



AN APPLICATION OF AHP MODEL IN BANK SELECTION DECISION

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ABSTRACT

Purpose: *The current study aims to measure the most preferred criteria used by the customers while selecting a bank first then most preferred type of bank selected on the basis of a particular criteria by the customers.*

Design/Methodology/Approach: *The study is based on the primary data. Data has been collected from the senior level academicians especially from the field of finance who have adequate knowledge of the Indian banking sector. The study is based on the Analytic hierarchy process (AHP) model which is mainly used for the multi criteria decision making. The selection criteria of a particular bank on the basis of ownership such as, public banks, private banks or foreign banks depends upon the various factors such as, bank's physical environment, bank's workforce and convenience & excellence.*

Findings: *It has been found from the study that customers give more weight age to the ability of a bank in providing convenient and excellent banking services in comparison to the efficient & knowledgeable staff or classy infrastructure of the banks while taking decision about selection of a particular bank.*

Research Limitations: *The current study is limited to three types of banks; it can be extended to the regional rural banks and cooperative banks too.*

Practical Implications: *The study will be useful for managers and policy makers while making strategies for increasing the customer data base of the bank, strategies for financial inclusion and marketing strategies of the bank. They will come to know that at which criteria they should focus more to attract the customers towards their services and also provides knowledge about the areas to be improved by the bank.*

Keywords: Public sector banks, Private Banks, Foreign banks, Commercial banks, Analytic hierarchy process (AHP), Working Environment and Efficiency of employees.

INTRODUCTION:

Indian banks are facing intense competition since Liberalisation, Privatisation and Globalisation process which permitted the entry of new players in the Indian banking sector in the form of new private sector banks and foreign banks [1]. A large number of growing new forms of non-banking financial institutions are also giving competition to the banks. Moreover when every bank provides same type of services with little differentiation in interest rates it becomes more difficult to survive and grow in the market for all the banks [2]. Thus only option left with banks to focus on the service quality to increase its customer database, to bank the untapped markets, to attract the new customers. Banks need to focus on the attributes which are directly related with the customers' perception about the banks' service quality [3]. The organisations, whether manufacturing or service organisations, both have recognized service quality as one of the key strategic values to increase customer satisfaction [4]. In an economy of innovative technologies and changing markets like India, customer satisfaction and service quality variables are gaining importance [5]. New financial products and services have to be continuously introduced in order to stay competent [6]. The organization which builds long term strategic relationships with its customers, the mantra for the success of those organisations could be customer centric orientation [7]. In Indian banks,

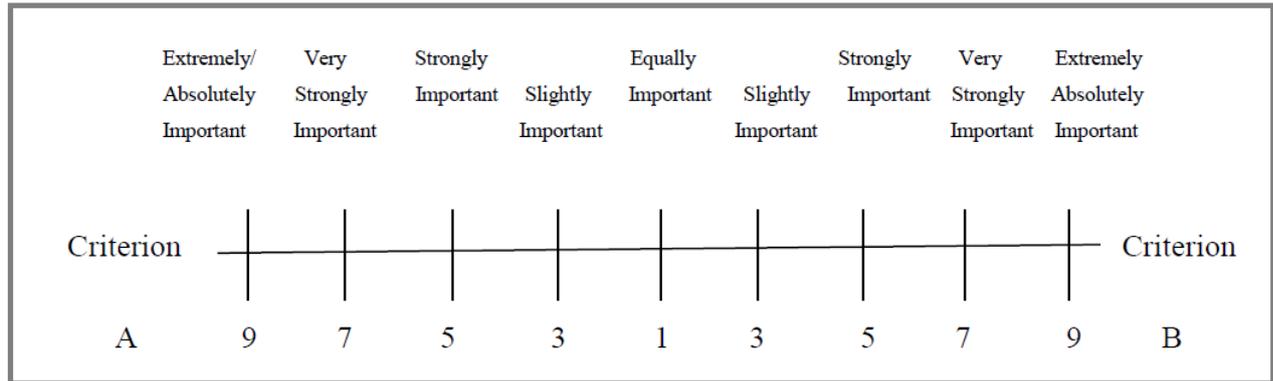


attention has now turned to improve the service quality in the banks, when customers arrives the bank and come into face-to-face contact with bank staff [8]. Thus there is a need to identify the variables which are mostly sought by the new customers while selecting a bank. The current study will fill this gap and aims to identify the most preferred criteria used by the customers while selecting a bank.

Analytic hierarchy process (AHP) Model

The analytic hierarchy process (AHP) is a structured technique which is used for the purpose of analysing multi criteria decisions. Thomas L. Saaty has developed this structured technique in the year 1970 on the basis of the two subjects i.e. psychology and mathematics [9]. Researchers have been studying and refining this structured technique comprehensively since it was developed. This technique is especially used in group decision making processes. AHP is extensively used in variety of decision problems almost everywhere in the world such as healthcare, business, education, and industry and government sector [10]. AHP is a multi-criteria decision making method which provides a complete and rational structure to decision problem, used for demonstration and quantification of various components of the decision problem, and relate these components to the overall objective of the problem [11]. In AHP model first of all the problem is decomposed into a hierarchy of sub-problems which can be realized more simply, and thus the each of the sub-problems can be examined independently and more easily. The components of the decision problems at various level of hierarchy can be tangible or intangible, prudently measured or incompletely projected. Once the hierarchy construction step is completed next step of the decision makers is to methodically estimate the various components of the decision problem by comparing them to one another two at the same time, with respect to their effect on a component on the upper level in the hierarchy [12]. While doing assessments, the decision makers normally use their decisions about the components' relative meaning and significance but they can also use actual data about the components. AHP is a widely used method due to the fact it uses both the fundamental information and human verdicts about the components in carrying out the assessments. AHP model converts these assessments to numerical values for all the components of the decision problem and assigns the arithmetical weight/priority for every component of the decision problem in the hierarchy [13]. AHP also permits diverse and incommensurable components to be compared to one another in a balanced and consistent way. This feature of AHP model differentiates the AHP method from other decision making methods. Therefore it can be said that AHP is a method which converts matching assessments into ratio scales. The input can be both quantitative such as price, weight, etc., and qualitative such as inclination, contentment and feelings. AHP also permits small inconsistencies in judgment because human judgments can't be consistent all the time. The ratio scales is derived using principal Eigen vectors and the principal Eigen value is used to derive consistency [14].

Below is an example to understand the AHP model with two criterions A and B. The nine point relative scale is used here to measure how much criterion A (on the left) is important than criterion B (on the right).



The respondents will have an option to tick any of the options on this relative scale. The respondent may also tick in between the options if they feel that their answer is in between the two options. The values in between options such as 2, 4, 6 and 8 are intermediary values which are used to represent the shades of judgement between five basic assessments values such as, 1, 3, 5, 7, and 9.

Relative importance of the different variables used by the customers while taking bank selection decision has been evaluated through AHP model. Firstly the three criteria Bank's workforce, Bank's Physical Environment and Convenience & excellence variable were used for peer comparison by the respondents at criteria level II. After this the sub criteria under these three variables i.e. public banks, private banks and foreign banks were used in the study for peer comparisons by the respondents. Thus two clusters were used in the AHP model for Bank Selection Decision, one at criteria level (Bank's workforce vs Bank's Physical Environment vs Convenience & excellence) and one at sub criteria level (public banks vs private banks vs foreign banks) are used in the study.

This section explains the mathematical model of AHP. Following are the assumptions used in the AHP model. If n represents a number of criteria, and C_1, C_2, \dots, C_n a set of alternatives, the quantitative pair wise assessment of activities, C_i, C_j is signified by $n \times n$ matrix [15][16][17]

$$A = (a_{ij}), \quad (i, j = 1, 2, \dots, n)$$

Where the elements a_{ij} are defined by the following rules (Saaty, 1980b):

Rule1. If $a_{ij} = \alpha$, then $a_{ji} = 1/\alpha$, $\alpha \neq 0$. This rule means that all the rows in the matrix are proportional to the first row and all of them are positive.

Rule 2. If it is estimated that C_i is equally important as C_j , then it follows that $a_{ij} = 1$, $a_{ji} = 1$, and $a_{ii} = 1$ for each i . Therefore, the matrix is arranged as follows:

$$A = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ \frac{1}{a_{12}} & 1 & \dots & a_{2n} \\ \vdots & \vdots & \dots & \vdots \\ \vdots & \vdots & \dots & \vdots \\ \frac{1}{a_{1n}} & \frac{1}{a_{2n}} & \dots & 1 \end{bmatrix}$$

The set of alternatives and the elements of the matrix A having been defined, it is necessary to determine numerical weights (priorities) w_1, w_2, \dots, w_n , which will affect the assessment. The weights w_i is determined on the basis of the assessment of the values of their ratio which is defined as follows:

$$a_{ij} = \frac{w_i}{w_j}$$

The matrix A can be given as follows:

$$A = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \vdots & \vdots & \ddots & \vdots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix}$$

The matrix A, in case of consistent assessment, where $a_{ij} = a_{ik}a_{kj}$, fulfills the equation

$$Aw = nw$$

The matrix A has special properties defined by the rules 1 and 2, due to which only one of its eigen values is different from 0 and equals n. In exercise, nevertheless, it often happens that matrix A contains non consistent valuations, so that the preceding equation cannot be valid. In such a case, weight vector w is obtained by solving the following equation:

$$Aw = \lambda_{\max}w$$

Under the condition $\sum w_i = 1$. λ_{\max} represents the greatest eigen values of the matrix A due to the properties of the matrix, it follows that $\lambda_{\max} \geq n$. Small changes in values of a_{ij} initiate small changes in λ_{\max} , the deviation in relation to n is the measure of consistency. It allows us to measure exactness of our scale in relation to a limitless scale, which we want to measure. Therefore, consistency index can be taken as our indicator of an "estimated, precise consistency". By use of consistency index the consistency ratio is calculated.

$$CI = (\lambda_{\max} - n) / (n-1)$$

$$CR = CI/RI$$

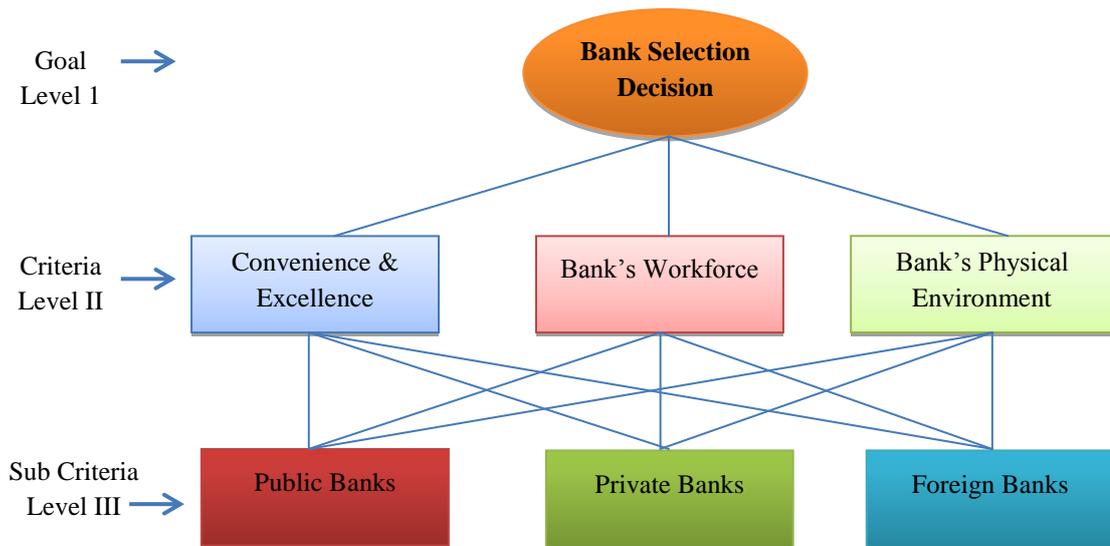
where RI is the random index (the consistency index of a randomly generated n-th order pairwise comparison matrix). Calculated values are presented in the below table 3.4.

Random Index Values

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45	1.49	1.51	1.54	1.56	1.57	1.58

If CR for the matrix A is below 0.10, the assessments of the relative importance of the criteria are considered satisfactory. If CR for the matrix A is not below 0.10, in that case the reasons for such a high inconsistency are to be found.

Figure 1: AHP Model for Bank Selection Decision



Objectives

Following are the main objectives of the study:

- To determine the most preferred criteria used by the customers while taking decision about selection of a bank to get financial services.
- To determine the most preferred type of bank selected by the customers on the basis of the bank selection criteria.

Research Methodology

The study is based on the survey method using a well-structured questionnaire divided in three parts. First part of the questionnaire consists paired comparison of the three variables i.e. Bank's Physical Environment, bank's workforce and Convenience & Excellence and. Second part of the questionnaire consist paired comparison of the three types of banks public, private and foreign using each three types of variables used at criteria level at II. Third part of the questionnaire consist statements related to banking behaviour of the respondents. Current study is based on judgements of the respondents who have some knowledge about the banks, who are involved in regular banking activities or from the field of finance. Thus the study has been focused on the persons from finance area only therefore primary data has been collected from the academicians holding the post of professor and associate professor, having finance as their specialization working in central universities, state universities, IIMs, IITs and NITs only in India. Total 320 questionnaires have been distributed through mails and personal interaction of which only 225 duly filled up and completed questionnaires were used for the analysis. The responses of the academicians have been given on the basis of their experience and subjective judgements, thus there is a need to test the consistency in the responses of each academicians for different criterions. Due to the fact that human judgement might not be consistent all the time, AHP model allows small inconsistency in judgments of the respondents. Therefore, consistency ratio has been calculated for each of the respondents. If the value of Consistency Ratio is smaller or equal to 10 per cent, the inconsistency is acceptable. If the Consistency Ratio is greater than 10 per cent, we need to revise the subjective judgments. Out of a total of 225 questionnaires which were completed and duly filled up by the respondents, only 175 questionnaires have been found with a consistency ratio of less than 10 per cent thus only these 175 questionnaires have been used in the study for the purpose of further analysis.

Data Analysis

Table 1 shows the priority vector of the three variables used at criteria level and sub criteria level using AHP model. The decision of selection of a particular bank by the customers depends upon the three main variables which are, bank's workforce, convenience & excellence and bank's physical environment. According to the judgements given by the academicians from the finance field convenience & excellence variable has the highest weight age among the three variables. Convenience & excellence variables is related to the easy banking procedures, easiness in obtaining loans, safety in transactions, reasonable interest rates and service charges and variety of products. A customer seeks mainly for convenience & excellence factor while selecting a bank for using financial services. Second highest weight age is given to the bank's workforce variable which is directly related to the behaviour of the employees of the bank, knowledge and skills of employees speed of personnel and customer care services of the bank. Customers get the services of banks through its employees thus this variable also plays an important role while selecting a bank by the customers. The way employees of banks satisfies the needs of the customers, deal with the customers, sort out the problems of the customers all these things ensures the possibility of gaining more and more customers by the bank. Bank's physical environment is also a vital variable to be kept in mind by the customers while selecting a bank. Physical environment includes the location of the bank branches, ATMs, internal environment of the bank and infrastructure of the bank. Before selection of bank a customer needs to know the availability of branches and ATMs nearby its places, also gives preference to bank with good infrastructure and internal environment of the branches like hygiene and safety factors etc. Thus the priorities of the customers while selecting a bank can be set as first for Convenience & excellence followed by bank's workforce and bank's physical environment.

Table 1 also explains the priorities of customers to different types of bank corresponding to these three variables at criteria level. According to the priority vector at sub criteria level III, public banks have been given highest weightage for convenience & excellence variable while lowest weightage has been given for bank's physical environment variable. Private Banks has got moderate weightage corresponding to all the three variables. Foreign banks got highest weightage for the bank's physical environment variable and lowest weightage for the convenience & excellence variable.

Table 1: Priority vector for Criteria and Sub criteria level

Priority Vectors for the Bank Selection Decision using AHP model			
Bank Selection Criteria Variables	Criteria Level II	Banks	Sub Criteria Level III
Bank's workforce	0.267	Public Banks	0.329
		Private Banks	0.368
		Foreign Banks	0.303
Convenience & Excellence	0.523	Public Banks	0.487
		Private Banks	0.301
		Foreign Banks	0.212
Bank's Physical Environment	0.210	Public Banks	0.228
		Private Banks	0.353
		Foreign Banks	0.419

Table 2 explains the total weight age of the three types of banks on the basis of the priorities at criteria and sub criteria level. Total weight age of the bank has been calculated as product of the priorities at criteria level II for each of the three bank selection variables and sub criteria level III for three types of banks. According to the total weight age public sector banks are the highest preferred banks by the customers when selecting a bank for any financial services due to its convenience and & excellence variable. Foreign banks are the lowest preferred banks by the customers and private sector banks come after public banks while taking a decision to select a bank.

Table 2: Total weight age of the Bank

Variables	Priorities at Level II	Public Banks	Private Banks	Foreign Banks
Bank's workforce	0.267	0.329	0.368	0.303
Convenience & Excellence	0.523	0.487	0.301	0.212
Bank's Physical Environment	0.210	0.228	0.353	0.419
Total Weight age		0.390	0.330	0.280

Respondents have been asked to tick the importance level of various parameters under the three main variables i.e. bank's physical environment, convenience & excellence and Bank's workforce which are used for taking decision of selection of bank by the customers. The responses were recorded using five point like's scale where 5 means very important, 4 means important, 3 means average, 2 means less important and 1 means not important. Table 3 explains the mean values of the parameters taken under three selection variable used at criteria level in AHP model for selection of a bank along. Mean values of the parameters have also been shown corresponding to each type of banks.

Table 3: Mean values of Importance level of various Parameters under three Variables at criteria level II Used for bank selection decision

Criteria	Level 2 Priorities	Public Banks	Private Banks	Foreign Banks
Bank's workforce (Priorities)	0.267	0.329	0.368	0.303
Behaviour of employees		3.6	4.1	3.9
Speed of personnel		2.4	4.0	3.8
Knowledge and skills of personnel		4.7	4.6	4.3
Customer care services		4.2	4.8	3.7
Convenience & Excellence (Priorities)	0.523	0.487	0.301	0.212
Interest Rates		4.7	4.1	3.5
Banking Procedures		3.9	4.3	4.1
Easiness in Obtaining Loans		3.8	4.1	4.0
Safety in transactions		4.9	3.1	2.5
Service charges		4.8	2.3	1.9
Variety of products	4.6	4.1	4.0	
Bank's Physical Environment		0.228	0.353	0.419

(Priorities)	0.210			
Physical facilities		2.9	3.4	4.1
Use of modern equipment		3.4	4.2	4.7
Internal Environment		2.8	4.1	4.8
Locations of Branches and ATMs		3.8	2.9	1.3

Table 4: Customers' Preference for Bank Selection decision at Criteria Level and Sub criteria Level for three types of banks

Criteria	Level 2 Priorities	Public Banks	Private Banks	Foreign Banks
Bank's workforce			√	
Behaviour of employees			√	
Speed of personnel			√	
Knowledge and skills of personnel		√		
Customer care services			√	
Convenience & Excellence	√	√		
Interest Rates		√		
Banking Procedures			√	
Easiness in Obtaining Loans			√	
Safety in transactions		√		
Service charges		√		
Variety of products		√		
Bank's Physical Environment				√
Physical facilities				√
Use of modern equipment				√
Internal Environment				√
Locations of Branches and ATMs		√		

Table 4 is a self-explanatory table where the cell having tick marks (√) shows the most preferred bank or bank with highest weight age or priority for a particular variable at criteria level II, and for particular parameters used to define the three variables at criteria level II.

In this study primary data has also been collected about the banking behaviour of the respondents. Out of a total of 175 respondents 69 per cent of the respondents were having bank accounts in public banks, 57 per cent of the respondents were having accounts in private banks while only 32 per cent of the respondents were having account in foreign banks. 82 per cent of the total respondents use the bank for saving account, 92 per cent of the total respondents were using salaried account service from the banks, 41 per cent of the respondents use the bank for loan account while none of the respondents were using current account service of the bank. 34 per cent of the total respondents using branch banking, 78 per cent of the total respondents use net banking and 29 per cent of the total respondents use mobile banking while only 10 per cent of the total respondents use home banking. 68 per cent of the total respondents who have taken loans from the bank, have taken loan from public banks, 21 per cent of the respondents have taken loan from private banks and rest of the respondents have taken loan from other financial institutions while none of the respondents have taken loan from foreign banks. Therefore it can be said that most of the respondents of the study have accounts in public banks, use public banks for saving account and salaried account, taken loan from public banks and use net banking facilities of the bank.



Conclusion

It can be concluded from the study that while taking decision about a bank selection; customers of the banks mainly look for the convenience in getting banking services and excellence of a particular bank in providing banking services to its customers. A customer also gives weight age to the interaction of bank employees with them. Customer gives priority to the attributes of bank's employees such as, their behaviour, speed of working, knowledge and skills of the employees etc. A customer gives less priority or weight age to the infrastructure, tangibility aspect of the banks.

Relevance of the Study

The current study is relevant from the point of view of managers of banks, policy and strategy makers in banking sector. The study gives an idea to these people about the customers' view point or perception while taking decision about selection of a bank for getting any type of financial services. The study highlights the most preferred criteria used by the customers while selection of a bank and which type of bank is preferred by the customer for particular criteria. Thus the study will be useful for managers and policy makers while making strategies for increasing the customer data base of the bank, strategies for financial inclusion and marketing strategies of the bank. They will come to know that at which criteria they should focus more to attract the customers towards their services and also provides knowledge about the areas to be improved by the bank.

Limitations of the Study:

The current study suffers from the following limitations:

- The study is based on the judgements of the experts thus can suffer from knowledge and experience of the experts.
- The study is limited to the sample size of 175 respondents only.
- The study is limited to the public, private and foreign banks which can be extended to the regional rural banks and cooperative banks.

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