Trends in Banking, Accounting and Business

Vol: 5(1), 2026

REST Publisher; ISBN: 978-81-956353-0-6

Website: http: //restpublisher.com/Book- Series/tbab/

DOI: https://doi.org/10.46632/tbab/5/1/3

Performance Evaluation and Ranking of Cooperative Banks: A Rational Analysis for Financial Efficiency

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Abstract: *The current study examines the performance of cooperative banks using the 'Grey Relational Analysis' method. It examines the performance of the banks based on the following parameters: credit disbursement, non-performing assets, and operating expenses. The findings of the current study reveal the performance differences between the banks and the most efficient bank, and the importance of stability, efficiency, and effective management in the context of the cooperative banking system. This study is relevant as it undertakes a comprehensive evaluation of the performance of cooperative banks using the Grey Relational Analysis method. It helps in the identification of areas of strength and weakness, facilitates better decisions, improves financial efficiency, and in the context of developing economies, enhances the sustainability and competitiveness of the cooperative banking industry. This research uses the Grey Relational Analysis method, which is a multi-criteria decision-making approach. It collects the required information on the disbursement of credit, NPAs, and operating costs. It then uses the Grey Relational Coefficients to calculate the Grey Relational Grades in order to rank the performance of the banks. The results indicate that the highest Grey Relational Grade was achieved by Cooperative Bank 4, implying that this bank performed exceptionally well. Cooperative Bank 2 ranked second, while Bank 3 ranked third. Banks 1 and 5 performed relatively low. This study has shown that the banks' performance is significantly enhanced by high credit disbursal and low non-performing assets.*

Keywords: *Cooperative Banking, Grey Relational Analysis, Loan Disbursement, Non-Performing Assets, Operating Costs, Performance Evaluation.*

1. INTRODUCTION

The cooperative banking sector represents a unique and vital component of the financial system, characterized by its member-oriented approach, democratic governance, and emphasis on socio-economic development. Unlike commercial banks that primarily aim at profit maximization for shareholders, cooperative banks operate on the principle of mutual assistance, where customers are also the owners and decision-makers [1]. This dual role fosters a sense of trust, inclusiveness, and accountability, making cooperative banks especially significant in promoting financial inclusion and supporting grassroots economic activities [2]. These banks evolved as a solution to the financial exclusion faced by social segments such as farmers, small entrepreneurs, and low-income earners that were largely overlooked by traditional banking institutions [3] .The foundation of these banks was built upon principles such as cooperation, self-help, and social welfare [4]. Over time, these entities evolved into formally structured financial institutions; while offering a wide spectrum of services including savings, credit, and other banking facilities they continued to uphold their social objectives [5]. The deep roots these banks possess within their local environments, combined with the close relationships they cultivate with their members, enable them to understand and fulfill the specific needs of their communities far more effectively than large, primarily profit-driven commercial banks [6]. In many countries, especially in nations whose market economies are in the emerging stage, such as

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India, the role of cooperative banks in the rural and agricultural sectors cannot be overstated, as it forms an integral part of the rural credit delivery system, which is multi-tiered in nature, meaning that it has a three-tier organizational structure, which comprises primary cooperative societies at the village level, central cooperative banks at the district level, and apex cooperative banks at the state level [7]. This not only facilitates the availability of credit facilities in the most rural areas of these countries, but it also ensures the required impetus for agriculture, industry, and self-employment initiatives [8]. In spite of the availability of other financial institutions, cooperative banks have managed to create a distinct place for themselves in the financial scenario of the rural area, with the most important distinguishing factors being the ease of accessibility and the member-centric nature of the banks [9]. The cooperative banks have played a crucial role in the rural and agricultural development of various nations, especially the developing countries of the world, including India [10]. The cooperative banks function as an indispensable part of the credit delivery system of the rural area, with the conventional multi-tier structure of cooperative banks consisting of primary cooperative societies operating at the village level, central cooperative banks functioning at the district level, and apex cooperative banks operating at the state level [11], which enables the availability of credit facilities in the rural areas along with providing support to agricultural activities, small-scale industries, and self-employment schemes [12]. Even after the emergence of commercial banks and other financial institutions, cooperative banks continue to play a pivotal role in rural finance; their unique distinguishing features include easy accessibility and member-centric operations. However, in the current financial landscape, the cooperative banking sector is also facing various challenges [13]. For instance, a low capital base, poor recovery of loans, increasing NPAs, and administrative issues have created challenges for many cooperative banks. Moreover, the influence of financial sector reforms, competition from commercial banks, and the need for technology up-gradation have also posed challenges for the cooperative banking sector. Hence, it is important to note that for the effective functioning of cooperative banks, reforms and good governance are a necessity [14]. Cooperative banking institutions are at the heart of promoting inclusive and equitable economic growth. The unique approach of a cooperative bank, its focus on local communities, and its commitment to social welfare are characteristics that distinguish it from other types of banking institutions. Despite their challenges, the role of a cooperative bank is indispensable in bridging gaps in financial services, especially in rural areas. The need to improve the cooperative banking sector is imperative for improving financial inclusion and for promoting socio-economic development [15].

2. MATERIALS AND METHODS

For the results to be precise and significant, the implementation of Grey Relational Analysis (GRA) needs to be based on a specific set of raw materials and inputs. In this respect, the most significant raw material or input in the implementation of GRA is the decision matrix, which consists of a set of alternatives and criteria. In this case, the alternatives can be any specific entities, such as cooperative banks, while the criteria can be any specific performance indicators. This classification is important, as it leads to the choice of a particular method for normalization of the input data. The dataset applied in this context has to be reliable, quantifiable, and derived from a reliable source, such as financial reports, surveys, or organizational records Normalization formulas and computation tools like Excel, MATLAB, or statistical software act as another input in the context of GRA. These tools help in the conversion of the input data into a comparable form, as well as in the computation of deviation sequences, Grey Relational Coefficients, and Grey Relational Grades. Moreover, a reference sequence is needed in order to represent the optimal or best-performing values from the various alternatives. For the control of the sensitivity of the analysis, specific parameters, such as the distinguishing coefficient, which is usually between 0 and 1, are also used. It is effective for solving problems where data is incomplete, uncertain, or scarce. The main purpose of GRA is to evaluate and rank alternative options based on their similarity to the ideal option. It has been found to be simple and effective in solving complex decision problems, and this has made the tool useful in a wide range of fields. The GRA approach starts with building a decision matrix with alternative options and criteria for evaluation. Since different criteria can have different scales and units, data normalization is done to ensure all criteria are on an equal scale. After the normalization process, a reference sequence is determined, which is normally the values representing the best performance of all the alternatives. Then, the deviation sequence is determined, which is the measure of the deviation between each alternative and the reference sequence. Using the deviation, the Grey Relational Coefficient is determined, which is the measure of the proximity of each alternative to the ideal solution. This is the measure of the performance level, and the higher the Grey Relational Coefficient, the better the performance level. Then, the Grey Relational Grade is determined, which is the average of the Grey Relational Coefficients of each alternative. The benefits of using the Gray Relational Analysis lie in its simplicity, flexibility, and capacity to consider several criteria at once. It has less data requirement and provides reliable results, even in uncertain conditions, when compared to other techniques.

Alternatives:

Represents a banking segment characterized by moderate levels of lending and controlled levels of operating costs, and in this analysis, it represents a banking institution with moderate performance. Driven by high levels of lending, this banking institution has moderate

levels of performance, although its operating costs may be slightly high. Represents a small or conservative banking institution characterized by low levels of lending and operating costs, although it may be facing difficulties in terms of high levels of Non-Performing Assets (NPAs). Represents a high-performing banking institution characterized by high levels of lending and operating costs, although the costs may be high due to high levels of expansion. Represents a stable banking institution characterized by average performance, although it has moderate values in all parameters.

Evaluation Parameter:

Lending: This represents the total amount of loans disbursed by the bank. Higher values indicate better performance and accessibility.
Non-Performing Assets (NPA %): This represents the percentage of loans not being repaid. Lower values are desirable, as this reflects better asset quality and better risk management.
Asset Quality: (As you have mentioned Non-Performing Assets again, this can be taken as a second risk factor.) This reflects the stability of the bank. Lower risk means better performance.
Operating Cost: This represents the total amount of expenses incurred in operating the bank.

3. ANALYE AND DISSCUSION

TABLE 1. Cooperative Banking Sector

DATA SET				
	Loan Disbursement	Deposit Growth Rate (%)	Non-Performing Assets (NPA %)	Operating Cost
Cooperative Bank 1	775.00	8.50	6.00	140.00
Cooperative Bank 2	850.00	9.00	5.60	154.00
Cooperative Bank 3	816.00	7.60	7.00	130.00
Cooperative Bank 4	900.00	10.00	5.40	165.00
Cooperative Bank 5	800.00	8.00	6.00	144.00

A comparison of the performance of five cooperative banks based on loan volumes, Non-Performing Assets, and operating expenses is presented in Table 1. Although Cooperative Bank 4 has granted a large amount of loans, its expenses are equally higher. Although the expenses of Bank 3 are lower, its Non-Performing Assets are consistently higher. The performance of banks 2 and 5 is consistent, whereas Bank 1 has moderate values for all parameters.

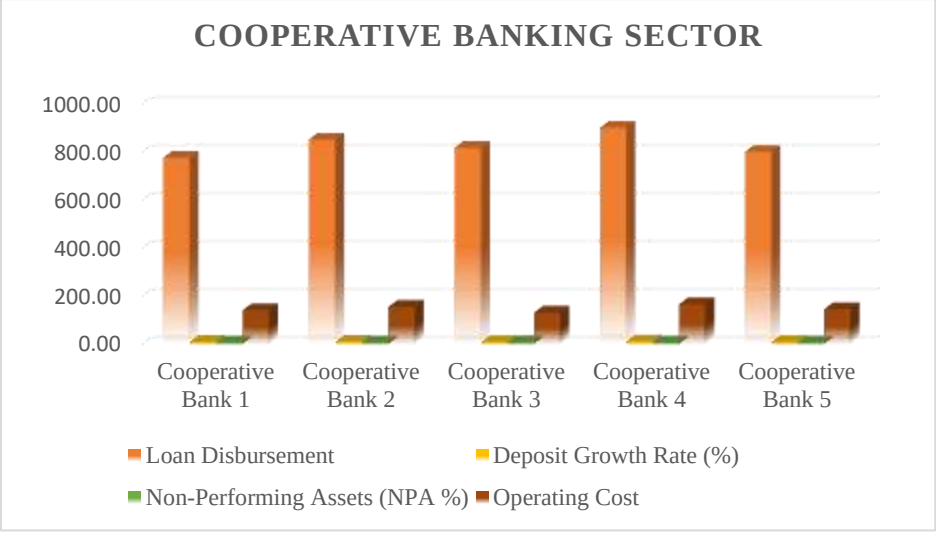

FIGURE 1. Cooperative Banking Sector

As shown in Figure 1, the highest lending activities occur in Cooperative Bank 4, and the lowest lending activities occur in Bank 1. The operating expenses moderately fluctuate and reach their peak in Bank 4. Non-Performing Assets (NPA %) of all banks remain low.

TABLE 2. Normalized Data

Normalized Data				
	Loan Disbursement	Deposit Growth Rate (%)	Non-Performing Assets (NPA %)	Operating Cost
Cooperative Bank 1	0.0000	0.3750	0.6250	0.7143
Cooperative Bank 2	0.6000	0.5833	0.8750	0.3143
Cooperative Bank 3	0.3280	0.0000	0.0000	1.0000
Cooperative Bank 4	1.0000	1.0000	1.0000	0.0000
Cooperative Bank 5	0.2000	0.1667	0.6250	0.6000

Table 2 shows Standardized data provides normalization of the entire set of metrics, which are then placed on a common baseline. Cooperative Bank 4 reflects strong performance in lending activities, but it trails significantly in cost efficiency. Bank 3 reflects strong performance in reducing both non-performing assets and expenses. Bank 2 reflects strong performance in terms of non-performing assets, while Banks 1 and 5 reflect moderate and balanced values for most of the metrics.

TABLE 3. Deviation sequence

	Loan Disbursement	Deposit Growth Rate (%)	Non-Performing Assets (NPA %)	Operating Cost
Cooperative Bank 1	1.0000	0.6250	0.3750	0.2857
Cooperative Bank 2	0.4000	0.4167	0.1250	0.6857
Cooperative Bank 3	0.6720	1.0000	1.0000	0.0000
Cooperative Bank 4	0.0000	0.0000	0.0000	1.0000
Cooperative Bank 5	0.8000	0.8333	0.3750	0.4000

As shown in Table 3, the deviation matrix shows the degree of deviation of the banks from their ideal benchmark. Bank 4 has zero deviations in almost all the parameters except the 'Expenses' criterion. This shows the exemplary performance of the bank. Bank 3 shows a high degree of deviation with regard to the parameter 'Non-Performing Assets.' Bank 2 shows moderate deviations in the parameters. Bank 1 and Bank 5 show mixed performance in all the parameters.

TABLE 4. Grey Relation Coefficient

	Loan Disbursement	Deposit Growth Rate (%)	Non-Performing Assets (NPA %)	Operating Cost
Cooperative Bank 1	0.3333	0.4444	0.5714	0.6364
Cooperative Bank 2	0.5556	0.5455	0.8000	0.4217
Cooperative Bank 3	0.4266	0.3333	0.3333	1.0000
Cooperative Bank 4	1.0000	1.0000	1.0000	0.3333
Cooperative Bank 5	0.3846	0.3750	0.5714	0.5556

As indicated in Table 4, 'Grey Relational Coefficients' measure the proximity to 'Ideal Solution.' Excluding cost-based criteria, Cooperative Bank 4 has the highest similarity with regards to most criteria.

TABLE 5. GRG Values

GRG	
Cooperative Bank 1	0.4964
Cooperative Bank 2	0.5807
Cooperative Bank 3	0.5233
Cooperative Bank 4	0.8333
Cooperative Bank 5	0.4716

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Table 5 displays the overall performance ranking based on the Grey Relational Grade (GRG). Cooperative Bank 4 possesses the highest GRG value, indicating its excellent performance. Bank 2 secures the second position with strong performance. Bank 3 demonstrates moderate performance, whereas Banks 1 and 5 have lower GRG values, signifying their relatively weak performance compared to the other alternative banks.

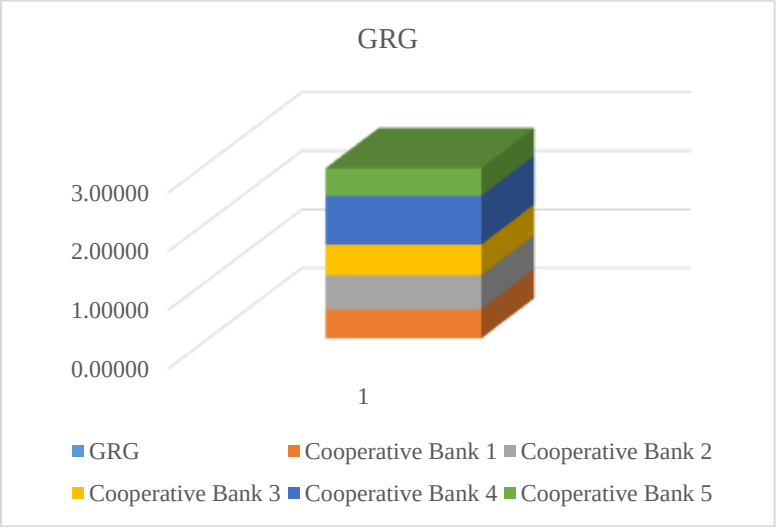

FIGURE 2. GRG Values

From the graph of the GRG, which is represented in Figure 2, we can see that there is a gradual increase in the values of all five cooperative banks. It is evident that the lowest value of the GRG is recorded by Cooperative Bank 1, while the subsequent banks are improving. It is also evident that the highest value of the GRG is recorded by Cooperative Bank 5, which signifies the best growth or performance.

TABLE 6. Rank

Rank	
Cooperative Bank 1	4
Cooperative Bank 2	2
Cooperative Bank 3	3
Cooperative Bank 4	1
Cooperative Bank 5	5

From the GRA results in Table 6 above, the order shows the performance of the banks. Therefore, with a demonstration of excellent performance, the highest rank is taken by Cooperative Bank 4. Bank 2 comes second, followed by Bank 3 in the third position. Bank 1 comes in the fourth position, while Bank 5 comes last in the ranking, showing its poor performance.

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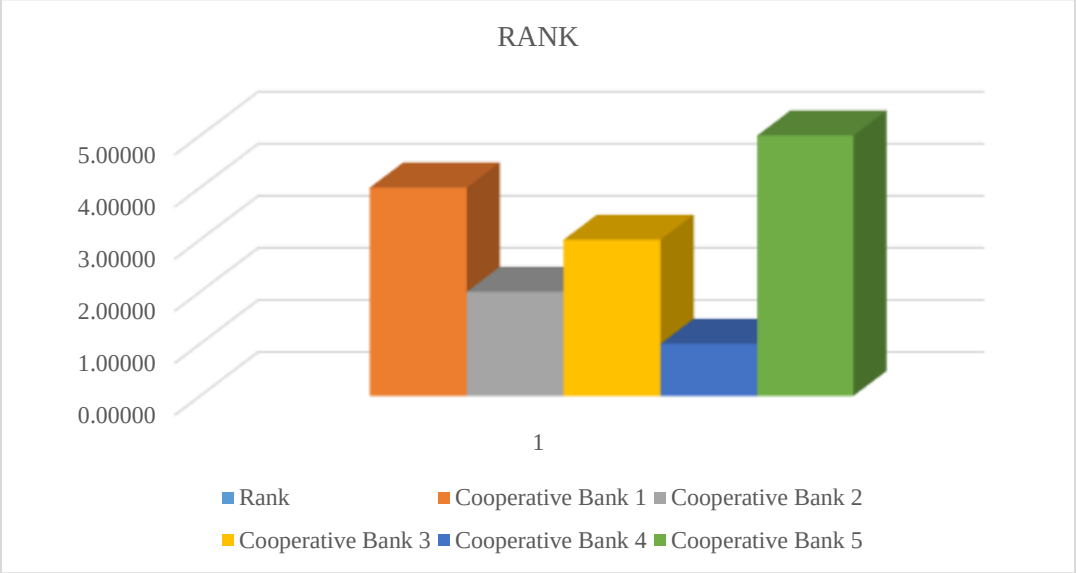

FIGURE 2. Rank

Figure 3 shows the ranking position of the five cooperative banks. Cooperative Bank 4 is ranked first, implying that the performance is excellent. Cooperative Bank 2 is ranked second, followed by Bank 3, which is ranked third. Cooperative Bank 1 is ranked fourth, while the lowest-ranked bank is Cooperative Bank 5, implying that the performance is the lowest compared to the other four banks.

4. CONCLUSION

The present study provides a comprehensive evaluation of the cooperative banking sector using Grey Relational Analysis (GRA), which proves to be an effective and reliable tool for multi-criteria decision-making. The analysis considered key financial indicators such as loan disbursement, Non-Performing Assets (NPAs), and operating costs to assess the performance of selected cooperative banks. The findings clearly indicate that Cooperative Bank 4 emerged as the top-performing institution, achieving the highest Grey Relational Grade. This superior performance is primarily attributed to its strong lending capacity and relatively better management of financial indicators, despite higher operating costs. Cooperative Bank 2 also demonstrated commendable performance, securing the second position due to its balanced approach towards lending and risk management. Cooperative Bank 3 exhibited moderate performance, while Cooperative Banks 1 and 5 lagged behind, indicating the need for improvement in efficiency and financial management. The study highlights that while higher loan disbursement contributes positively to bank performance, it must be complemented with effective control over NPAs and operating expenses. Banks with poor asset quality or high costs tend to underperform, even if their lending activities are substantial. Thus, maintaining a balance between growth and financial stability is crucial. Furthermore, the application of GRA in this study demonstrates its usefulness in handling complex financial data and providing clear rankings. It offers valuable insights for policymakers, bank managers, and stakeholders to informed decisions.

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