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A TOPSIS Approach to Evaluate the Financial Performance of Scheduled Commercial Banks in India

Dr.A.R.Rihana Banu*, Dr.G.Santhiyavalli**
Assistant Professor, Department of Commerce, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.
Professor, Department of Commerce, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.
Corresponding Author: Dr.A.R.Rihana Banu

Abstract: *In a liberalizing economy, the banking and financial sector assume top priority. Globalization requires adhering to standards and yardsticks that are universally applicable. Although, prospects for the Indian banking industry remain optimistic, it is being affected by the dynamic and highly competitive global banking environment. Hence, the financial performance of the Scheduled Commercial Banks in India was assessed with a view to explore the financial soundness of the banks using the multiple criteria decision - making approach (TOPSIS). A total of 40 Scheduled Commercial Banks were selected on the basis of the advances provided, amounting to a minimum of Rs.1,500 billions as on 31-03-2014. The study covered a period of 16 years from 1999-2000 to 2014-2015. The data was collected from the secondary sources and an expert opinion was obtained to assign the weights to the ratios. The findings of the study indicated that the banks that effectively reduce their risks garners more profit and upholds consistency in their business.*
Keywords*: Financial Performance, Efficiency, Business operations*

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I. Introduction

The banking industry plays an important role in the economic development of a country and is considered to be the most dominant segment of the financial sector. It plays a crucial role in the attainment of macro-economic objectives, and acts as a catalyst for socio-economic transformation by channelizing the savings into investments in different sectors of the economy and fosters economic growth. The Scheduled Commercial Banks, having massive share in the business operations have further diversified their activities to cater to the needs of trade and industry.

The structure of Indian Banking Industry is vibrant since the reforms in 1991. The financial sector reforms stirred the banking industry from a regulated arrangement to a deregulated market economy, and have brought many private and foreign banks into the Indian banking scenario. The economic development through liberalization and globalization augmented the intermediation role of the banks. The expansion of international integration enabled Indian banks to explore global markets, and deregulation induced banks to explore new business opportunities. This increased the scope and significance of the Indian banking industry. The WTO agreement in 2002 is of substantial importance where the economy grew exponentially, not just by number but also by magnitude. Many innovative financial products were introduced in the domestic financial market due to the increasing international trade and competitive edge among the banks.

In the modern set up, the banks have stepped into various allied businesses like merchant banking, housing finance, factoring, leasing, mutual funds, venture capital, portfolio management, stock trading, etc. Therefore, the banks are no further considered as dealers in money but as the leaders of development. The sustainability and the financial stability of the banks strongly rely more on the management ability and innovative strategies for facing both the physical and human challenges that wait ahead in the future.

Financial performance analysis is a process of synthesis and summarization of financial and operative data with a view to get an insight into the operative activities of a business enterprise. The banking system which constitutes the core of the financial sector plays a substantial role in transmitting monetary policy impulses to the entire economic system. Thus, the performance evaluation indicates the strength and weakness of the banks and influences the growth of the economy.

The performance of the commercial banks is influenced by the globalization, competition and volatile market dynamic pressures. With the purpose to improve the profitability, the banks are under pressure to efficiently manage their risks related with their business. Moreover, the banks are under obligation to protect their stakeholders' interest, besides meeting their regulatory requirements. Hence, an evaluation at all the

financial aspects having an effect on their operations, enables the management to effectively deploy their resources, make efficient use of funds and thereby reduce their risks. This approach of the banks ensures higher productivity by controlling the costs and consecutively improves the overall profitability of the banks.

Objective of the Study

The prime objective of this research is to evaluate the financial performance of the Scheduled Commercial Banks in India by applying the multiple criteria decision making approach (TOPSIS) and to find the Top and Low performing banks.

The secondary objective is to find the variables that discriminate the Top and Low ranked banks.

II. Literature Review

Chao Li and Caiqin Ye (2014) used an improved TOPSIS method to evaluate the performance of 16 listed commercial banks of China. In order to apply the principles of comprehensiveness and representativeness, first, the study built a set of index system using cluster analysis and multiple correlation coefficient method. Secondly, the Analytical Hierarchy Process (AHP) was used to identify the weight coefficient. Finally, the operating performance of the commercial banks was assessed and ranked, using the improved TOPSIS method, and the comprehensive scores were assigned to each bank.**Tamal Datta Chaudhri and Indranil Ghosh (2014)** applied multi-criteria decision making algorithms to arrive at the financial health of the commercial banks in India, both in the public and private sectors. The study considered various performance parameters of Basel guidelines. They analyzed the performance of the banks over time and also investigated whether the stock market has taken cognizance of these regulatory variables and have valued the banks accordingly. The study results indicated that the relative performance of private sector has not undergone much change while some public sector banks have improved over time. Further, the study also revealed that the stock market does not attach much importance to these regulatory variables in the valuation of banks. **Sanjeev C Panandikar (2014)** used the multi criteria method, TOPSIS, to obtain the entropy function of information theory, to measure the metric efficiency ratings for Indian Commercial Banks on a (0,1) scale. In order to rate and rank the banks, the bank-wise data, comprising seven financial ratios, were used from the financial year 2001-02 to 2012-13. The non-performing assets and business per employee were assigned highest weights. The hypotheses of equal and stable performance were tested. The findings revealed that the public, private and foreign banks do not differ in terms of average efficiency ratings but they differ from year to year. **Emrah Onder and Ali Hepsen (2013)** forecasted the financial performance of 3 state banks (Ziraat Bank, Halk Bank and Vakıflar Bank) 9 private banks (Akbank, Anadolubank, Sekerbank, Tekstil Bank, Turkish Bank, Turk Ekonomi Bank, Garanti Bank, Is Bank and Yapı Kredi Bank) and 5 foreign banks (Denizbank, Eurobank Tekfen, Finans Bank, HSBC Bank and ING Bank) in Turkey during 2012-2015 for ten groups of financial performance indicators including Capital Ratios, Balance Sheet Ratios, Assets Quality, Liquidity, Profitability, Income-Expenditure Structure, Share in Sector, Share in Group, Branch Ratios and Activity Ratios as described by the Banks Association of Turkey. The forecasting analysis tools like classical time series methods such as moving averages, exponential smoothing, Brown's single parameter linear exponential smoothing, Brown's second-order exponential smoothing, Holt's two parameter linear exponential smoothing and decomposition methods were applied to financial ratios data (based on 2002-2011 data) for forecasting, after which the outranking was made using multi criteria decision techniques like Analytical Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methodologies. Results indicated that Garanti Bank continue to be the leader followed by Ziraat Bank and Denizbank during years 2012-2015. **Emrah Onder, et al. (2013)** evaluated the performance of 3 state banks, 9 private banks and 5 foreign banks in Turkey using AHP and TOPSIS method for the period 2002 to 2011. The total performance of banks was divided into ten groups including Capital Ratios, Balance Sheet Ratios, Assets Quality, Liquidity, Profitability, Income-Expenditure Structure, Share in Sector, Share in Group, Branch Ratios and Activity Ratios. The five important ratios were identified using AHP method, and the ranking of the banks was made using TOPSIS method. Their model showed that Akbank is the best performing bank during the years 2007-2011 and 2009-2011. **Soner Akkoc and Kemal Vatansever (2013)** opined that the banking sector is crucial for any economy. The performance measurement of the bank concerns different segments of the society. The study was conducted to provide decision support for decision makers about the performance of banks by using multi criteria decision making techniques. For the purpose, the authors analysed financial performance of twelve commercial banks in terms of seventeen financial performance indicators by employing Fuzzy Analytic Hierarchy Process and Fuzzy Technique for Order Preference by Similarity to Ideal Solution methods. The findings of the study proved that these two methods rank banks in a similar manner. Here, the authors could have made suggestions on the most relevant method of ranking. **Abbas Toloie-Eshlaghy, et al. (2011)** proposed a conceptual approach to assess and rank the perceived service quality dimensions such as SERVQUAL gap between two types of banks, namely Public and Private Islamic Banks in Iran. The aim of the study was to introduce Fuzzy TOPSIS approach for this purpose to

evaluate the service quality of state and private banks. The paper futher developed an evaluation model based on the Fuzzy Analytic Hierarchy Process (FAHP) and Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (FTOPSIS) and Fuzzy Simple Additive Weighting (FSAW) methods. Furthermore, the relative weights of the chosen evaluation indexes were calculated by Fuzzy Analytic Hierarchy Process (FAHP), and FTOPSIS and FSAW were respectively adopted to rank the four banks, and as a result both the approaches gave the same result. It was concluded that service quality in private banks ranked far higher than state banks. **Hsu-Shih Shiha, et al. (2007)** integrated TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution), a Multi-Attribute Decision Making (MADM) technique, to a group decision environment which was found to be a practical and useful technique for ranking and selection of a number of externally determined alternatives through distance measures with the other decision makers. The proposed model developed by the authors was mentioned as a unified process and readily applicable to many real-world decision making situations without increasing the computational burden. The authors suggested that the newly developed model proved to be both robust and efficient with less computational complications.

III. Research Methodology

➢ **Data Source**

The data for the research was obtained primarily from the secondary sources.

- **Secondary Source**

The data from the secondary sources were collected and analyzed for the study. Most part of the data was gathered from RBI publications like RBI Bulletins, Reports on Trend and Progress of Banking in India and Statistical Tables Relating to Banks in India from the official website of RBI. In addition, data from the website of World Bank, the annual reports of the banks, reports of researchers and committees, books, journals and working papers were collected for the study.

- **Primary Source**

For the purpose of assigning weights to the criteria (ratios), expert opinion was obtained from a group of 50 experts constituting chartered accountants, academicians and bank officials.

➢ **Period of the Study**

The study covered a total period of 16 years from 1999-2000 to 2014-2015. The financial sector reforms in 1991 and the launch of e-banking in 1996 improved the operational environment of the banking sector in India while the global financial meltdown experienced in the year 2008 posed a great challenge for the banks in maintaining their financial stability. Thus, the period with opportunities and challenges was selected for the study.

➢ **Sampling Design**

With a view to measure the financial performance of the Scheduled Commercial Banks operating in India, the following criteria was used to select the banks from the universe of 95 Scheduled Commercial Banks excluding Regional Rural Banks. The selection criteria are listed below:-

✓ The advances provided by the banks, amounting to a minimum of Rs. 1,500 billions as on 31-03-2014,

✓ The banks having positive capital adequacy during the study period from 1999-2000 to 2014-2015, and

✓ The banks with continuous availability of data from 1999-2000 to 2014-2015.

Thus, a total of 40 banks (4 Foreign Banks, 18 Nationalized Banks, 12 Private Banks and 6 SBI and its Associates) were chosen. The composition of the selected banks for the study is presented in Table 1.

Table 1
List of Select Scheduled Commercial Banks

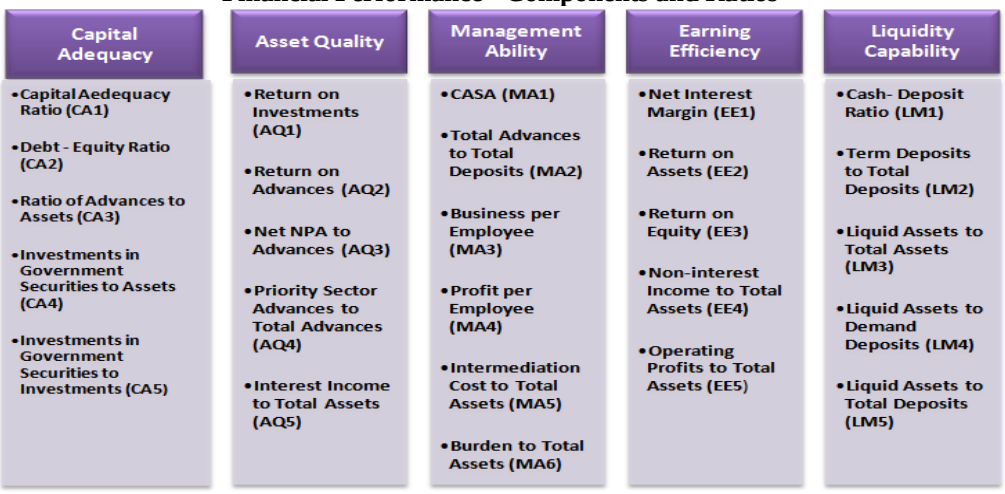
Bank Group	Name of the Bank	Code
Foreign Banks	Citibank	F1
	Deutsche Bank	F2
	Hongkong and Shanghai Bank	F3
	Standard Chartered Bank	F4
Nationalized Banks	Allahabad Bank	N1
	Andhra Bank	N2
	Bank of Baroda	N3
	Bank of India	N4
	Bank of Maharashtra	N5
	Canara Bank	N6
	Central Bank of India	N7
	Corporation Bank	N8

Bank Group	Name of the Bank	Code
	Dena Bank	N9
	Indian Overseas Bank	N10
	Oriental Bank of Commerce	N11
	Punjab and Sind Bank	N12
	Punjab National Bank	N13
	Syndicate Bank	N14
	UCO Bank	N15
	Union Bank of India	N16
	United Bank of India	N17
	Vijaya Bank	N18
Private Banks	Axis Bank	P1
	City Union Bank Limited	P2
	Federal Bank	P3
	HDFC Bank	P4
	ICICI Bank	P5
	Indusind Bank	P6
	ING Vysya Bank	P7
	Jammu & Kashmir Bank Ltd	P8
	Karnataka Bank Ltd	P9
	Karur Vysya Bank	P10
	South Indian Bank	P11
	Tamilnadu Mercantile Bank Ltd	P12
SBI and its Associates	State Bank of Bikaner & Jaipur	S1
	State Bank of Hyderabad	S2
	State Bank of India	S3
	State Bank of Mysore	S4
	State Bank of Patiala	S5
	State Bank of Travancore	S6

- **Statistical Design**

The major financial components of the banks like capital adequacy, asset quality, management ability, earning efficiency and liquidity management were assessed to understand the financial performance of the Scheduled Commercial Banks by applying ratio analysis, cluster analysis, rank-sum test TOPSIS and Discriminant function analysis.

Figure 2
Financial Performance - Components and Ratios



IV. Findings

The results of the processed data are recorded in this section to bring out the financial performance of the Scheduled Commercial Banks in India based on the multiple criteria decision - making approach.
The following table shows the representative and comprehensive criteria by applying cluster analysis and the weights assigned to them using rank-sum test method.

Table 2
Comprehensive and Representative Criteria Selection

Components	No. of Clusters	Criteria	R^2	Representative Criteria	Weight
CAPITAL ADEQUACY	CLUSTER 1	CA1	0.188	CA1 (Capital Adequacy Ratio)	0.018
		CA2	0.168		
		CA4	0.050		
	CLUSTER 2	CA3	0.172	CA5 (Investment in Government Securities to Investments)	0.164
		CA5	0.172		
ASSET QUALITY	CLUSTER 1	AQ1	0.250	AQ5 (Interest Income to Total Assets)	0.091
		AQ2	0.591		
		AQ3	0.158		
		AQ5	0.673		
	CLUSTER 2	AQ4		AQ4 (Priority sector Advances to Advances)	0.127
MANAGEMENT ABILITY	CLUSTER 1	MA1	0.757	MA5 (Intermediation Cost to Total Assets)	0.182
		MA4	0.612		
		MA5	0.798		
		MA6	0.568		
	CLUSTER 2	MA2	0.544	MA3 (Business per Employee)	0.073
		MA3	0.544		
EARNING EFFICIENCY	CLUSTER 1	EE1	0.733	EE5 (Operating Profits to Total Assets)	0.055
		EE2	0.857		
		EE4	0.736		
		EE5	0.942		
	CLUSTER 2	EE3		EE3 (Return on Equity)	0.036
LIQUIDITY MANAGEMENT	CLUSTER 1	LM1	0.523	LM5 (Liquidity Assets to Total Deposits)	0.145
		LM2	0.518		
		LM3	0.894		
		LM5	0.925		
	CLUSTER 2	LM4		LM4 (Liquidity Assets to Demand Deposits)	0.109

Source: Computed data

Table 3
Ranks of the Scheduled Commercial Banks between 2000 and 2015 using TOPSIS Method

Banks	2015		2014		2013		2012		2011		2010		2009		2008	
	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank
F1	0.429	12	0.510	4	0.538	4	0.581	1	0.621	1	0.613	1	0.593	1	0.564	1
F2	0.517	3	0.469	9	0.455	7	0.465	13	0.394	26	0.419	21	0.510	2	0.520	2
F3	0.512	4	0.495	5	0.396	19	0.433	21	0.369	34	0.379	31	0.400	16	0.424	15
F4	0.410	16	0.429	20	0.376	27	0.377	33	0.398	24	0.360	36	0.346	36	0.390	24
N1	0.450	8	0.455	11	0.416	13	0.491	9	0.436	17	0.419	22	0.335	38	0.379	28
N2	0.385	24	0.443	13	0.400	18	0.492	8	0.503	6	0.549	2	0.393	23	0.426	12
N3	0.534	2	0.589	1	0.556	2	0.579	2	0.547	2	0.521	4	0.440	10	0.465	6
N4	0.563	1	0.577	2	0.559	1	0.514	6	0.530	3	0.525	3	0.448	9	0.411	17
N5	0.364	33	0.379	33	0.347	32	0.379	32	0.348	37	0.435	18	0.350	34	0.351	35
N6	0.485	5	0.542	3	0.525	5	0.527	5	0.462	10	0.444	14	0.399	19	0.427	11
N7	0.378	28	0.365	37	0.363	30	0.401	30	0.404	23	0.442	15	0.365	28	0.365	31
N8	0.393	19	0.428	21	0.407	16	0.446	18	0.381	32	0.409	27	0.368	27	0.379	29
N9	0.413	15	0.392	30	0.436	10	0.410	29	0.417	19	0.430	20	0.448	8	0.409	18
N10	0.427	13	0.440	17	0.409	15	0.470	12	0.395	25	0.407	28	0.417	13	0.408	19
N11	0.373	31	0.442	14	0.372	28	0.422	24	0.449	12	0.520	5	0.469	6	0.430	10
N12	0.355	34	0.434	18	0.392	21	0.448	17	0.462	11	0.484	9	0.399	17	0.424	14
N13	0.442	10	0.453	12	0.380	23	0.431	22	0.438	15	0.431	19	0.396	22	0.382	27
N14	0.421	14	0.423	22	0.421	12	0.449	16	0.417	20	0.441	16	0.429	11	0.392	23
N15	0.377	29	0.373	35	0.307	38	0.483	10	0.514	4	0.352	38	0.404	15	0.387	26
N16	0.387	21	0.402	28	0.329	36	0.377	34	0.418	18	0.405	29	0.398	20	0.356	34
N17	0.339	38	0.411	24	0.376	26	0.386	31	0.365	35	0.363	35	0.357	32	0.332	38
N18	0.381	27	0.440	16	0.400	17	0.450	15	0.388	28	0.439	17	0.470	5	0.402	21
P1	0.350	35	0.359	38	0.299	39	0.331	40	0.371	33	0.336	39	0.327	40	0.334	39
P2	0.450	9	0.491	7	0.445	8	0.427	23	0.437	16	0.416	24	0.396	21	0.424	13
P3	0.382	26	0.417	23	0.379	24	0.437	20	0.442	14	0.446	13	0.501	3	0.472	5
P4	0.342	37	0.392	29	0.346	33	0.365	35	0.388	31	0.447	11	0.358	31	0.279	39
P5	0.276	40	0.340	39	0.336	34	0.362	36	0.331	38	0.416	25	0.408	14	0.445	7
P6	0.386	22	0.383	31	0.381	22	0.439	19	0.388	30	0.374	33	0.329	39	0.438	9
P7	0.346	36	0.381	32	0.276	40	0.333	39	0.329	39	0.380	30	0.346	37	0.373	30
P8	0.302	39	0.330	40	0.328	37	0.336	38	0.322	40	0.377	32	0.372	26	0.357	33
P9	0.365	32	0.371	36	0.331	35	0.360	37	0.354	36	0.357	37	0.362	29	0.402	22
P10	0.388	20	0.408	25	0.359	31	0.412	27	0.388	29	0.367	34	0.361	30	0.342	36
P11	0.434	11	0.462	10	0.547	3	0.512	7	0.489	8	0.489	8	0.484	4	0.492	4
P12	0.398	18	0.440	15	0.428	11	0.415	25	0.411	21	0.446	12	0.385	24	0.364	32
S1	0.463	6	0.489	8	0.442	9	0.461	14	0.510	5	0.454	10	0.420	12	0.439	8
S2	0.376	30	0.407	26	0.411	14	0.475	11	0.446	13	0.418	23	0.378	25	0.387	25
S3	0.400	17	0.403	27	0.370	29	0.411	28	0.392	27	0.334	40	0.351	33	0.274	40
S4	0.385	23	0.373	34	0.395	20	0.414	26	0.406	22	0.410	26	0.350	35	0.403	20

Source: Computed data (continued)

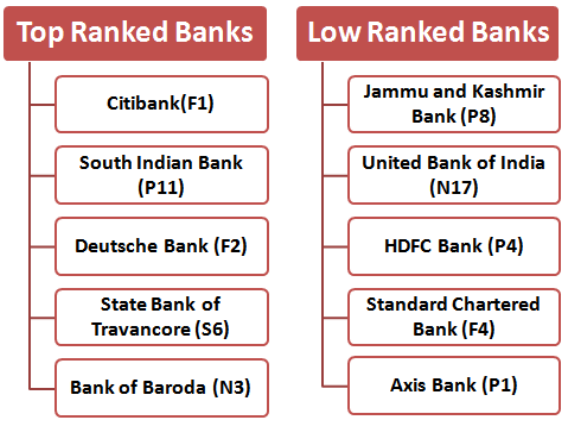
Table 3
Ranks of the Scheduled Commercial Banks between 2000 and 2015 using TOPSIS Method

Banks	2007		2006		2005		2004		2003		2002		2001		2000		Mean Rank
	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	Ci*	Rank	
F1	0.484	2	0.424	3	0.402	3	0.436	4	0.512	2	0.486	4	0.582	2	0.482	4	1
F2	0.545	1	0.648	1	0.769	1	0.694	1	0.567	1	0.460	5	0.492	7	0.420	16	3
F3	0.415	9	0.298	36	0.322	29	0.282	39	0.356	37	0.452	6	0.474	12	0.410	19	20
F4	0.375	23	0.346	16	0.294	39	0.283	38	0.341	35	0.334	39	0.414	31	0.375	30	37
N1	0.336	35	0.342	18	0.350	18	0.325	23	0.368	20	0.404	20	0.446	22	0.390	26	19
N2	0.404	13	0.404	5	0.385	8	0.357	12	0.400	10	0.409	18	0.485	9	0.425	14	7
N3	0.433	7	0.365	7	0.343	21	0.307	31	0.357	29	0.390	24	0.485	10	0.456	8	5
N4	0.400	15	0.353	11	0.315	33	0.337	17	0.363	25	0.363	36	0.397	33	0.391	24	9
N5	0.331	37	0.311	31	0.388	5	0.439	3	0.412	7	0.404	19	0.466	15	0.386	28	29
N6	0.385	20	0.361	8	0.325	27	0.358	10	0.365	22	0.433	10	0.469	14	0.346	39	8
N7	0.356	27	0.287	39	0.351	16	0.314	28	0.348	32	0.401	21	0.423	27	0.366	32	34
N8	0.378	22	0.336	20	0.342	22	0.325	24	0.364	23	0.429	12	0.466	16	0.379	29	23
N9	0.348	29	0.338	19	0.321	30	0.305	32	0.345	34	0.372	32	0.410	32	0.356	37	28
N10	0.400	14	0.311	30	0.350	17	0.358	11	0.379	17	0.414	16	0.455	19	0.452	10	14
N11	0.409	10	0.348	15	0.403	2	0.345	15	0.364	24	0.412	17	0.424	26	0.396	21	11
N12	0.371	24	0.326	26	0.351	15	0.347	14	0.410	8	0.420	15	0.487	8	0.440	12	13
N13	0.342	32	0.403	6	0.349	19	0.328	22	0.363	26	0.383	27	0.418	29	0.390	27	21
N14	0.395	18	0.335	22	0.313	35	0.383	6	0.349	31	0.388	26	0.426	25	0.425	15	17
N15	0.344	30	0.299	35	0.380	9	0.331	20	0.341	36	0.361	38	0.394	37	0.337	40	32
N16	0.342	31	0.329	25	0.355	13	0.295	35	0.345	33	0.370	34	0.395	36	0.417	18	35
N17	0.333	36	0.322	29	0.316	32	0.315	27	0.357	30	0.365	37	0.365	39	0.361	36	39
N18	0.379	21	0.324	28	0.313	36	0.301	34	0.365	21	0.388	25	0.393	38	0.362	35	25
P1	0.365	25	0.292	37	0.320	31	0.375	8	0.446	6	0.366	35	0.464	17	0.460	6	16
P2	0.386	19	0.324	27	0.334	26	0.337	18	0.368	19	0.290	40	0.440	24	0.394	23	18
P3	0.446	5	0.416	4	0.385	6	0.376	7	0.402	9	0.376	28	0.353	40	0.364	34	12
P4	0.310	39	0.309	32	0.290	40	0.270	40	0.322	38	0.374	30	0.417	30	0.395	22	38
P5	0.418	8	0.349	13	0.347	20	0.362	9	0.466	4	0.557	1	0.459	18	0.495	2	16
P6	0.399	16	0.361	9	0.377	10	0.495	2	0.459	5	0.490	3	0.605	1	0.554	1	10
P7	0.407	11	0.301	33	0.304	38	0.293	36	0.398	11	0.449	7	0.535	3	0.433	13	31
P8	0.339	34	0.262	40	0.314	34	0.323	26	0.292	40	0.372	31	0.421	28	0.391	25	40
P9	0.351	28	0.348	14	0.385	7	0.325	25	0.395	12	0.428	13	0.500	6	0.486	3	24
P10	0.330	38	0.336	21	0.337	25	0.331	21	0.393	13	0.444	8	0.446	23	0.446	11	27
P11	0.476	3	0.439	2	0.358	12	0.393	5	0.475	3	0.505	2	0.532	4	0.460	7	2
P12	0.340	33	0.287	38	0.323	28	0.292	37	0.315	39	0.371	33	0.397	34	0.364	33	30
S1	0.443	6	0.352	12	0.339	23	0.343	16	0.383	15	0.426	14	0.502	5	0.476	5	6
S2	0.363	26	0.330	24	0.337	24	0.309	30	0.360	27	0.398	22	0.395	35	0.369	31	26
S3	0.251	40	0.300	34	0.311	37	0.311	29	0.372	18	0.432	11	0.471	13	0.407	20	33
S4	0.398	17	0.345	17	0.371	11	0.351	13	0.379	16	0.390	23	0.449	21	0.417	17	22
S5	0.404	12	0.354	10	0.354	14	0.304	33	0.359	28	0.375	29	0.449	20	0.354	38	13
S6	0.465	4	0.334	23	0.399	4	0.334	19	0.389	14	0.438	9	0.481	11	0.454	9	4

Source: Computed data

Table 3 shows the selection value and the rank obtained by banks through the Technique for the Order of Preference by Similarity to Ideal Solution (TOPSIS) method for 16 years from 2000 to 2015 along with the mean rank. The top five ranked banks and the least five ranked banks have been selected on the basis of the mean rank obtained by the banks during the study period.
Figure 13 shows the classification of top and low ranked banks by taking into consideration the mean rank obtained by the banks.

Figure 2: Classification of Banks Using TOPSIS Analysis



The Scheduled Commercial Banks were classified as top and low ranked banks on the basis ranks assigned to the banks using TOPSIS analysis. The banks identified under top ranked banks in Figure 13, proved to be the best banks, by witnessing an increase in interest and non-interest income and through the growth in deposits and advances. Further, the NPAs of the top ranked banks are highly under control. The banks that are classified as the low ranked banks experienced a decline in standalone profit year over year. The operating income of the banks turned down as their deposits and advances decreased and the adverse loan impairment trends also continued to impact their performance. A few banks in the group reported high operating expenses, and a slippage in credit – deposit ratio was also observed. The stressed assets of the low ranked banks lead to pitiable earnings while a few banks suffered a net loss due to inefficient management and liquidity capability.

The reliability of the banks discriminated as top and low ranked banks using the technique for order of preference by similarity to ideal solution (TOPSIS) was tested using Discriminant Function Analysis. Step-wise method was applied to identify the most discriminating variables of the banks. Discrimination of the scheduled commercial banks on the basis of the ranks using the technique for order of preference by similarity to ideal solution (TOPSIS) is tested using the Discriminant function analysis.

Table 4
Discriminating Variables of the Top and Low Ranked Banks

Variables Entered	Wilks' Lambda	F	df1	df2	Sig.
LM4	0.727	61.342	1	163.000	0.000
MA5	0.533	71.008	2	162.000	0.000
CA5	0.445	66.911	3	161.000	0.000
MA3	0.402	59.474	4	160.000	0.000
AQ4	0.367	54.866	5	159.000	0.000
AQ1	0.345	50.033	6	158.000	0.000
EE3	0.326	46.424	7	157.000	0.000
AQ2	0.311	43.254	8	156.000	0.000
LM5	0.292	41.746	9	155.000	0.000

Source: Computed data

Table 4 shows the most discriminating variables identified through stepwise discriminant function analysis. The values of Wilks' Lambda of the variables identified are less than one and are found to be significant at 1% level of confidence showing that the group mean of the variables is different. The discriminating variables identified are Liquid Assets to Demand Deposits (LM4), Intermediation Cost to Total Assets (MA5), Investment in Government Securities to Investment (CA5), Business per Employee (MA3), Priority Sector Advances to Advances (AQ4), Return on Investments (AQ1), Return on Equity (EE3), Return on Advances (AQ2) and Liquid Assets to Total Deposits (LM5).

Table 5
Discriminant Function Coefficients of the Variables

Variables Entered	Canonical Discriminant Function Coefficients	
	Unstandardized	Standardized
LM4	0.027	1.502
MA5	1.534	1.173
MA3	0.016	0.876
AQ4	0.084	0.606
AQ1	0.095	0.448
EE3	0.054	0.385
CA5	0.020	0.301
AQ2	-0.265	-0.448
LM5	-0.023	-0.402
(Constant)	-10.711	

Source: Computed data

Table 5 illustrates the importance of each variable. High standardized discriminant function coefficients mean that the groups differ a lot on that variable. The standardized coefficient value registered by Liquid Assets to Demand Deposits(LM4) is 1.502 which is the most discriminating variable amidst all the other variables followed by Intermediation Cost to Total Assets (MA5) at 1.173, Investment in Government Securities to Investment (CA5) at 0.301, Business per Employee (MA3) at 0.876, Priority Sector Advances to Advances (AQ4) at 0.606, Return on Investments (AQ1) at 0.448, Return on Equity (EE3) at 0.385, Return on Advances (AQ2) at -0.448 and Liquid Assets to Total Deposits (LM5) at -0.402.

The Unstandardized canonical discriminant coefficient is used to maximize the difference in mean discriminant score between the top and low level banks. The equation for the discriminant function is

DF = -10.711 + 0.027 LM4 + 1.534 MA5 + 0.016 MA3 + 0.084AQ4 + 0.095AQ1 + 0.054 EE3 + 0.020 CA5 – 0.265 AQ2 – 0.023 LM5

where, DF - Discriminant Function
LM4 - Liquid Assets to Demand Deposits
MA5 - Intermediation Cost to Total Assets
MA3 - Business per Employee
AQ4 - Priority Sector Advances to Advances
AQ1 - Return on Investments
EE3 - Return on Equity
CA5 - Investment in Government Securities to Investment
AQ2 - Return on Advances
LM5 - Liquid Assets to Total Deposits

To find whether there is any significant difference in discriminating variables between top and low ranked banks, ANOVA was employed and the result is presented in Table 50.

H_{06}: There is no significant difference in discriminating variables between top and lower ranked banks.

Table 6
Analysis of Variance in Discriminating Variables

Variables	F	'p' value	Significance
CA5	49.406	0.000	Significant
AQ1	0.915	0.340	Insignificant
AQ2	1.865	0.174	Insignificant
AQ4	17.630	0.000	Significant
MA3	2.851	0.093	Insignificant
MA5	6.309	0.013	Significant
EE3	0.004	0.952	Insignificant
LM4	61.342	0.000	Significant
LM5	8.088	0.005	Significant

Source: Computed data

For determining whether there is any significant mean difference in discriminating variables between top and low ranked banks, ANOVA test was applied and the results are presented in Table 6. The test revealed that there is statistically significant difference in Investments in government securities to investments (CA5), Priority sector advances to advances (AQ4), Intermediation cost to total assets (MA5), Liquid assets to demand deposits (LM4) and Liquid assets to total deposits (LM5) at 5% level of significance between the top and low ranked banks while Return on investments (AQ1), Return on advances (AQ2), Business per employee (MA3) and Return on equity (EE3) do not have significant difference in the mean value of the variables .

Table 7
Classification Results of the Banks

Eigen value 2.424			**Wilks' Lambda** 0.292		
Canonical Correlation 0.841			**'p' value** 0.000		
		Bank_Range	**Predicted Group Membership**		**Total**
			top	**low**	
Original	Count	top	84	6	90
		low	4	71	75
	%	top	93.3	6.7	100.0
		low	5.3	94.7	100.0
93.9% of original grouped cases correctly classified.					

Source: Computed data

Table 7 establishes the power of banks discriminated. The high eigen value at 2.424 and canonical correlation at 0.841 elucidate that the statistically significant predictors are good explicators of differences between top and low ranked banks. The lower Wilks' Lambda at 0.292 signifies that the predictor variables have a discriminant power and found to be statistically significant at 99 percent confidence level. Classification results of the banks shows that the banks correctly classified at 93.90 percent. This proves that the result obtained from the TOPSIS analysis is highly reliable in ranking the banks during the study period.

V. Conclusion

The performance of banks is measured through their sustainability, efficiency in managing the funds and earning returns by proper application of the available resources. At the same time, the banks must have adequate liquid assets to meet the requirements of their customers and economy. Further, the disbursements made by the banks must be secured in order to avoid adverse loan impairment. Thus, the strategies worked out by the banks must be able to balance the risks in the business operations. The findings of the present study, using the multiple criteria decision making approach, has considered the major components of financial performance to comprehend the managerial ability of the banks and is identified that the banks that effectively reduces their risks garners more profit and upholds consistency in their business.

VI. Suggestions

The suggestions proposed on the basis of research findings to enhance the operational efficiency of the low ranked banks are as follows:

- Liquid assets to demand deposits ratio of the top ranked banks is exceptionally high in contrast to the low ranked banks which insists that the low ranked banks must increase their liquid assets to meet the obligations of its demand depositors,
- The ratio of intermediation cost to total assets is comparatively low in the top ranked banks while it is slightly high in low ranked banks. Hence, the low ranked banks are suggested to have control on their operating expenses,
- Investment in government securities is very high in top ranked banks indicating safe investments of the banks and is found to be lower in the low ranked banks. Thus, the low ranked banks are suggested to opt for more risk – free investments.
- Business per employee of the low ranked banks is significantly lower when compared to the top ranked banks. Hence, the productivity of the employees should be enhanced through effective management of the banks,
- Priority sector advances to advances ratio of the top ranked banks is higher witnessing more advances disbursed to the priority sector while it is observed to be lesser in the low ranked banks. Thus, the banks are suggested to disburse more debts to priority sectors which in turn will lead to economic development,
- Return on investments and return on equity of the low ranked banks is higher than that of top ranked banks, but the standard deviation of the low ranked banks are registered to be very high when compared to the top ranked banks. Hence, the low ranked banks are suggested to improve their returns on investments,
- Return on advances of the top ranked banks is faintly higher compared to the low ranked banks indicating the better quality of advances offered by the top ranked banks, and
- Liquid assets to total deposits ratio of the top ranked banks is considerably higher insisting the availability of the liquid assets with the banks for meeting its debt (total deposits). Thus, low ranked banks must increase their liquid assets by increasing their deposits and short term investments.

References

[1]. Chao Li and Caiqin Ye. (2014). "Comprehensive Evaluation of the Operating Performance for Commercial Banks in China based on improved TOPSIS". International Conference on Global Economy, Commerce and Service Science (GECSS 2014).
[2]. Sanjeev C Panandikar. (2014). "The performance of Indian Commercial Banks based on Multiple Criteria of Efficiency". The IUP Journal of Bank Management. 13.3:7-22.
[3]. Tamal Datta Chaudhri and Indranil Ghosh. (2014). "A Multi-Criteria decision Making Model- Based Approach for evaluation of the Performance of Commercial Banks in India". The IUP Journal of Bank Management. 13.3: 23-33.
[4]. Emrah Onder , Ali Hepsen. (2013). "Combining Time Series Analysis and Multi Criteria Decision Making Techniques for Forecasting Financial Performance of Banks in Turkey" International Conference on Applied Business and Economics (ICABE-13), New York, United States of America.
[5]. Emrah Onder, Nihat Taş and Ali Hepsen et al .(2013). "Performance evaluation of Turkish banks using Analytical Hierarchy Process and TOPSIS methods". Journal of International Scientific Publication: Economy & Business. 7.1:470-503.
[6]. Soner Akkoc and Kemal Vatansever. (2013). "Fuzzy Performance Evaluation with AHP and Topsis Methods: Evidence from Turkish Banking Sector after the Global Financial Crisis". Eurasian Journal of Business and Economics. 6.11: 53-74.
[7]. Hsu-Shih Shiha, Huan-Jyh Shyurb and E. Stanley Leec. (2007). "An extension of TOPSIS for group decision making". Mathematical and Computer Modeling.45: 801–813.
[8]. www.moneycontrol.com
[9]. www.rbi.org.in
[10]. www.worldbank.org.in
[11]. www.investopedia.com
[12]. www.statisticssolutions.com
[13]. http://www.investopedia.com/ask/answers/052515/what-debt-equity-ratio-common-bank.asp
[14]. http://www.jagranjosh.com/current-affairs/issues-and-challenges-facing-indian-banking-sector-1456572882-1
[15]. http://myimsv2.imsindia.com
[16]. http://jugaadguru.net/in/banking-awareness/articles/Structure-of-Commercial-Banking/15.aspx
[17]. http://www.pwc.in/press-releases/india-third-largest-domestic-banking-sector-by-2050.html
[18]. https://rbi.org.in/scripts/BS_SpeechesView.aspx?Id=955

[19]. https://www.sbi.co.in/portal/web/international/international
[20]. https://www.sbi.co.in/webfiles/includes_english/images/SBI_MERGER_LANDING_PAGE.jpg
[21]. https://www.icsi.edu/docs/webmodules/Publications/9.1%20Banking%20Law%20-Professional.pdf
[22]. http://www.vitt.in/banks/foreign.html
[23]. http://www.bis.org/speeches/sp140226.htm

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