}{\text{Sum of } (\text{product})^{1/5}}$$

$$W = \begin{bmatrix} 0.3867 \\ 0.2440 \\ 0.1705 \\ 0.1292 \\ 0.00693 \end{bmatrix}$$

The weights of the different banking service quality dimensions obtained through AHP are calculated and tabulated in the table 4.5

Table 4.5: weights of the banking service quality dimensions

Sl.No	service quality	Weights
1	Physical Features	0.3867
2	Special features in	0.2440
3	Banking Facilities	0.1705
4	Customer Service	0.1292
5	System	0.0693

Figure 4.3 Weights of service quality dimensions for Branch I

The consistency index (CI) and consistency ratio (CR) are calculated using the procedure and the computations are given as follows

$$V = A*W$$

$$V = \begin{bmatrix} 1 & 2 & 2 & 3 & 5 \\ 1/2 & 1 & 3 & 2 & 2 \\ 1/2 & 1/3 & 1 & 2 & 3 \\ 1/3 & 1/2 & 1/2 & 1 & 3 \\ 1/5 & 1/2 & 1/3 & 1/3 & 1 \end{bmatrix} \times \begin{bmatrix} 0.3867 \\ 0.2440 \\ 0.1705 \\ 0.1292 \\ 0.0693 \end{bmatrix}$$

$$V = \begin{bmatrix} 1.9504 \\ 1.3463 \\ 0.9110 \\ 0.6722 \\ 0.3676 \end{bmatrix}$$

$$\lambda = \frac{v}{W}$$

$$\lambda = \begin{bmatrix} 1.9504/0.3867 \\ 1.3463/0.2440 \\ 0.9110/0.1705 \\ 0.6722/0.1292 \\ 0.3676/0.0693 \end{bmatrix}$$

$$\therefore \lambda = \begin{bmatrix} 5.0426 \\ 5.5164 \\ 5.3416 \\ 5.2008 \\ 5.3020 \end{bmatrix}$$

$$\lambda_{max} = \frac{5.0426+5.5164+5.3416+5.2008+5.3020}{5}$$

$$\lambda_{max} = \frac{26.4036}{5}$$

$$\lambda_{max} = 5.2807$$

$$\text{Consistency index (C.I)} = \frac{\Lambda \max - n}{n-1} = \frac{5.2807-5}{4} = 0.07018$$

$$\text{Consistency ratio (C.R)} = \frac{0.07018}{1.12} = 0.06266 \ (< 0.10)$$

Similarly, the overall weights obtained through pair wise comparison of different service attributes of Branch II,III,IV are grouped together and are shown in the following table :

Table 4.6 Pair-wise comparison matrix of different service quality dimensions and branches

	B I	**B II**	**B III**	**B IV**
PF	0.3867	0.3354	0.3688	0.3239
SF	0.2440	0.2344	0.2229	0.2754
BF	0.1705	0.2213	0.1558	0.1415
CS	1.1929	0.1315	0.1434	0.127
ST	0.0693	0.0773	0.0895	0.1019

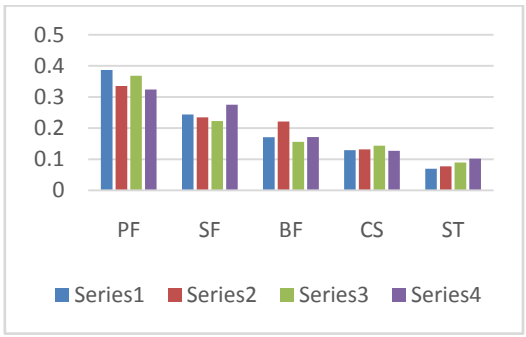


Figure 4.4 Weights of service quality dimension for different branches

In the present work, AHP is integrated with Factor analysis so as to determine the weights of service quality attributes and different Branches. Finally we get:

Table 4.7: Overall weights of different service quality dimensions and branches

Weigh	0.3537	0.2442	0.1798	0.1327	0.0845
Branc	**PF**	**SF**	**BF**	**CS**	**ST**
B I	0.4590	0.4501	0.4409	0.476	0.3467
B II	0.1340	0.2599	0.1236	0.087	0.1279
B III	0.2254	0.1837	0.3118	0.2966	0.3837
B IV	0.1895	0.1061	0.1236	0.1398	0.1415

The ranks of different branches with respect to Service quality attributes are calculated using TOPSIS methodology

5.TOPSIS Methodology*:*

Start TOPSIS procedure using the weights calculated using AHP methodology.

Construct normalized decision matrix by using the formula,

$$r_{ij} = \frac{x_{ij}}{\left(\sum_i x_{ij}^2\right)^{1/2}} \quad \text{for i = 1,2,……..,m; j= 1,2,……,n}$$

Table 5.1: Normalized Decision Matrix

Weigh	0.3537	0.2442	0.1798	0.1327	0.0845
Branc	**PF**	**SF**	**BF**	**CS**	**ST**
B I	0.8124	0.8018	0.7769	0.8143	0.6291
B II	0.2415	0.4629	0.2177	0.1488	0.2320
B III	0.4061	0.3271	0.5494	0.5074	0.6962
B IV	0.3415	0.1899	0.2177	0.2383	0.2567

Construct the weighted normalized decision matrix. Multiply each column of the normalized decision matrix by its associated weight. An element of the new matrix is:

Vij = wj * rij

Table 5.2: Weighted Normalized Decision Matrix

	PF	**SF**	**BF**	**CS**	**ST**
B I	0.2873	0.1958	0.1396	0.1081	0.0531
B II	0.0854	0.1130	0.0391	0.0197	0.0196
B III	0.1436	0.0799	0.987	0.1587	0.0588
B IV	0.1208	0.0461	0.391	0.0316	0.0217

Now determine the positive ideal and negative ideal solutions using,

Positive ideal solution : **Vj* = { max (^{v}ij) }**

Negative ideal solution : **Vj= {min (^{v}ij) }**

Hence,

Vj * = {0.2873, 0.1958, 0.1396, 0.1587, 0.05885}

Vj′ = {0.08543, 0.0461, 0.0391, 0.0197, 0.0196}

Now, calculate the separation measures for each alternative**.** The separation from the ideal alternative is:

$$S_i^* = \left[\sum_{j=1}^{m} \left(v_{ij} - v_j^*\right)^2\right]^{1/2}$$

Table 5.3: Separation measure from Positive Ideal alternative

	PF	SF	BF	CS	ST	S_I^*
B I	0	0	0	0.0025	0.00003	0.0
B II	0.0407	0.0668	0.0101	0.0193	0.0015	0.2
B III	0.0206	0.0134	0.0016	0	0	0.1
B IV	0.0277	0.022	0.0101	0.0161	0.0013	0.5722

Similarly, the separation from the negative ideal alternative is:

$$S_i^{'} = \left[\sum_{j=1}^{m} \left(v_{ij} - v_j^{'}\right)^2\right]^{1/2}$$

Table 5.4: Separation measure from Negative Ideal alternative

	PF	SF	BF	CS	ST	Si′
B I	0.0407	0.0224	0.0101	0.0078	0.0011	0.2867
B II	0	0.0044	s0	0	0	0.066
B III	0.0033	0.0011	0.0035	0.0193	0.0015	0.1700
B IV	0.0012	0	0	0.00014	0.000044	0.0120

Calculate the relative closeness to the ideal solution Ci* and the corresponding ranks of different branches

$$C_i^* = \frac{S_i^{'}}{S_i^{'} + S_i^*} ; 0 < C_i^* < 1$$

Table 5.5: Relative closeness and Ranks of branches

BRANCHES	RESULT	RANK
BRANCH I	**0.8515**	**1**
BRANCH II	**0.1905**	**3**
BRANCH III	**0.4735**	**2**
BRANCH IV	**0.0266**	**4**

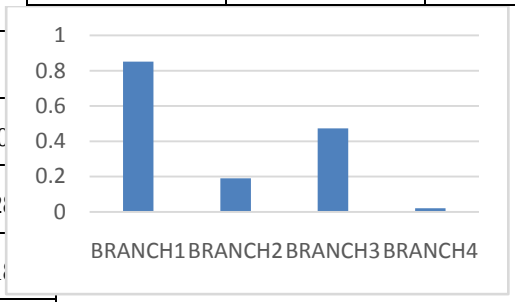


Figure 5.1: Overall Rankings of Branches

6.Conclusion: Service quality is a major factor causing leverage in the competitive market place where same kind of output is given by various manufacturers. With a proper strategy of service quality it helps to sustain and improve the consumers trust and also acquire a profit. And also helps in getting new consumers.The bank considered here is the bhratiya mahila bank which tends to have a bias over the female customers leading to almost a different scenario .The result obtained shows the ranking of different branches with reference to the various attributes considered .the model thus obtained satisfies the banking sector service quality that provides the guidelines for the further assessment and the improvement of the program. Finally, this work includes approach that integrates AHP & TOPSIS to support the conclusion.

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