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EVALUATING POST-MERGER AND ACQUISITIONS FINANCIAL PERFORMANCE IN SELECTED INDIAN SECTOR: A TOPSIS STUDY

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Abstract
Financial Performance and its analysis are very important because of the fact that the efficiency of the different sectors is crucial for the growth of the economy. In this respect, the present study carried out a performance analysis of 2 sectors namely, the Automobile sector and the Banking sector using TOPSIS technique in order to help decision makers in the country to make better decision. The financial ratio data of the selected companies has been collected for the last 15 years. Secondary data from various sources was used to reach the goal of the study. The purpose of this paper is to foresee the post-merger effect of mergers and acquisitions activity on major organizations in the Automobile sector during the period 2008-2016 in India, and the effect of mergers and acquisitions in the Banking sector during the period, 2008-2019 in India. The methodology used in the paper is TOPSIS to rank the organizations sector-wise based on selected financial ratio analysis data. It has been interpreted, that Mahindra & Mahindra has the best performance in the merger period, and ranks first among six Automobile companies in recent15 years. Likewise, in the case of Banks, HDFC Bank has been seen as the best-performing Bank in the post-merger period and ranks first among the five selected merged Banks.

Keywords
Mergers and Acquisitions, Automobile Industries, Banking Sector, Return on Equity, Profitability.

Introduction
There are many reasons why companies merge with each other or acquire other companies, by performing such activities, it helps in combining complementary strengths and weaknesses, ensures growth by removing competitors, and makes it simpler and larger to enter new markets. Mergers and Acquisitions (M&A) is a way to survive and succeed in a competitive global environment as a consequence of new political, monetary, and regulatory issues. M&A have been prominent strategic initiatives in the Indian Automobile industry, driving significant transformations and reshaping the competitive landscape. With the aim of achieving various

strategic objectives such as market expansion, technology integration, and synergies, M&A activities have played a crucial role in the growth and enlargement of the sector. The merger delivers substantial benefits for customers, employees, suppliers, parties involved in the marketing channel, shareholders, and other stakeholders.

The life cycle of Automobile products is currently getting shorter and shorter, while product development is moving rapidly. Furthermore, due to the advancement of technology, high-tech is being widely adopted, cars are getting more and more capital intensive, and new product development is requiring larger investments. The global automotive industry is encountering novel challenges and issues. To address these issues and reconcile these disparities, Automobile enterprise groups must integrate and optimize resource allocation globally, lower operating costs, boost enterprise competitiveness, and facilitate the transition of enterprises to larger-scale development. Global, cross-border, and cross-regional major Automobile corporations have reorganized the international Automobile industry in the last ten years of the twenty-first century. The global trend of the Automobile industry's future development is the grouping and globalization of the Automobile industry, as well as the mergers and reorganizations of the industry group. These developments are the outcome of the intense rivalry in the global car market. India's Automobile sector is one of the largest in the world, and has witnessed a plethora of M&A transactions involving both domestic and international players. These transactions have ranged from acquisitions of smaller firms for technology or market access to large-scale mergers aimed at consolidating market presence and enhancing competitiveness.

"The Banking sector plays an important role in promoting economic growth in the society. As a result, performance evaluation of the Banking sector has received a high level of attention over the past several years in both theoretical and practical areas" (wanke et al.). "Bank has been at the forefront of Banking in India, through innovation, efficiency and customer centricity. This has earned us the distinction of being one of the most trusted financial institutions in the country. The Bank focuses on holistic value creation for stakeholders. It plays a critical role in achieving individuals' financial goals, fostering business growth, making a difference to the lives of people through our social initiatives and contributing to the nation's overall progress" (HDFC Bank). Merger in Banking sector have been as a special point of interest for various classes of peoples, like researcher, economists, analysts and financial professionals for last few years from the beginning of the 20th century. Moreover, the number of occurrences of Bank merger and acquisition and its importance have been changing over time and need of the various Banks. The Banking sector started to deregulate and liberalize more rapidly after the1990s as there was change in government policies (LPG). Bank mergers leads to concentration of power in the hands of a certain large-scale leading Banks, which will lead to trimming of competition, and which may raise consumer service charges and stagnate innovation. Bank mergers have large numbers of benefits. The most important financial benefit of mergers and acquisitions are economies of scale. It implies to the financial savings generated through expansion of its business operations. The combining two or more Banks into a new organization can reduce costs by eradicating unnecessary operations related to technology, marketing, financial and human resources, which will lead to

lower costs, increase in the new entity's profitability. Mergers and Acquisitions occurred in Automobile Industries from 2007 to 2016 are listed as follows:

1. Tata Motors limited and Ford Motors (Jaguar and Land Rovers Brands) (2008)
2. Volkswagen and Porsche (2012)
3. Ashok Leyland and Hinduja Tech limited (2014)
4. Fiat and Chrysler (2014)
5. Bharat Forge and Walker Forge Tennessee (2016)
6. Nissan and Mitsubishi Motor (2016)
7. Mahindra& Mahindra's Acquisition of SsangYong Motor Company (2011)
8. Bajaj Auto's Partnership with KTM (2007)

Mergers and Acquisitions occurred in Banking Sector during the period 2007 to 2019 are:

1. Bank of Baroda and Dena Bank and Vijaya Bank (1 January 2019)
2. State Bank of India merged with State Bank of Bikaner and Jaipur, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala, State Bank of Travencore

(1 April 2017)

3. Kotak Mahindra Bank and ING Vyasa Bank (20 November 2014)
4. ICICI Bank merged with Bank of Rajasthan Ltd (23 May 2010)
5. HDFC Bank merged with Centurion Bank of Punjab (23 May 2008)
6. Indian Overseas Bank merged with Bharat Overseas Bank (31 March 2007)

Mergers and Acquisitions in the Automobile Industry

Mergers and Acquisitions (M&A) have been significant strategy in the global Automobile industry, aimed at achieving many objectives like market expansion, technological advancement, and cost reduction.

One notable study by Smith and Jones (2018) analysed the motives behind M&A deals in the Automobile industry and found that strategic objectives, such as gaining access to new markets or technologies, were the primary drivers. The study emphasized the importance of synergy realization and post-merger integration in achieving M&A success. In a similar vein, Johnson et al. (2019) investigated the effects of M&A on firm performance in the Automobile industry. Their research revealed that successful integration processes, effective leadership, and cultural alignment were critical factors influencing post-M&A performance. Furthermore, Gupta and Sharma (2020) conducted a comparative analysis of M&A activities in the Indian Automobile industry, focusing on the strategic implications for both acquirers and target firms. Their study highlighted the role of government policies, market dynamics, and organizational culture in shaping M&A outcomes. On the other hand, studies by Chen et al. (2017) and Kumar et al. (2018) explored the challenges and risks associated with M&A transactions in the Automobile sector, including cultural clashes, regulatory hurdles, and financial constraints. These studies underscored the importance of thorough due diligence and strategic planning in mitigating M&A risks. Siddalingya et al (2018) "study relies primarily on data that was obtained from other sources. Analytical methods used to

measure financial performance include ratio analysis, standard deviation and "t" test and "paired t" test. Post-acquisition due to slowdown in domestic and world economy demand of commercial as well as passenger vehicle decreased. Tata motors major revenue is coming from commercial vehicle before acquisition. This acquisition will help the company to develop its brand in luxury passenger vehicle. The opportunity came to Tata motors for the acquisition is also the result of economic downtrend. Fall in domestic market demand may change their strategy to move to growing countries like china is also the strategic decision taken towards the fulfilment of strategic intent of company. Tata motors now develop its brand value in world because of this successful acquisition and growth of these two companies" (Laddha, 2016). Simons (2002) "find that the more U.S. auto manufacturers cite patents from Germany, the more patents the U.S. companies obtain. Taken together with the above results, this indicates that international M&As might lead to a greater overall volume of innovation by the acquiring firm". In terms of performance outcomes, research by Lee and Park (2016) examined the long-term effects of M&A on innovation and competitive advantage in the Automobile industry. They found that successful M&A transactions facilitated knowledge transfer, technological synergies, and product innovation, leading to sustained competitive advantages for the merged entities.

Literature is also been reviewed from Scopus database using 2 keywords i.e. mergers and acquisitions, Automobile industries and time period taken is 1991-2023. We found out there are 113 documents. From the graph shown in Scopus database, we can say that the research papers related to mergers and acquisitions in Automobile sector are mainly conducted in United States, then in second position is China and in third position there is India with less than 10 research articles. From the pie chart diagram as shown in Scopus database we can say that only 18.6% of studies out of 113 studies are from business and management area rest are from others disciplines. Mainly studies are from engineering area i.e. 31.9%. So, we can state that there are less studies related to mergers and acquisitions in Automobile industries in business and management disciplines.

Overall, the literature suggests that M&A activities play a crucial role in shaping the competitive landscape and strategic direction of the Automobile industry. However, achieving M&A success requires careful planning, effective integration strategies, and a deep understanding of industry dynamics.

Mergers and Acquisitions in the Banking sector

Bank mergers decisions are very important financial advantages for the Banks and also for the country's economy. "Bank mergers have a significant impact on increasing profitability" (Mikhaylov, 2022). "M&A theories justify that synergistic gains are achieved in the longer term rather than the short-term (Harrison et al., 1991), and synergistic gains of M&A are reflected in profitability ratios such as ROA and ROE (Hitt et al., 1998)".Emrah et al. "evaluated the financial performance model of Turkish Banks during 2002-2011 periods using both the models Analytical Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methodologies are used for the outranking of Banks". "Mencaite (2012) used a multi-

criteria decision-making approach, particularly the AHP model to evaluate the performance of Lithuanian commercial Banks. They have concluded that the AHP model is appropriate for using it in the process valuating Bank performance". Wanke et al. (2015) "uses an integrated two-stage approach to assess the performance of 88 ASEAN (Association of Southeast Asian Nations) Banks from 2010-2013.The computation of empirical joint probabilities is used first to derive weights for a number of criteria related to Capital adequacy, Asset quality, Management quality, Earnings, Liquidity, and Sensitivity to market risk. In the second stage, these weights are used as TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) inputs to assess the relative efficiency of ASEAN Banks. The results reveal the prominent role of Islamic principles in Banking efficiency." Doumpos et al. (2023) "stated that owing to the Bank merger, it is possible to reduce costs with high transaction volumes. This allows businesses to increase their operational efficiency." On the other hand, Eaton et al. (2022) "mentioned that it is possible to distribute risks through Bank mergers. In other words, as a result of the merger, it is possible for the Bank to have many different types of customers. In this way, effective risk management can be made". "This allows Banks to increase their long-term profitability in a solid way. Increasing market share is also one of the most important benefits of Bank mergers" (Leledakis, 2022). Demireli (2010) "used TOPSIS and data for 2001-2007 to study the performance of public capital Banks in the Turkish Banking sector, and found that public capital Banks were affected by national and global crises. Moreover, the performance points obtained continually fluctuated on the basis of overseas data". According to Lu (2022), "thanks to the merger practice, Banks have a larger scale. This allows Banks to benefit from economies of scale."

Research Gap

There are large number of studies in the field of mergers and acquisitions but there is a smaller number of studies related to the merger and acquisitions in Automobile industries globally and very few studies in Automobile sector in India. The studies are mainly related to cross border merger. The Researchers have been researching extensively the impacts, drivers, and outcomes of M&A activities in this sector.

Objectives

The purpose of this paper is to evaluate the post-merger effect of mergers and acquisitions on major organisations of Automobile industries during the period 2008-2016 in India and the effect of mergers and acquisitions on major organisations of the Banking sector during the period 2008-2019 in India.

Research Methodology

Here we have taken sample size of 11 organizations for the manufacturing sector and service sector, i.e. 6 Automobile industries; Tata Motors, Mahindra & Mahindra, Ashok Leyland Limited, Volkswagen AG, Nissan Motor Co., Limited and Bharat Forge Limited, and 5 Banks, Bank of Baroda, State Bank of India, HDFC Bank, ICICI Bank, and Kotak Mahindra Bank. The

Automobile companies' merger period taken for the study is from 2008 to 2016. And in the Banking sector, we took the merger period from 2008 to 2019, so that we can get at least five years of post-merger data. In 2020, 4 set of Banks merger but after that, we cannot get five years of post-merger data therefore we have not included that in our study. We have collected secondary data from their financial statements. To know the recent trends, we have collected the recent 15 years data i.e., 2010-2024. Various profitability ratios are taken to check the condition of the profitability of the industries and the growth of their shareholders' wealth after their merger and acquisition. Ratios taken for the analysis are Net Profit Ratio, Current Ratio, Return on Asset, Return on Capital Employed, Return on Equity, and Earning per share. Researchers like Kose (2021); Adhikari (2023); Stojanovic (2016); Kwadwo Boateng (2020); Jayaraman (2014); have used various financial ratios in their research papers for their analysis to see the merger effect on companies' financial performance. AHP is used for assigning weight to the criteria on the Satty scale. The TOPSIS model is used for analysis in this paper following Demireli (2010); Kose (2021); Wanke (2015, 2016); Stankevičienė (2012) who have used TOPSIS as research methodology in their studies.

Variables which are taken for in this study are

CR = Current Ratio

ROE = Return on Equity

NP = Net Profit Margin

ROA = Return on Asset

EPS= Earnings per share

ROCE = Return on Capital Employed

TOPSIS

TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) is a method developed by Yoon and Hwang in 1980 that is based on the principle of ideal solution vicinity of decision points. "In addition, TOPSIS is effective methods that can help companies make decisions. TOPSIS is frequently used measuring the financial performance, in many cases and situation. It is easily applicable to different sectors and enables a comparison of alternatives based on the optimum of minimum and maximum values of variables in different sectors (Yurdakul and İç, 2003:11). In their research, Hwang and Yoon (1981) acted on the assumption that solution alternatives would be at the distance that was closest to the positive optimum solution point and furthest from the negative optimum solution point". The TOPSIS method is designed for the linear ordering methods of multidimensional objects (Hwang and Yoon; Dymova et al., 2013). Broadly speaking, the task of linear ordering involves the ordering of objects from the best to the worst, based on a latent measure – such as efficiency or performance - that is not subject to a direct observation or measurement (Jefmański & Dudek, 2015). A characteristic feature of TOPSIS is to take into consideration how far an evaluated object is from its negative- and positive-ideal solutions (Tavana et al., 2013; Roszkowska and Kacprazak, 2016)". Roszkowska (2009) "Some of the advantages of TOPSIS methods are: simplicity, rationality, comprehensibility, good

computational efficiency and ability to measure the relative performance for each alternative in a simple mathematical form."

"The main steps in multi-criteria decision making are the following, the establish system evaluation criteria that relate system capabilities to goals, (Hwang, Yoon, 1981; Jahanshahloo, Hosseinzadeh, Lofti, Izadikhah, 2006a)

– develop alternative systems for attaining the goals (generating alternatives),

– evaluate alternatives in terms of criteria,

– apply one of the normative multiple criteria analysis methods,

– accept one alternative as "optimal" (preferred),

– if the final solution is not accepted, gather new information and go to the next iteration of multiple criteria optimizations."

Analytical Hierarchy Process (AHP)

The analytic hierarchy process (AHP) was developed by Thomas Satty while he was teaching at the university of Pennsylvania's Wharton School of Business. "The AHP is a process that uses hierarchical Decomposition to deal with information in multi-criterion decision making, such as information technology, vendor and product evaluation". The AHP consists of three steps: first step is to developing the hierarchy of attributes germane to the selection of the vendor. Second step is to identifying the relative importance of the attributes. And the third step is to Scoring the alternatives' relative performance on each element of the hierarchy.

"The AHP is recognised as the leading theory in multi-criterion decision making."

"The AHP method uses system analysis and continuously decomposes the evaluating indices according to the main evaluating indices of every level (Saaty, 1980)".

Gnanasekaran et al. (2006) "has applied Analytical Hierarchy Process (AHP) for effective supplier selection in a leading Automobile component manufacturing company. The study shows that application of AHP enhances the decision-making process and reduces the time taken to select the supplier".

Sreekumar et al. (2011) "Bias in decision-making process has been avoided using weightages for decision-makers based on their proficiency in the problem under consideration. In real practice, the decision makers are hardly equally important as they usually come from varied backgrounds. It is a novel technique for determining weightages for decision-makers. The procedure uses the ranking of a decision-maker by other decision-makers; hence, conflict resolution becomes quite easy".

TOPSIS procedure can be expressed in a series of following steps:

Step 1: Data Collection

Step 2: Construct the Decision Matrix.

Step 3: Normalize the Decision Matrix for Each Year

Step 4: Determine the Weighted Normalized Decision Matrix for Each Year

Step 5: Determine the Ideal and Negative-Ideal Solutions for Each Year

Step 6: Calculate the Separation Measures for Each Year

Step 7: Calculate the Relative Closeness to the Ideal Solution for Each Year

Step 8: Rank the Companies for Each Year
Step 9: Aggregate the Rankings Over 15 Years
Cumulative Performance Score: Sum the Ci∗ scores over the 15 years.

Analysis

Table No.:1- Decision Matrix

	1	2	3	4	5	6
1	1	2	5	6	7	9
2	0.5	1	3	5	7	9
3	0.2	0.33	1	2	4	7
4	0.17	0.2	0.5	1	3	6
5	0.14	0.14	0.25	0.33	1	3
6	0.11	0.11	0.14	0.17	0.33	1

Table No.:2- Weights of criterions and Priorities

Criteria	Priority	Suggested weight
Current Ratio	42.4%	0.33
Return on Asset	29.1%	0.24
Return on Equity	13%	0.15
Return on Capital	8.7%	0.12
Earnings Per Share	4.4%	0.10
Net Profit Ratio	2.4%	0.06

Table No: 3- Score and Ranking of Automobile Companies

	Automobile company	TATA Motors	Volkswagen	Ashok Leyland Limited	Bharat Forge	Nissan Motor Co. Ltd	Mahindra & Mahindra
2010	Score	0.46	0.48	0.57	0.31	0.29	0.96
	Ranking	4	3	2	5	6	1
2011	Score	0.07	0.72	0.43	0.57	0.43	0.84
	Ranking	6	2	4	3	5	1
2012	Score	0.35	0.7	0.14	0.43	0.33	0.36
	Ranking	4	1	6	2	5	3
2013	Score	0.25	0.23	0.04	0.25	0.41	0.74
	Ranking	3	5	6	4	2	1

2014	Score	0.5	0.46	0	0.71	0.42	0.9
	Ranking	3	4	6	2	5	1
2015	Score	0.33	0.01	0.14	0.89	0.34	0.54
	Ranking	4	6	5	1	3	2
2016	Score	0.22	0.03	0.1	0.87	0.39	0.64
	Ranking	4	6	5	1	3	2
2017	Score	0.08	0.19	0.3	0.9	0.37	0.46
	Ranking	6	5	4	1	3	2
2018	Score	0.09	0.24	0.37	0.8	0.47	0.57
	Ranking	6	5	4	1	3	2
2019	Score	0.47	0.23	0.32	0.87	0.26	0.49
	Ranking	3	6	4	1	5	2
2020	Score	0.28	0.24	0.09	0.9	0.57	0.27
	Ranking	3	5	6	1	2	4
2021	Score	0.53	0.61	0.03	0.83	0.63	0.18
	Ranking	4	3	6	1	2	5
2022	Score	0.3	0.65	0.04	0.79	0.31	0.74
	Ranking	5	3	6	1	4	2
2023	Score	0.08	0.73	0.33	0.43	0.31	0.82
	Ranking	6	2	4	3	5	1
2024	Score	0.53	0.69	0.27	0.25	0.35	0.75
	Ranking	3	2	5	6	4	1
	cumulative Rank	4.26	3.86	4.86	2.2	3.8	2

From the above table we can say that the Mahindra and Mahindra overall performance in its merger period is excellent with the cumulative rank of 2 among the 6 merged Automobile companies. The Mahindra and Mahindra is 6 times in rank 1 in last 15 years. The Bharat Forge is in second position with 8 times in rank 1 in last 15 years. The Bharat Forge overall performance in its merger period is excellent with its cumulative rank of 1.8 among the 6 Automobile companies. The Nissan Motor co. ltd is in third position with 3 times in 2nd rank in last 15 years. Nissan Motor co. Limited's overall performance in its merger period is good with the cumulative rank of 2.86 among the 6 Automobile companies. The Volkswagen AG is in forth position in last 15 years. The overall performance in its merger period is to be improved with the cumulative rank of 3.86 among the 6 Automobile companies. The TATA Motors is in fifth position in last 15 years. The TATA Motors overall performance in its post-merger period needs to be improve with the cumulative rank of 4.26 among the 6 Automobile companies. Ashok Leyland limited is in sixth position in last 15 years. Ashok Leyland limited overall performance in its merger period need to be improved with the cumulative rank of 4.86 among the 6 Automobile companies.

Table No.:4 Cumulative Ranks of Automobile Companies

Automobile company	Cumulative Score	Rank
TATA Motors	4.26	5
Volkswagen	3.86	4
Ashok Leyland Limited	4.86	6
Bharat Forge	2.2	2
Nissan Motor Co. Ltd	3.8	3
Mahindra & Mahindra	2	1

From the above table we can say that Mahindra & Mahindra Company rank 1 among the 6 merged Automobile companies. Bharat Forge Company rank 2 with cumulative score of 2.2; then comes in 3rd rank Nissan Motor Company with its cumulative score of 3.8. Thereafter come is rank 4th Volkswagen company with its cumulative score of 3.86; then comes TATA Motors in rank 5th with cumulative score of 4.26 and at last in 6th rank comes Ashok Leyland company among the 6 Automobile companies.

Table No. 5-Score and Ranking of Banks

	Banks	BOB	SBI	KMB	HDFC	ICICI
2010	Score	0.35	0.51	0.57	0.54	0.2
	Ranking	4	3	1	2	5
2011	Score	0.4	0.43	0.54	0.54	0.28
	Ranking	4	3	2	1	5
2012	Score	0.32	0.46	0.56	0.54	0.41
	Ranking	5	3	1	2	4
2013	Score	0.09	0.4	0.47	0.61	0.58
	Ranking	5	4	3	1	2
2014	Score	0.3	0.2	0.62	0.63	0.77
	Ranking	4	5	3	2	1
2015	Score	0.2	0.38	0.6	0.57	0.58
	Ranking	5	4	1	3	2
2016	Score	0.37	0.2	0.55	0.78	0.61
	Ranking	4	5	3	1	2
2017	Score	0.23	0.13	0.75	0.86	0.66
	Ranking	4	5	2	1	3
2018	Score	0.18	0.14	0.74	0.86	0.45
	Ranking	4	5	2	1	3

2019	Score	0.21	0.12	0.78	0.87	0.28
	Ranking	4	5	2	1	3
2020	Score	0.16	0.28	0.8	0.8	0.44
	Ranking	5	4	1	2	3
2021	Score	0.16	0.33	0.81	0.81	0.66
	Ranking	5	4	2	1	3
2022	Score	0.2	0.23	0.79	0.74	0.61
	Ranking	5	4	1	2	3
2023	Score	0.25	0.22	0.75	0.59	0.46
	Ranking	4	5	1	2	3
2024	Score	0.3	0.39	0.52	0.28	0.69
	Ranking	4	3	2	5	1
	Cumulative Rank	4.4	4.13	1.8	1.8	2.86

Table No.:6 Cumulative Ranks of Banks

Banks	Cumulative Score	Rank
BOB	4.4	4
SBI	4.13	5
KMB	1.8	1
HDFC	1.8	1
ICICI	2.86	3

From the above table we can say that HDFC Bank and Kotak Mahindra Bank have acquired rank 1 in last 15 years among the 5 merged Banks. In 3RD rank comes ICICI Bank thereafter comes SBI in 4TH rank and at last come Bank of Baroda in 5th rank with cumulative score of 4.4 among the all Banks.

Business Strategy of Mahindra & Mahindra

Mahindra & Mahindra set one's on to be 'Globally Recognised Automotive Manufacturer'. Mahindra & Mahindra follows some strategic plan and process like Product Strategy, Research and Development unit, Production Diversification, Innovation and use of new and advance Technology, Marketing Strategy, Financial Strategy, etc. Mahindra & Mahindra has developed a robust product strategy focused on advancing powertrains to meet the growing preference for gasoline. They are collaborating with Ssangyong Motors from Korea to create a new engine family that includes both diesel and gasoline options. The company aims to build a Competitive Advantage (CV) Moat for its Maxx Pickup. At Mahindra Research Valley (MRV) in Chennai, which houses over 2,500 engineers, the company has fostered innovation and technological advancement. The XUV500, a product emerging from this hub of creativity, showcases their commitment to new technology. As part of their future mobility vision, Mahindra is also investing

in battery-operated electric powertrains and electric vehicles through their subsidiary, Mahindra Reva Electric Vehicles Pvt. Ltd. They are driving innovation with cutting-edge products and pioneering "E-SUVs" with purpose-built platforms, software-defined architecture, and an ecosystem partnership approach. Their marketing strategy aims to capitalize on strong momentum for core auto brands like Scorpio Classic, Scorpio-N, Bolero, Neo, and Thar, while strengthening their leadership in light commercial vehicles (LCVs). They also plan to scale up globally, leveraging new global pickups and electric SUVs. In fiscal year 2024 (F24), Mahindra achieved export volumes of 24,663 vehicles and is focused on developing its EV strategy as customers remain highly brand-focused. Financially, Mahindra has committed significant investments, including a 2014-15 MOU with the Government of Maharashtra for a Rs 4,000 crores investment in Chakan for expansion. For fiscal years 2025-27 (F25-27), they plan to invest Rs 12,000 crores in setting up a new manufacturing facility and advancing SUV electric vehicles. MD & CEO's message "we are grateful for our shareholder's trust in our journey, a crucial part of our 'Infinity loop' of growth" (Mahindra & Mahindra Annual Report 2023-2024). Future plan is to explore new potential market in UK and Europe with upcoming 'Born Electric Range'; 'Gearing up for Tomorrow'.

Business Strategy of HDFC Bank

"HDFC Bank provides a wide array of products and services that cater to the diverse needs of retail and business (MSMEs and emerging corporates), customers spread across metros, urban, semi-urban and rural locations. From personal loans and mortgages to working capital and trade finance, also offer solutions that are designed to meet the evolving requirements of our customers. HDFC Bank strives to support every stage of a customer's financial journey".

HDFC Bank has 23,920 total Banking outlets and 20,938 ATMs in India and 4 overseas branches and 4 digital Banking units in abroad. HDFC Bank follows some strategic plan and process like increasing its sphere operations and its services; innovation and technological upliftment, educating citizens, leadership in innovation. HDFC Bank launched its first overseas commercial branch in Bahrain in 2008. In 2010, the Bank introduced Asia's first ATMs that were 40% faster than existing models. Two years later, in 2012, HDFC Bank launched a Mobile Banking App in Hindi and initiated "Josh Unlimited," a nationwide sports program for its employees. By 2013-14, it emerged as the market leader in India for issuing Credit Cards, surpassing 55 lakh cards. The year 2015 saw the introduction of PayZapp, India's pioneering one-click mobile-pay solution, alongside a revolutionary 10-second personal loan disbursement service in retail lending. In later years, HDFC Bank continued to push technological boundaries. In 2017, it deployed the country's first AI-based chatbot for customer service and established Smart-Up Zones to support start-ups. The Bank also enhanced convenience for customers with Easy EMI options on Debit Cards and introduced an all-in-one DigiPOS machine. Building on these innovations, HDFC Bank launched its next-generation Mobile Banking App in 2018, setting new standards for digital Banking experiences. Appreciation increases when HDFC Bank was voted India's top Bank by customers in the Forbes World's Best Banks Survey. The Bank further expanded its offerings in 2020 with its new HDFC Bank Millennia range of cards and introduced contactless, consent-based customer

on-boarding via video KYC. In 2022, HDFC Bank announced SmartHubVyapar, an integrated merchant solutions App, and in 2023, it upgraded the PayZapp to version 2.0 with advanced security and user-friendly features. The Bank achieved a significant milestone in July 2023 by merging with HDFC Limited, forming one of the world's most valued financial institutions. In 2024, HDFC Bank continued to lead among the other Bank with the launch of a UPI QR code interoperable with Central Bank Digital Currency (CBDC) and achieved 75 lakh registrations for PayZapp 2.0. Additionally, it educated over 2 lakh citizens across India on safe digital Banking practices. Future plans are pledged to become carbon neutral by 2031-32 underscoring its commitment to sustainability and responsible Banking practices.

Findings

Mahindra & Mahindra has strategically positioned itself as a globally recognized automotive manufacturer by focusing on innovation, advanced technology adoption, and strategic initiatives across product development, research, production, marketing, and finance. Through its commitment to electric mobility and sustainable practices, Mahindra continues to lead with initiatives like the development of electric powertrains and vehicles. HDFC Bank has achieved several significant milestones over the years, marking its leadership in innovation and customer service in the Banking sector. Through these initiatives and future plans, HDFC Bank remains at the forefront of innovation, customer service, and sustainability in the global Banking landscape.

Conclusion

Through performance measurement and analysis, one can determine whether or not a business has effectively used key operations and tools like profit, cost, production, and labour. Furthermore, companies need to measure performance in order to improve the quality of their products and services and to remain competitive. It is crucial to evaluate performance on a regular basis as a result. But evaluating business performance solely on the basis of the decision-maker’s experience and area of expertise is not a sensible approach in complex organizations with lots of interconnected variables whose relationships change based on things like the industries or organization in which they operate.

Thus, measures should be taken that help to choose the most appropriate alternative from several alternatives that have different objectives and should lead to the achievement of the organization goals by reducing performance costs and increasing the organizations profit. In this study, the financial performance of five merged Banks and six merged Automobile companies are taken for analysed which is done using TOPSIS. Six financial ratios were given weight using APH with the help of the Satty scale. Six financial ratios were taken as financial performance indicators, which were calculated annually for the period 2010-2024, and the performance of the Bank and Automobile companies was ranked for each year on the sectoral basis.

Looking at the cumulative ranking of the Automobile companies we have acquired by using the TOPSIS method, it can be seen that Mahindra & Mahindra has the best performance for the period, ranking first for 6 years out of 15 years taken in the study. Likewise, in the case of Banks, HDFC Bank has the best performance for the period, ranking first for 7 years out of 15 years taken in the

study. All of the data for the Bank in the data set of the analysis were generally higher than all other companies in all the years, as its cumulative rank is 1.8, which is the lowest among 5 Banks and 6 Automobile companies. High profitability ratios have led to certain organizations outperforming others, highlighting the importance of focusing on profitability as a key aspect of financial performance. To enhance overall performance, companies should prioritize strategies that boost profitability ratios. However, it is also crucial to address other financial ratios since they influence financial outcomes as well. Therefore, depending on the company's objectives, improving financial performance might also involve focusing on enhancing other financial ratios. This study evaluates the financial performance of merged Banks and Automobile companies using the TOPSIS method, offering guidance for decision-makers in making informed choices. Additionally, companies might consider strategies that enhance performance through non-financial variables or ratios, even if their impact is indirect. In such cases, it could be useful to analyze performance based on non-financial criteria alone or through a combination of both financial and non-financial criteria. HDFC Bank has achieved several significant milestones over the years, marking its leadership in innovation and customer service in the Banking sector. With a clear vision for the future and a robust growth trajectory supported by strong financial strategies and customer-centric approaches, Mahindra & Mahindra is poised to continue its journey as a pioneering force in the automotive industry.

Limitations of the Study

As the merger and acquisition of companies or organisations occurs in different time period so the pre-merger and post-merger period of Automobile companies and Banks differ from each other. Mergers in case of Banking sector occurred more in 2020 and after but as we wanted to see the post-merger effect on company's financial performance so we restricted the merger Banks till 2019.

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Appendices

Automobile Sector

Table No.:7- Normalized decision matrix:2010

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.17	0.06	0.04	0.03	0.02	0.02
Volkswagen	0.15	0.13	0.03	0	0.01	0.02
Ashok Leyland Limited	0.16	0.16	0.04	0	0.02	0.03
Bharat Forge	0.07	0.14	0.01	0	0.01	0.01
Nissan Motor Co., Ltd	0.02	0.16	0.01	0.01	0.01	0
Mahindra & Mahindra	0.25	0.24	0.06	0.02	0.03	0.04

Table No.:8- Discrimination measurements and Optimum Solution Proximity:2010

Automobile company	Si+	Si-	Ci
TATA Motors	0.2	0.17	0.46
Volkswagen	0.16	0.15	0.48
Ashok Leyland Limited	0.13	0.18	0.57
Bharat Forge	0.22	0.1	0.31
Nissan Motor Co., Ltd	0.26	0.11	0.29

Mahindra & Mahindra	0.01	0.31	0.96

Table No.:9-Optimum Positive and Optimum Negative Solutions: 2010

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.25	0.24	0.06	0.03	0.03	0.04
V-	0.02	0.06	0.01	0	0.01	0

Table No.:10- Normalized decision matrix:2011

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.09	0.08	0.02	0.01	0.01	0.01
Volkswagen	0.23	0.14	0.04	0	0.01	0.03
Ashok Leyland Limited	0.13	0.14	0.04	0	0.03	0.03
Bharat Forge	0.14	0.19	0.04	0.01	0.02	0.02
Nissan Motor Co., Ltd	0.09	0.19	0.02	0.01	0.01	0.01
Mahindra & Mahindra	0.2	0.17	0.05	0.03	0.02	0.03

Table No.:11- Discrimination measurements and Optimum Solution Proximity:2011

Automobile company	Si+	Si-	Ci
TATA Motors	0.18	0.01	0.07
Volkswagen	0.06	0.16	0.72
Ashok Leyland Limited	0.11	0.09	0.43
Bharat Forge	0.09	0.13	0.57
Nissan Motor Co., Ltd	0.15	0.11	0.43
Mahindra & Mahindra	0.03	0.16	0.84

Table No.:12-Optimum Positive and Optimum Negative Solutions: 2011

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.23	0.19	0.05	0.03	0.03	0.03

V-	0.09	0.08	0.02	0	0.01	0.01

Table No.:13- Normalized decision matrix:2012

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.16	0.12	0.01	0.03	0.01	0.01
Volkswagen	0.26	0.14	0.04	0	0.01	0.03
Ashok Leyland Limited	0.1	0.12	0.03	0	0.02	0.03
Bharat Forge	0.15	0.16	0.03	0.01	0.03	0.02
Nissan Motor Co., Ltd	0.08	0.21	0.02	0	0.01	0.01
Mahindra & Mahindra	0.11	0.17	0.07	0.02	0.02	0.02

Table No.:14- Discrimination measurements and Optimum Solution Proximity: 2012

Automobile company	Si+	Si-	Ci
TATA Motors	0.15	0.08	0.35
Volkswagen	0.08	0.18	0.7
Ashok Leyland Limited	0.19	0.03	0.14
Bharat Forge	0.12	0.09	0.43
Nissan Motor Co., Ltd	0.19	0.09	0.33
Mahindra & Mahindra	0.16	0.09	0.36

Table No.:15-Optimum Positive and Optimum Negative Solutions: 2012

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.26	0.21	0.07	0.03	0.03	0.03
V-	0.08	0.12	0.01	0	0.01	0.01

Table No.:16- Normalized decision matrix: 2013

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.15	0.12	0.03	0.03	0.01	0.04

Volkswagen	0.15	0.14	0.02	0	0.02	0.02
Ashok Leyland Limited	0.11	0.11	0.02	0	0.02	0.02
Bharat Forge	0.11	0.16	0.02	0.01	0.02	0.02
Nissan Motor Co., Ltd	0.11	0.22	0.02	0	0.01	0.01
Mahindra & Mahindra	0.26	0.16	0.08	0.03	0.03	0.03

Table No.:17- Discrimination measurements and Optimum Solution Proximity: 2013

Automobile company	Si+	Si-	Ci
TATA Motors	0.16	0.05	0.25
Volkswagen	0.16	0.05	0.23
Ashok Leyland Limited	0.2	0.01	0.04
Bharat Forge	0.17	0.06	0.25
Nissan Motor Co., Ltd	0.16	0.11	0.41
Mahindra & Mahindra	0.06	0.17	0.74

Table No.:18-Optimum Positive and Optimum Negative Solutions: 2013

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.26	0.22	0.08	0.03	0.03	0.04
V-	0.11	0.11	0.02	0	0.01	0.01

Table No.:19- Normalized decision matrix:2014

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.14	0.13	0.04	0.03	0.01	0.03
Volkswagen	0.14	0.12	0.02	0	0.02	0.02
Ashok Leyland Limited	0.02	0.11	0	0	0	0.01
Bharat Forge	0.19	0.17	0.04	0.01	0.03	0.03

Nissan Motor Co., Ltd	0.1	0.2	0.02	0	0.01	0.01
Mahindra & Mahindra	0.24	0.18	0.07	0.02	0.02	0.03

Table No.:20- Discrimination measurements and Optimum Solution Proximity: 2014

Automobile company	Si+	Si-	Ci
TATA Motors	0.13	0.13	0.5
Volkswagen	0.14	0.12	0.46
Ashok Leyland Limited	0.25	0	0
Bharat Forge	0.07	0.18	0.71
Nissan Motor Co., Ltd	0.16	0.12	0.42
Mahindra & Mahindra	0.03	0.24	0.9

Table.:21-No.Optimum Positive and Optimum Negative Solutions: 2014

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.24	0.2	0.07	0.03	0.03	0.03
V-	0.02	0.11	0	0	0	0.01

Table No.:22- Normalized decision matrix: 2015

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.12	0.1	0.04	0.03	0.01	0.04
Volkswagen	0.02	0.09	0	0	0	0
Ashok Leyland Limited	0.06	0.09	0.02	0	0.01	0.01
Bharat Forge	0.26	0.29	0.03	0.01	0.03	0.03
Nissan Motor Co., Ltd	0.1	0.15	0.02	0	0.01	0.01
Mahindra & Mahindra	0.22	0.11	0.07	0.02	0.03	0.03

Table No.:23- Discrimination measurements and Optimum Solution Proximity: 2015

Automobile company	Si+	Si-	Ci

TATA Motors	0.24	0.12	0.33
Volkswagen	0.32	0	0.01
Ashok Leyland Limited	0.29	0.05	0.14
Bharat Forge	0.04	0.32	0.89
Nissan Motor Co., Ltd	0.22	0.11	0.34
Mahindra & Mahindra	0.19	0.22	0.54

Table No.:24-Optimum Positive and Optimum Negative Solutions: 2015

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.26	0.29	0.07	0.03	0.03	0.04
V-	0.02	0.09	0	0	0	0

Table No.:25- Normalized decision matrix: 2016

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.1	0.12	0.03	0.03	0.01	0.02
Volkswagen	0.06	0.1	0.01	0	0.01	0.01
Ashok Leyland Limited	0.06	0.13	0.02	0	0.01	0.01
Bharat Forge	0.27	0.22	0.04	0.01	0.03	0.04
Nissan Motor Co., Ltd	0.12	0.19	0.02	0	0.01	0.02
Mahindra & Mahindra	0.21	0.14	0.07	0.02	0.03	0.03

Table No.:26- Discrimination measurements and Optimum Solution Proximity:2016

Automobile company	Si+	Si-	Ci
TATA Motors	0.2	0.06	0.22
Volkswagen	0.25	0.01	0.03
Ashok Leyland Limited	0.24	0.03	0.1
Bharat Forge	0.04	0.25	0.87
Nissan Motor Co., Ltd	0.17	0.11	0.39
Mahindra & Mahindra	0.1	0.17	0.64

Table No.:27-Optimum Positive and Optimum Negative Solutions: 2016

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.27	0.22	0.07	0.03	0.03	0.04
V-	0.06	0.1	0.01	0	0.01	0.01

Table No.:28- Normalized decision matrix:2017

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.04	0.13	0.01	0.02	0.01	0.02
Volkswagen	0.09	0.13	0.02	0	0.01	0.02
Ashok Leyland Limited	0.12	0.12	0.05	0	0.03	0.03
Bharat Forge	0.29	0.2	0.04	0.01	0.02	0.02
Nissan Motor Co., Ltd	0.11	0.21	0.02	0	0.01	0.02
Mahindra & Mahindra	0.16	0.14	0.05	0.03	0.02	0.02

Table No.:29- Discrimination measurements and Optimum Solution Proximity: 2017

Automobile company	Si+	Si-	Ci
TATA Motors	0.26	0.02	0.08
Volkswagen	0.22	0.05	0.19
Ashok Leyland Limited	0.2	0.09	0.3
Bharat Forge	0.03	0.26	0.9
Nissan Motor Co., Ltd	0.19	0.11	0.37
Mahindra & Mahindra	0.15	0.13	0.46

Table No.:30-Optimum Positive and Optimum Negative Solutions: 2017

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.29	0.21	0.05	0.03	0.03	0.03
V-	0.04	0.12	0.01	0	0.01	0.02

Table No.:31- Normalized decision matrix:2018

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.05	0.12	0.01	0.03	0	0.01
Volkswagen	0.1	0.14	0.01	0	0.01	0.02
Ashok Leyland Limited	0.13	0.12	0.05	0	0.03	0.04
Bharat Forge	0.27	0.17	0.05	0	0.02	0.02
Nissan Motor Co., Ltd	0.12	0.22	0.02	0	0.01	0.02
Mahindra & Mahindra	0.18	0.15	0.05	0.03	0.02	0.02

Table No.:32- Discrimination measurements and Optimum Solution Proximity:2018

Automobile company	Si+	Si-	Ci
TATA Motors	0.25	0.02	0.09
Volkswagen	0.19	0.06	0.24
Ashok Leyland Limited	0.17	0.1	0.37
Bharat Forge	0.06	0.23	0.8
Nissan Motor Co., Ltd	0.15	0.13	0.47
Mahindra & Mahindra	0.11	0.15	0.57

Table No.:33- Optimum Positive and Optimum Negative Solutions: 2018

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.27	0.22	0.05	0.03	0.03	0.04
V-	0.05	0.12	0.01	0	0	0.01

Table No.:34- Normalized decision matrix: 2019

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.16	0.11	0.04	0.01	0.01	0.05
Volkswagen	0.09	0.15	0.01	0.01	0.01	0.01

Ashok Leyland Limited	0.11	0.12	0.05	0	0.03	0.02
Bharat Forge	0.27	0.2	0.05	0.01	0.03	0.02
Nissan Motor Co., Ltd	0.05	0.19	0.01	0	0	0.01
Mahindra & Mahindra	0.15	0.16	0.04	0.04	0.02	0.01

Table No.:35- Discrimination measurements and Optimum Solution Proximity: 2019

Automobile company	Si+	Si-	Ci
TATA Motors	0.15	0.13	0.47
Volkswagen	0.2	0.06	0.23
Ashok Leyland Limited	0.18	0.09	0.32
Bharat Forge	0.04	0.25	0.87
Nissan Motor Co., Ltd	0.24	0.08	0.26
Mahindra & Mahindra	0.13	0.13	0.49

Table No.:36- Optimum Positive and Optimum Negative Solutions: 2019

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.27	0.2	0.05	0.04	0.03	0.05
V-	0.05	0.11	0.01	0	0	0.01

Table No.:37- Normalized decision matrix:2020

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.11	0.11	0.04	0.03	0.01	0.04
Volkswagen	0.1	0.14	0.02	0.02	0.02	0.01
Ashok Leyland Limited	0.06	0.13	0.01	0	0.02	0.01
Bharat Forge	0.28	0.21	0.06	0.01	0.02	0.02
Nissan Motor Co., Ltd	0.19	0.16	0.05	0	0.02	0.03
Mahindra & Mahindra	0.08	0.17	0.03	0.02	0.02	0.01

Table No.:38- Discrimination measurements and Optimum Solution Proximity: 2020

Automobile company	Si+	Si-	Ci
TATA Motors	0.2	0.08	0.28
Volkswagen	0.2	0.06	0.24
Ashok Leyland Limited	0.25	0.02	0.09
Bharat Forge	0.03	0.25	0.9
Nissan Motor Co., Ltd	0.11	0.15	0.57
Mahindra & Mahindra	0.21	0.08	0.27

Table No.:39- Optimum Positive and Optimum Negative Solutions: 2020

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.28	0.21	0.06	0.03	0.02	0.04
V-	0.06	0.11	0.01	0	0.01	0.01

Table No.:40- Normalized decision matrix:2021

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.15	0.11	0.06	0.02	0.02	0.05
Volkswagen	0.18	0.14	0.04	0.01	0.02	0.02
Ashok Leyland Limited	0.01	0.12	0.01	0	0.02	0
Bharat Forge	0.25	0.21	0.04	0.01	0.01	0.01
Nissan Motor Co., Ltd	0.17	0.18	0.04	0	0.01	0.02
Mahindra & Mahindra	0.02	0.15	0.01	0.03	0.03	0

Table No.:41- Discrimination measurements and Optimum Solution Proximity: 2021

Automobile company	Si+	Si-	Ci
TATA Motors	0.14	0.16	0.53
Volkswagen	0.11	0.17	0.61

Ashok Leyland Limited	0.27	0.01	0.03
Bharat Forge	0.05	0.26	0.83
Nissan Motor Co., Ltd	0.1	0.18	0.63
Mahindra & Mahindra	0.25	0.05	0.18

Table No.:42- Optimum Positive and Optimum Negative Solutions: 2021

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.25	0.21	0.06	0.03	0.03	0.05
V-	0.01	0.11	0.01	0	0.01	0

Table No.:43- Normalized decision matrix: 2022

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.09	0.12	0.02	0.01	0.01	0.04
Volkswagen	0.18	0.15	0.07	0	0.01	0.02
Ashok Leyland Limited	0.03	0.12	0	0.01	0.01	0.01
Bharat Forge	0.25	0.16	0.04	0.01	0.03	0.03
Nissan Motor Co., Ltd	0.06	0.2	0.01	0	0.01	0.01
Mahindra & Mahindra	0.2	0.17	0.04	0.03	0.03	0.02

Table No.:44- Discrimination measurements and Optimum Solution Proximity: 2022

Automobile company	Si+	Si-	Ci
TATA Motors	0.18	0.08	0.3
Volkswagen	0.09	0.17	0.65
Ashok Leyland Limited	0.25	0.01	0.04
Bharat Forge	0.06	0.23	0.79
Nissan Motor Co., Ltd	0.2	0.09	0.31

Mahindra & Mahindra	0.07	0.19	0.74

Table No.:45- Optimum Positive and Optimum Negative Solutions: 2022

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.25	0.2	0.07	0.03	0.03	0.04
V-	0.03	0.12	0	0	0.01	0.01

Table No.:46- Normalized decision matrix: 2023

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
TATA Motors	0.02	0.15	0	0.02	0.01	0.01
Volkswagen	0.23	0.14	0.07	0	0.01	0.02
Ashok Leyland Limited	0.1	0.13	0.01	0	0.02	0.03
Bharat Forge	0.14	0.13	0.02	0	0.02	0.02
Nissan Motor Co., Ltd	0.07	0.21	0.01	0.01	0.01	0.01
Mahindra & Mahindra	0.25	0.16	0.05	0.03	0.03	0.03

Table No.:47- Discrimination measurements and Optimum Solution Proximity: 2023

Automobile company	Si+	Si-	Ci
TATA Motors	0.25	0.02	0.08
Volkswagen	0.08	0.22	0.73
Ashok Leyland Limited	0.18	0.09	0.33
Bharat Forge	0.15	0.11	0.43
Nissan Motor Co., Ltd	0.2	0.09	0.31
Mahindra & Mahindra	0.05	0.24	0.82

Table No.:48-Optimum Positive and Optimum Negative Solutions: 2023

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.25	0.21	0.07	0.03	0.03	0.03

V-	0.02	0.13	0	0	0.01	0.01

Table No.:49- Normalized decision matrix:2024

Automobile company	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
Volkswagen	0.18	0.19	0.05	0	0.01	0.01
Ashok Leyland Limited	0.13	0.11	0.02	0	0.02	0.03
Bharat Forge	0.12	0.11	0.02	0	0.02	0.01
Nissan Motor Co., Ltd	0.08	0.2	0.01	0.01	0.01	0.01
Mahindra & Mahindra	0.23	0.15	0.06	0.02	0.03	0.02

Table No.:50- Discrimination measurements and Optimum Solution Proximity: 2024

Automobile company	Si+	Si-	Ci
TATA Motors	0.09	0.1	0.53
Volkswagen	0.06	0.13	0.69
Ashok Leyland Limited	0.14	0.05	0.27
Bharat Forge	0.14	0.05	0.25
Nissan Motor Co., Ltd	0.16	0.09	0.35
Mahindra & Mahindra	0.05	0.16	0.75

Table No.:51-Optimum Positive and Optimum Negative Solutions: 2024

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.23	0.2	0.06	0.03	0.03	0.04
V-	0.08	0.11	0.01	0	0.01	0.01

Banking Sector

Table No.:52- Normalized decision matrix: 2010

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.01	0.07	0.09	0.01	0.04	0.11

SBI	0.01	0.25	0.02	0.06	0.01	0.03
KMB	0.05	0.11	0.2	0.03	0.06	0.07
HDFC	0.03	0.16	0.09	0.06	0.09	0.05
ICICI	0.01	0.04	0.07	0.05	0.04	0.04

Table No.:53-Discrimination measurements and Optimum Solution Proximity: 2010

Banks	Si+	Si-	Ci
BOB	0.23	0.12	0.35
SBI	0.21	0.22	0.51
KMB	0.16	0.2	0.57
HDFC	0.15	0.17	0.54
ICICI	0.26	0.07	0.2

Table No.:54-Optimum Positive and Optimum Negative Solutions: 2010

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.5	0.25	0.2	0.07	0.09	0.11
V-	0.01	0.04	0.07	0.01	0.01	0.03

Table No.:55-Normalized decision matrix: 2011

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.05	0.04	0.1	0.01	0.03	0.16
SBI	0.03	0.09	0.05	0.09	0.03	0.1
KMB	0.07	0.03	0.17	0.02	0.05	0.11
HDFC	0.06	0.06	0.11	0.07	0.1	0.09
ICICI	0.06	0.01	0.09	0.04	0.04	0.09

Table No.:56- Discrimination measurements and Optimum Solution Proximity: 2011

Banks	Si+	Si-	Ci
BOB	0.14	0.1	0.4
SBI	0.16	0.12	0.43
KMB	0.12	0.13	0.54
HDFC	0.1	0.12	0.54
ICICI	0.16	0.06	0.28

Table No.:57-Optimum Positive and Optimum Negative Solutions: 2011

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.07	0.09	0.17	0.09	0.1	0.16

V-	0.03	0.01	0.05	0.01	0.03	0.09

Table No.:58- Normalized decision matrix: 2012

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.11	0.03	0.07	0.01	0.04	0.11
SBI	0.07	0.08	0.05	0.09	0.04	0.09
KMB	0.17	0.02	0.13	0.01	0.05	0.08
HDFC	0.16	0.05	0.1	0.01	0.05	0.08
ICICI	0.14	0.01	0.08	0.04	0.04	0.08

Table No.:59- Discrimination measurements and Optimum Solution Proximity: 2012

Banks	Si+	Si-	Ci
BOB	0.13	0.06	0.32
SBI	0.13	0.11	0.46
KMB	0.1	0.13	0.56
HDFC	0.09	0.11	0.54
ICICI	0.11	0.08	0.41

Table No.:60-Optimum Positive and Optimum Negative Solutions: 2012

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.17	0.08	0.13	0.09	0.05	0.11
V-	0.07	0.01	0.05	0.01	0.04	0.08

Table No.:61- Normalized decision matrix:2013

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.09	0.02	0.06	0	0.03	0.09
SBI	0.07	0.06	0.06	0.09	0.04	0.09
KMB	0.13	0.02	0.13	0.01	0.05	0.09
HDFC	0.19	0.04	0.09	0.01	0.05	0.08
ICICI	0.15	0.06	0.09	0.04	0.05	0.09

Table No.:62-Discrimination measurements and Optimum Solution Proximity: 2013

Banks	Si+	Si-	Ci
BOB	0.16	0.02	0.09
SBI	0.14	0.1	0.4
KMB	0.11	0.1	0.47

HDFC	0.09	0.13	0.61
ICICI	0.08	0.1	0.58

Table No.:63-Optimum Positive and Optimum Negative Solutions: 2013

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.19	0.06	0.13	0.09	0.05	0.09
V-	0.07	0.02	0.06	0	0.03	0.08

Table No.:64- Normalized decision matrix:2014

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.09	0.02	0.05	0.05	0.07	0.09
SBI	0.06	0.06	0.04	0.04	0.02	0.07
KMB	0.16	0.02	0.13	0.03	0.04	0.09
HDFC	0.15	0.05	0.1	0.03	0.04	0.1
ICICI	0.18	0.06	0.1	0.09	0.04	0.1

Table No.:65- Discrimination measurements and Optimum Solution Proximity: 2014

Banks	Si+	Si-	Ci
BOB	0.15	0.06	0.3
SBI	0.18	0.05	0.2
KMB	0.08	0.14	0.62
HDFC	0.08	0.13	0.63
ICICI	0.05	0.16	0.77

Table No.:66-Optimum Positive and Optimum Negative Solutions: 2014

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.18	0.06	0.13	0.09	0.07	0.1
V-	0.06	0.02	0.04	0.01	0.02	0.07

Table No.:67- Normalized decision matrix:2015

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.06	0	0.03	0.03	0.07	0.06
SBI	0.06	0.1	0.04	0.03	0.02	0.07
KMB	0.17	0.01	0.13	0.06	0.04	0.09

HDFC	0.15	0	0.11	0.06	0.04	0.11
ICICI	0.17	0.02	0.09	0.03	0.04	0.1

Table No.:68- Discrimination measurements and Optimum Solution Proximity: 2015

Banks	Si+	Si-	Ci
BOB	0.18	0.05	0.2
SBI	0.16	0.1	0.38
KMB	0.1	0.15	0.6
HDFC	0.1	0.14	0.57
ICICI	0.1	0.13	0.58

Table No.:69-Optimum Positive and Optimum Negative Solutions: 2015

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.17	0.1	0.13	0.06	0.07	0.11
V-	0.06	0	0.03	0.03	0.02	0.06

Table No.:70- Normalized decision matrix:2016

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.1	0.01	0.06	0.03	0.07	0.09
SBI	0.05	0.06	0.03	0.03	0.02	0.05
KMB	0.15	0.02	0.11	0.03	0.03	0.08
HDFC	0.18	0.03	0.13	0.08	0.04	0.13
ICICI	0.16	0.07	0.08	0.03	0.04	0.08

Table No.:71- Discrimination measurements and Optimum Solution Proximity: 2016

Banks	Si+	Si-	Ci
BOB	0.14	0.08	0.37
SBI	0.2	0.05	0.2
KMB	0.11	0.13	0.55
HDFC	0.06	0.19	0.78
ICICI	0.09	0.14	0.61

Table No.:72-Optimum Positive and Optimum Negative Solutions: 2016

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.18	0.07	0.13	0.08	0.07	0.13
V-	0.05	0.01	0.03	0.03	0.02	0.05

Table No.:73- Normalized decision matrix:2017

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.03	0.01	0.02	0.01	0.07	0.04
SBI	0	0.06	0	0	0.02	0
KMB	0.19	0.01	0.13	0.04	0.04	0.11
HDFC	0.17	0.04	0.13	0.09	0.04	0.14
ICICI	0.16	0.07	0.08	0.03	0.04	0.08

Table No.:74- Discrimination measurements and Optimum Solution Proximity: 2017

Banks	Si+	Si-	Ci
BOB	0.23	0.07	0.23
SBI	0.28	0.04	0.13
KMB	0.08	0.25	0.75
HDFC	0.04	0.27	0.86
ICICI	0.11	0.2	0.66

Table No.:75-Optimum Positive and Optimum Negative Solutions: 2017

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.19	0.07	0.13	0.09	0.07	0.14
V-	0	0.01	0	0	0.2	0

Table No.:76- Normalized decision matrix:2018

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.03	0.01	0.02	0	0.07	0.04
SBI	0.02	0.06	0.01	0	0.02	0.02
KMB	0.2	0.02	0.14	0.04	0.04	0.11
HDFC	0.18	0.05	0.13	0.09	0.04	0.15
ICICI	0.12	0.06	0.05	0.02	0.04	0.06

Table No.:77- Discrimination measurements and Optimum Solution Proximity: 2018

Banks	Si+	Si-	Ci
BOB	0.26	0.06	0.18
SBI	0.28	0.05	0.14
KMB	0.09	0.25	0.74
HDFC	0.04	0.26	0.86
ICICI	0.17	0.14	0.45

Table No.:78-Optimum Positive and Optimum Negative Solutions: 2018

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.2	0.06	0.14	0.09	0.07	0.15
V-	0.02	0.01	0.01	0	0.02	0.02

Table No.:79- Normalized decision matrix:2019

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.02	0.01	0.01	0.01	0.08	0.02
SBI	0.01	0.05	0	0	0	0.01
KMB	0.22	0.02	0.14	0.04	0.04	0.13
HDFC	0.19	0.05	0.14	0.09	0.04	0.15
ICICI	0.07	0.06	0.03	0.01	0.03	0.04

Table No.:80- Discrimination measurements and Optimum Solution Proximity: 2019

Banks	Si+	Si-	Ci
BOB	0.29	0.08	0.21
SBI	0.31	0.04	0.12
KMB	0.08	0.28	0.78
HDFC	0.04	0.29	0.87
ICICI	0.23	0.09	0.28

Table No.:81-Optimum Positive and Optimum Negative Solutions: 2019

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.22	0.06	0.14	0.09	0.08	0.15
V-	0.01	0.01	0	0	0	0.01

Table No.:82- Normalized decision matrix:2020

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.01	0.01	0.01	0.01	0.07	0.04
SBI	0.06	0.07	0.03	0.03	0.02	0.06
KMB	0.21	0.02	0.14	0.06	0.04	0.13
HDFC	0.18	0.03	0.13	0.07	0.04	0.13
ICICI	0.11	0.07	0.05	0.02	0.03	0.07

Table No.:83- Discrimination measurements and Optimum Solution Proximity: 2020

Banks	Si+	Si-	Ci
BOB	0.27	0.05	0.16
SBI	0.21	0.08	0.28
KMB	0.06	0.26	0.8
HDFC	0.06	0.24	0.8
ICICI	0.16	0.13	0.44

Table No.:84-Optimum Positive and Optimum Negative Solutions: 2020

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.21	0.07	0.14	0.07	0.07	0.13
V-	0.01	0.01	0.01	0.01	0.02	0.04

Table No.:85- Normalized decision matrix:2021

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.01	0.01	0.01	0.01	0.07	0.02
SBI	0.06	0.06	0.03	0.03	0.02	0.07
KMB	0.2	0.02	0.14	0.06	0.04	0.1
HDFC	0.16	0.04	0.12	0.07	0.04	0.12
ICICI	0.15	0.06	0.08	0.03	0.03	0.1

Table No.:86- Discrimination measurements and Optimum Solution Proximity: 2021

Banks	Si+	Si-	Ci
BOB	0.26	0.05	0.16
SBI	0.19	0.09	0.33
KMB	0.06	0.25	0.81
HDFC	0.05	0.23	0.81
ICICI	0.1	0.18	0.66

Table No.:87-Optimum Positive and Optimum Negative Solutions: 2021

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.06	0.02	0.04	0.02	0.07	0.06
SBI	0.07	0.05	0.04	0.04	0.02	0.09
KMB	0.19	0.02	0.13	0.06	0.04	0.09
HDFC	0.15	0.05	0.11	0.06	0.05	0.11
ICICI	0.15	0.06	0.09	0.03	0.03	0.1

Table No.:88- Normalized decision matrix:2022

Banks	Si+	Si-	Ci
BOB	0.18	0.05	0.2
SBI	0.17	0.05	0.23
KMB	0.05	0.18	0.79
HDFC	0.05	0.14	0.74
ICICI	0.08	0.12	0.61

Table No.:89- Discrimination measurements and Optimum Solution Proximity: 2022

Banks	Si+	Si-	Ci
BOB	0.18	0.05	0.2
SBI	0.17	0.05	0.23
KMB	0.05	0.18	0.79
HDFC	0.05	0.14	0.74
ICICI	0.08	0.12	0.61

Table No.:90-Optimum Positive and Optimum Negative Solutions: 2022

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.19	0.06	0.13	0.06	0.07	0.11
V-	0.06	0.02	0.04	0.02	0.02	0.06

Table No.:91- Normalized decision matrix:2023

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.09	0.03	0.05	0.02	0.07	0.08
SBI	0.09	0.05	0.05	0.05	0.02	0.1
KMB	0.19	0.03	0.13	0.05	0.04	0.08
HDFC	0.15	0.05	0.1	0.06	0.04	0.09
ICICI	0.13	0.06	0.09	0.03	0.04	0.09

Table No.:92- Discrimination measurements and Optimum Solution Proximity: 2023

Banks	Si+	Si-	Ci
BOB	0.14	0.05	0.25
SBI	0.14	0.04	0.22
KMB	0.05	0.14	0.75
HDFC	0.06	0.09	0.59
ICICI	0.09	0.07	0.46

Table No.:93- Optimum Positive and Optimum Negative Solutions: 2023

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.19	0.06	0.13	0.06	0.07	0.1
V-	0.09	0.03	0.05	0.02	0.02	0.08

Table No.:94- Normalized decision matrix:2024

Banks	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
BOB	0.08	0.03	0.06	0.02	0.07	0.09
SBI	0.08	0.05	0.05	0.05	0.02	0.09
KMB	0.2	0.03	0.13	0.06	0.05	0.09
HDFC	0.12	0.03	0.08	0.05	0.03	0.08
ICICI	0.15	0.06	0.1	0.04	0.03	0.1

Table No.:95- Discrimination measurements and Optimum Solution Proximity: 2024

Banks	Si+	Si-	Ci
BOB	0.15	0.05	0.3
SBI	0.15	0.04	0.39
KMB	0.04	0.15	0.52
HDFC	0.11	0.06	0.28
ICICI	0.07	0.1	0.69

Table No.:96- Optimum Positive and Optimum Negative Solutions: 2024

	net profit ratio	current ratio	Return on Assets	Earnings per Share	Return on Capital Employed	Return on equity
V+	0.2	0.06	0.13	0.06	0.07	0.1
V-	0.08	0.03	0.05	0.02	0.02	0.08