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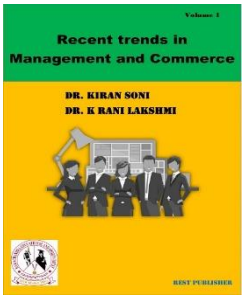

An Assessment of Performance of the Private Sector Banks in India Using the EDAS Approach

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Abstract

Banks are essential to every economy. The best possible use of financial resources is maintained when the banking sector is stable and banks are doing sustainably. This stability also enables efficient financial movement between the various parts of the economy. Therefore, banks play a crucial role in the equitable development and financial progress of any nation. Research significance: Every economy's ability to grow sustainably depends on the financial sector operating effectively and steadily. For the purpose of promoting growth and coping with the dynamics of the world economy, India has recently started a number of economic changes. Methodology: The present study contrasts the efficiency of the chosen "private sector banks in India" over the year of 2019 in this regard. First, using "a Multicriteria Decision Making (MCDM)" tool like the EDAS method, the productivity of the chosen banks is assessed from the standpoint of management effectiveness. Result: The rank of "AXIS is seventh, HDFC is first, ICICI is eight, KMB is second, FBL is fourth, IIBL is third, RBL is sixth and DCB is fifth". The ranking order is "HDFC > KMB > IIBL > FBL > DCB > RBL > AXIS > ICICI". Conclusion: Depending on EDAS research in this paper, it was discovered that among all banks, HDFC had the best overall performance while ICICI had the poorest.

Keywords: Banks, Net profit margin, return on long-term fund, Return on net worth and MCDM.

Introduction

Any economy needs banks to function. In addition to maintaining the best possible use of financial assets, security in the banking sector and long-term success of banks also enable efficient financial flow among the many sectors of the economy. Therefore, banks play a crucial role in the economic expansion and inclusive growth of any nation [1]. Beginning in the early 1990s, the Indian economy underwent continual restructuring and significant reforms. There have been numerous changes in the economy as well as the rest of the world. Recent past events, including "the 2008 Lehman Brothers bankruptcy" that sparked "the global financial disaster, Brexit, the yuan's devaluation, the Greece debt crisis, the increase in US debt, the collapse of Japan's economy" as a result of a natural disaster, and the ongoing armed conflict on terrorism, to identify a few, have had a substantial consequence on the global economy [2]. "Demonetization", the growth of the digital sector, and GST are just a few of the significant transformations that India has seen recently. There are primarily two sorts of ownership groups in the Indian banking industry: "public and private (Domestic and Foreign)". " Regional rural banks and urban and rural cooperative banks" are further options [3,4]. In this respect, the RBI regulates a complex system known as the Indian banking industry. Despite being subject to regulatory standards, banks' productivity is not uniform due to the changing global economic climate and differing demands from other parts of the economy. Even though new research on "credit, market, and liquidity risk" have emphasized the robustness of "the Indian banking system" due to its innate ability to endure global financial turmoil, it is crucial to examine bank achievement in order to ensure continued profitability while limiting risk. As a result, this field has always drawn researchers and professionals. Additionally, given India's rapid economic development, a comparison of the country's "public and private sector banks" is necessary [5,6]. "Public sector banks, private sector banks, and foreign banks" are some of the divisions that the Indian banking industry may be divided into. With their numerous branches, public service banks typically have more sway over the financial system in terms of providing and borrowing money. Finance industry are crucial pillars for success for the economic development of any nation. Various assessment methods have been proposed to assess bank branch productivity [7,8]. Emerging study demonstrates that well-developed metropolitan and extensive banking systems are essential for quick advancement. The banking industry is integrated with the nation's primary financial system. Assessment of banks' performance is crucial for growth and stability in a competitive business system. Productivity is a key indicator of an organization effectiveness and of its level of development. Banks must take the initiative to choose the best course of action [9, 10]. However, taking specific success criteria into account when picking the perfect bank might be advantageous for a number of reasons: In actual situations, the financial industry attempts to take into account the best method for assessing

bank efficiency in order to identify its strengths and weaknesses. The finance manager may be able to allocate better tasks and create better plans and policies with the use of performance assessment. Bank managers are interested about raising efficiency in order to strengthen their institutions [11,12]. The present study contrasts the performance of the chosen "private sector banks in India" over the year of 2019 in this regard. First, using "a Multicriteria Decision Making (MCDM) tool" like "the EDAS method", the behavior of the chosen banks is assessed from the standpoint of administrative productivity [13].

Materials And Methods

"The Evaluation Based on Distance from Average Solution (EDAS) method" was proposed by "Keshavarz Ghorabaee et al". The EDAS technique's computational process can be characterised as very novel and is also built on tested methodologies utilised in certain well-known MCDM techniques, including "SAW, TOPSIS, and VIKOR" [14]. As a result, it is anticipated that the EDAS technique will eventually be able to have been used to deal with a variety of MCDM issues. However, a lot of real-world judgement issues arise in circumstances when it is impossible to identify with absolute certainty how alternatives should be rated and how important each criterion is. Conventional MCDM techniques that rely on using sharp ratings levels in judgement are ineffective in these situations [15]. One could describe the EDAS as a recently proposed system. " Keshavarz Ghorabaee et al." also proposed a fuzzy variation of this approach. " The Positive Distance from Average (PDA) and the Negative Distance from Average (NDA") are the two deviation measures that serve as the foundation of the EDAS technique, and higher numbers of the PDA and lowered with the increase of the NDA are used to evaluate alternatives [16,17].

- Select the characteristics that best define the decision possibilities for the given decision problem. It constructed the choice matrix X, which shows how different solutions fare in comparison to particular standards.

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ x_{31} & x_{32} & \cdots & x_{3n} \end{bmatrix} \quad (1)$$

- Weights for the criteria are expressed in equation 2.

$$w_j = [w_1 \quad \cdots \quad w_n], \text{ where } \sum_{j=1}^{n} (w_1 \quad \cdots \quad w_n) = 1 \quad (2)$$

- The average result concerning all criteria must be computed using the formulas presented below, per the specification of the EDAS method:

$$AV_j = \frac{\sum_{j=1}^{n} k_{ij}}{n} \quad (3)$$

- The “positive distance from average (PDA)” is expressed in equation 4. Here B is “Beneficial criteria” and C is “non-beneficial criteria”.

$$PDA_{ij} = \begin{cases} \frac{\max(0,(x_{ij} - AV_{ij})}{AV_{ij}} & | \ j \in B \\ \frac{\max(0,(AV_{ij} - x_{ij})}{AV_{ij}} & | \ j \in C \end{cases} \quad (4)$$

- The “negative distance from average (NDA)” is expressed in equation 5. Here B is “Beneficial criteria” and C is “non-beneficial criteria”.

$$NDA_{ij} = \begin{cases} \frac{\max(0,(AV_{ij} - x_{ij})}{AV_{ij}} & | \ j \in B \\ \frac{\max(0,(x_{ij} - AV_{ij})}{AV_{ij}} & | \ j \in C \end{cases} \quad (5)$$

- Applying equation 2 calculated by multiplying by factors 4 and 5, respectively, "the weighted sum of the positive and negative distances from the average solution for all options" is normalized. The below Equation calculates "weighted sums of the positive and negative distance".

$$SP_i = \sum_{j=1}^{m} w_j \times PDA_{ij} \quad (6)$$

$$SN_i = \sum_{j=1}^{m} w_j \times NDA_{ij} \quad (7)$$

- The “weighted sum of the positive and the negative distance from the average solution for all alternatives” is normalized using equations 8 and 9.

$$NSP_i = \frac{SP_i}{max_i(SP_i)} \quad (8)$$

$$NSN_i = 1 - \left(\frac{SN_i}{max_i(SN_i)}\right) \quad (9)$$

- The “average of the normalized weighted sum of the positive and negative distances from the average solution for all alternatives” is used to determine the “final appraisal score (ASi) for all alternatives”.

$$AS_i = \frac{(NSP_i + NSN_i)}{2} \quad (10)$$

where “0 ≤ ASi ≤ 1”. The alternative with “the highest appraisal score” is selected as the most preferred choice among the other preferred choice [18,19].

The present study contrasts the performance of the chosen "private sector banks in India" over the year of 2019 in this regard. First, using "a Multicriteria Decision Making (MCDM) tool" like "the EDAS method", the behavior of the chosen banks is assessed from the standpoint of administrative productivity. The alternatives considered are “AXIS, HDFC, ICICI, KMB, FBL, IIBL, RBL and DCB”. The attributes are considered “Net profit margin % (EP1), Return on long-term fund % (EP2), Return on net worth % (EP3), Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)”. “Net profit margin % (EP1), Return on long-term fund % (EP2) and Return on net worth % (EP3)” are beneficial attributes. “Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)” are non-beneficial attributes.

Analysis And Discussion

TABLE 1. Decision matrix for the performance of Indian private sector banks

Banks	EP1	EP2	EP3	EP4	EP5	EP6
AXIS	8.5	60.36	7.01	4.46	2.03	60.52
HDFC	21.29	55.57	14.12	4.4	2.16	51.26
ICICI	5.3	38.13	3.19	3.96	1.88	57.39
KMB	20.32	46.78	11.47	4.4	2.48	52.98
FBL	10.89	68.96	9.37	4.87	1.78	63.43
IIBL	14.82	63.44	12.52	5.38	2.48	60.26
RBL	13.75	67.05	11.48	5.29	2.7	59.7
DCB	10.69	83.57	11.33	5.78	2.47	62.21
AVj	**13.20**	**60.48**	**10.06**	**4.82**	**2.25**	**58.47**

Table 1 shows data for the “Decision matrix for the performance of Indian private sector banks”. The alternatives considered are “AXIS, HDFC, ICICI, KMB, FBL, IIBL, RBL and DCB”. The attributes are considered “Net profit margin % (EP1), Return on long-term fund % (EP2), Return on net worth % (EP3), Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)”. “Net profit margin % (EP1), Return on long-term fund % (EP2) and Return on net worth % (EP3)” are beneficial attributes. “Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)” are non-beneficial attributes. Then, “the corresponding average solution (AV) for all evaluation criteria” is calculated from equation 3 which can be seen in the last row of Table 1.

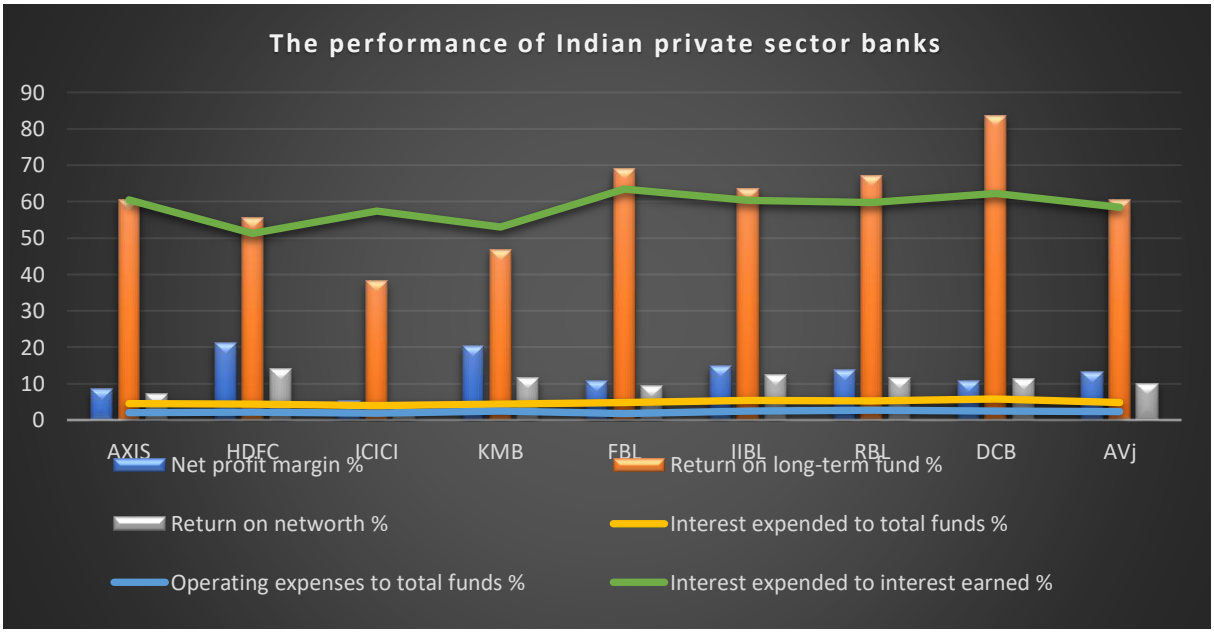

FIGURE 1. The performance of Indian private sector banks

Figure 1 represents data for the “Decision matrix for the performance of Indian private sector banks”. The alternatives considered are “AXIS, HDFC, ICICI, KMB, FBL, IIBL, RBL and DCB”. The attributes are considered “Net profit margin % (EP1), Return on long-term fund % (EP2), Return on net worth % (EP3), Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)”. “Net profit margin % (EP1), Return on long-term fund % (EP2) and Return on net worth % (EP3)” are beneficial attributes. “Interest expended to total funds % (EP4), Operating expenses to total funds % (EP5) and Interest expended to interest earned % (EP6)” are non-beneficial attributes.

TABLE 2. PDA

0.0000	0.0000	0.0000	0.0742	0.0968	0.0000
0.6135	0.0000	0.4034	0.0867	0.0389	0.1233
0.0000	0.0000	0.0000	0.1780	0.1635	0.0185
0.5400	0.0000	0.1400	0.0867	0.0000	0.0939
0.0000	0.1402	0.0000	0.0000	0.2080	0.0000
0.1232	0.0489	0.2444	0.0000	0.0000	0.0000
0.0421	0.1086	0.1410	0.0000	0.0000	0.0000
0.0000	0.3817	0.1261	0.0000	0.0000	0.0000

Table 2 displays the PDA corresponding to the evaluation criteria. "The positive distance from average (PDA) value" is calculated using "the average solution" from table 1 concerning "type of criteria (Beneficial criteria and non-Beneficial criteria)" as displayed in equation 4.

TABLE 3. NDA

0.35582	0.00203	0.30327	0.00000	0.00000	0.03508
0.00000	0.08122	0.00000	0.00000	0.00000	0.00000
0.59833	0.36957	0.68294	0.00000	0.00000	0.00000
0.00000	0.22655	0.00000	0.00000	0.10345	0.00000
0.17469	0.00000	0.06870	0.01090	0.00000	0.08485
0.00000	0.00000	0.00000	0.11676	0.10345	0.03064
0.00000	0.00000	0.00000	0.09808	0.20133	0.02106
0.18984	0.00000	0.00000	0.19979	0.09900	0.06399

Table 3 displays the NDA corresponding to the evaluation criteria. "The Negative distance from average (NDA) value" is calculated using "the average solution" from table 1 about "type of criteria (Beneficial criteria and non-Beneficial criteria)" as displayed in equation 5.

TABLE 4. Weight

0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667
0.1667	0.1667	0.1667	0.1667	0.1667	0.1667

Table 4 shows the weights distributed to the alternatives. Here weights are equally distributed among evaluation parameters "Net profit margin %, Return on long-term fund %, Return on net worth %, Interest expended to total funds %, Operating expenses to total funds % and Interest expended to interest earned %". The weights assigned to the test parameters add up to one.

TABLE 5. Weighted PDA

Weighted PDA						SPi
0.00000	0.00000	0.00000	0.01237	0.01613	0.00000	0.02850
0.10225	0.00000	0.06723	0.01444	0.00649	0.02055	0.21096
0.00000	0.00000	0.00000	0.02967	0.02725	0.00308	0.05999
0.09000	0.00000	0.02334	0.01444	0.00000	0.01565	0.14342
0.00000	0.02336	0.00000	0.00000	0.03467	0.00000	0.05803
0.02053	0.00815	0.04073	0.00000	0.00000	0.00000	0.06940
0.00701	0.01810	0.02350	0.00000	0.00000	0.00000	0.04861
0.00000	0.06362	0.02102	0.00000	0.00000	0.00000	0.08464

Table 5 shows the data values of "the Weighted Positive Distance from the Average and the sum of the Weighted Positive Distance from the Average". It is calculated using equation 6. "The weighted matrix of PDA" is calculated using the multiplication of the matrix of PDA from table 2 and the matrix of criteria weight W from table 4. Then "the sum of the weighted PDA values" is calculated corresponding to the alternates.

TABLE 6. Weighted NDA

Weighted NDA						SNi
0.05930	0.00034	0.05054	0.00000	0.00000	0.00585	0.11603
0.00000	0.01354	0.00000	0.00000	0.00000	0.00000	0.01354

0.09972	0.06159	0.11382	0.00000	0.00000	0.00000	0.27514
0.00000	0.03776	0.00000	0.00000	0.01724	0.00000	0.05500
0.02911	0.00000	0.01145	0.00182	0.00000	0.01414	0.05652
0.00000	0.00000	0.00000	0.01946	0.01724	0.00511	0.04181
0.00000	0.00000	0.00000	0.01635	0.03356	0.00351	0.05341
0.03164	0.00000	0.00000	0.03330	0.01650	0.01066	0.09210

Table 6 shows the data values of "the Weighted Negative Distance from the Average and the sum of the Weighted Negative Distance from the Average". It is calculated using equation 7. "The weighted matrix of PDA" is calculated using the multiplication of the matrix of PDA from table 3 and the matrix of criteria weight W from table 4. Then "the sum of the weighted NDA values" is calculated corresponding to the alternates.

TABLE 7. NSPi and NSNi value

Banks	NSPi	NSNi
AXIS	0.13508	0.57828
HDFC	1.00000	0.95080
ICICI	0.28438	0.00000
KMB	0.67984	0.80010
FBL	0.27507	0.79456
IIBL	0.32899	0.84805
RBL	0.23042	0.80587
DCB	0.40119	0.66525

Table 7 shows the normalized values of "the Weighted Positive Distance from the Average and the Weighted negative Distance from the Average". SPi and SNi values are normalized by equations 8 and 9 using values from tables 5 and 6.

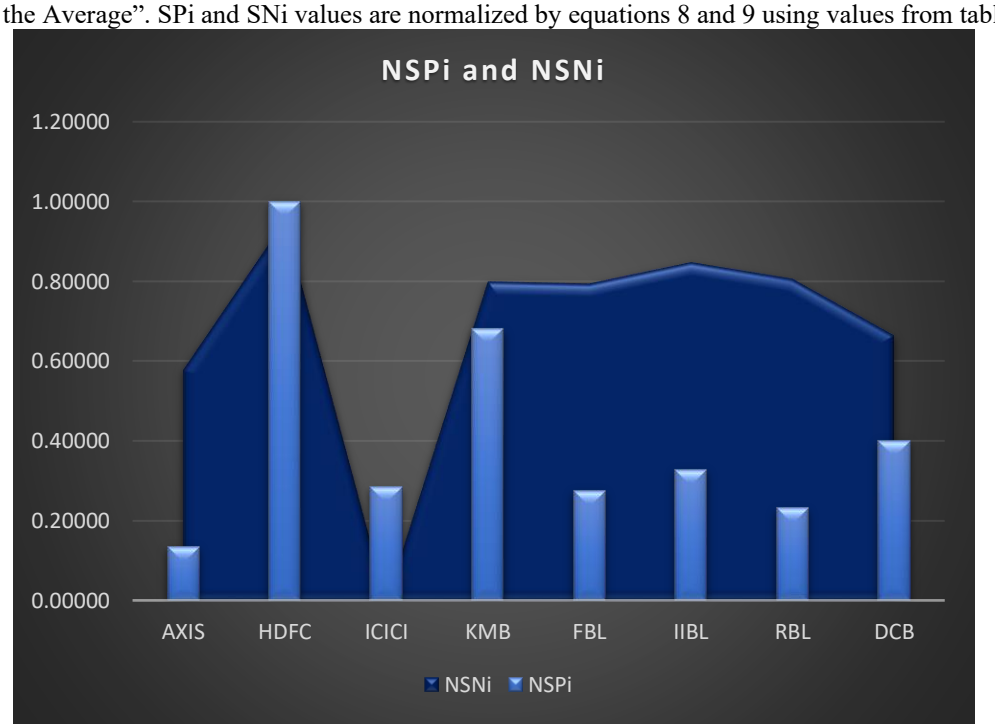

FIGURE 2. NSPi and NSNi value

Figure 2 shows a graphical representation of the normalized values of "the Weighted Positive Distance from the Average and the Weighted negative Distance from the Average". SPi and SNi values are normalized by equations 8 and 9 using values from tables 5 and 6.

TABLE 8. ASi

Banks	ASi
AXIS	0.35668
HDFC	0.97540
ICICI	0.14219
KMB	0.73997
FBL	0.53482

IIBL	0.58852
RBL	0.51815
DCB	0.53322

Table 8 shows the final appraisal score of alternative aviation fuels calculated by using 10. The final appraisal score values were calculated using the average of NSPi and NSNi. Here the final appraisal score for "AXIS is 0.35668, HDFC is 0.97540, ICICI is 0.14219, KMB is 0.73997, FBL is 0.53482, IIBL is 0.58852, RBL is 0.51815 and DCB is 0.53322".

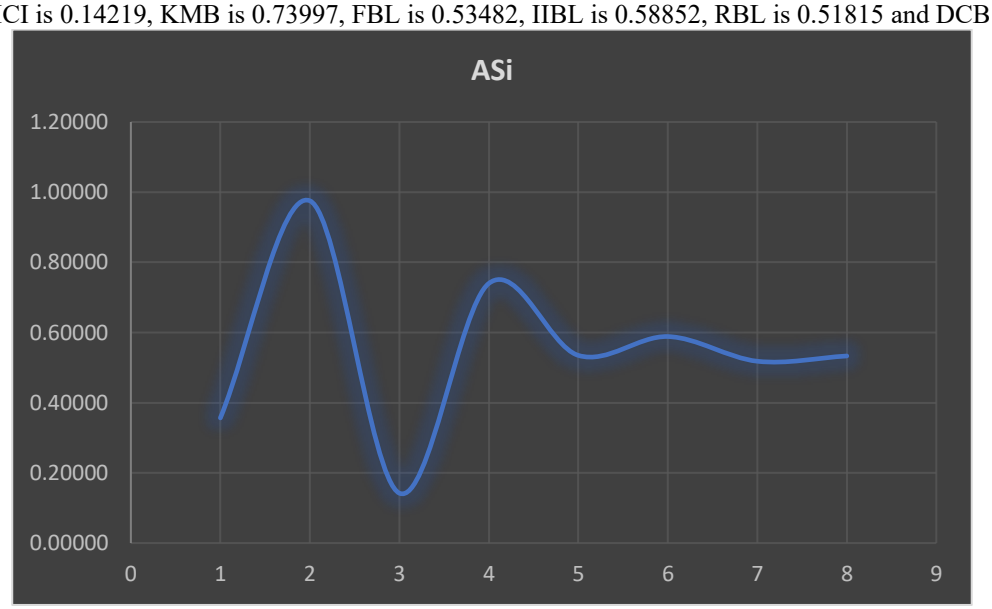

FIGURE 3. Final appraisal score of alternative banks

Figure 3 illustrates the final appraisal score of alternative banks calculated by using 10. The final appraisal score values were calculated using the average of NSPi and NSNi. Here the final appraisal score for "AXIS is 0.35668, HDFC is 0.97540, ICICI is 0.14219, KMB is 0.73997, FBL is 0.53482, IIBL is 0.58852, RBL is 0.51815 and DCB is 0.53322".

TABLE 9. Rank

Banks	**Rank**
AXIS	7
HDFC	1
ICICI	8
KMB	2
FBL	4
IIBL	3
RBL	6
DCB	5

Table 9 shows the final rank of alternative banks calculated by using 10. In this instance, the options are listed in decreasing order by the "final assessment score (AS)". Here rank of "AXIS is seventh, HDFC is first, ICICI is eight, KMB is second, FBL is fourth, IIBL is third, RBL is sixth and DCB is fifth". The ranking order is "$HDFC > KMB > IIBL > FBL > DCB > RBL > AXIS > ICICI$".

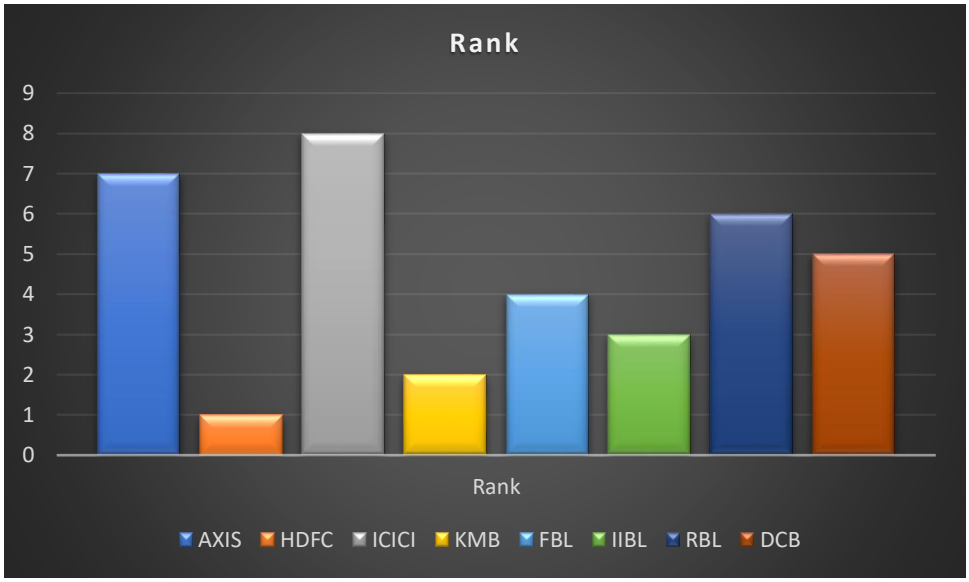

TABLE 4. The rank of private sector banks

Figure 4 shows a graphical representation of the final rank of alternative banks calculated by using 10. The options are listed here in order of descending of "the final appraisal score (AS)". Here rank of "AXIS is seventh, HDFC is first, ICICI is eight, KMB is second, FBL is fourth, IIBL is third, RBL is sixth and DCB is fifth". Depending on EDAS research in this paper, it was discovered that among all banks, "HDFC had the best overall performance while ICICI had the poorest".

Conclusion

Banks are the economic middlemen whose primary duties are to disburse cash and basic act is to accompany people requesting and delivering money. Banks serve as an intermediary by maintaining public savings and financing for the expansion of commerce and enterprise. A bank must assess its performance and compare it to the standard level in a world of global competition. The efficiency measuring method is advantageous to banks since it identifies their strengths and weaknesses. Records from the past indicate that banks are striving to evaluate their productivity and compare it to the reference level in order to determine the results of their development activities under varied circumstances. The economic results of "private sector banks on the BSE index for 2019" is prioritized in this study using the EDAS method. The rank of "AXIS is seventh, HDFC is first, ICICI is eight, KMB is second, FBL is fourth, IIBL is third, RBL is sixth and DCB is fifth". Depending on EDAS research in this paper, it was discovered that among all banks, HDFC had the best overall performance while ICICI had the poorest.

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