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## Evaluation of Bank using DEMATEL Method

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### Abstract

Bank. Since Italian merchants would establish arrangements for borrowing and lending at a bar during the Renaissance, the word bank is derived from the Italian word banco, which means bench. The cash was placed on that bench. The earliest books of accounts go back to the dawn of time. A bank is a business that offers services related to money, as well as alternatives to it. A bank functions as a financial middleman, taking deposits and issuing loans. An institution that is permitted to make loans and take deposits for checking and savings accounts is a bank. The provision of auxiliary services by banks also includes the provision of certificates of deposit, safe deposit boxes, and currency exchange (CDs). A bank is a type of financial organisation that is authorised to accept deposits and offer loans. Banks may also offer additional financial services like asset management, currency exchange, and safe deposit boxes. The two different types of banks are commercial/retail banks and investment banks. When used as a noun, the word "bank" describes a location where people deposit money as well as a long ridge or slope, like a river bank. The verb bounce can also be used with the noun bank. The word bank is quite all-encompassing and has numerous noun and verb senses. DEMATEL (Decision-Making Trial and Evaluation Laboratory). They are divided into analyses using the Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Evaluation Parameters Equity Ranking, Enforcement Action, Z-Score Ranking, and Failure Probability in the value. Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability. Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability. Enforcement Action has the highest rank whereas Z-Score Ranking has the lowest rank.

**Keywords:** Identifying Financially Distressed Banks, E-CRM in the Banking Sector, DEMATEL Method.

### 1. Introduction

Since the early 1980s, the market share of deposits and loans from commercial banks has been decreasing. The easing of legislative barriers to competition in banking product markets and regional markets, as well as developments in migration information technology, were the driving forces behind these shifts. Traditional Banks are producing and selling more fee-based financial services as a response to the diminishing market share of their conventional business. Since 1984, noninterest income at commercial banks covered by the FDIC has increased from 25% to 40% of total operating income, (that is, income net of interest expense). The basic banking services provided by commercial banks, such as checking, trust, letters of credit, and cash management, have long generated non-interest income. However, banks have recently begun generating non-interest income from a number of cutting-edge sources. First, banks have expanded into less traditional payment service products including the sale of insurance and mutual funds. Second, banks increasingly impose transparent fees on previously free financial services. The bank may provide greater interest rates to retail and correspondent banking customers on their balances however; they are required to pay for the same services in return. Data processing and passenger screening. Third, banks now have the opportunity to gain fees for originating and servicing loans in addition to the interest income they would otherwise receive from holding the loans in their portfolio due to the rise of securitization in the mortgage, credit card, and other credit markets. The failure of a small number of very large, multinational corporations was the main cause of the global financial crisis, financial entities that are crucial to the system. However, throughout the crisis and its aftermath, numerous small banks and thrifts in the US failed, nine out of nine banks and thrifts in the United States are listed on the FDIC's list of questionable institutions. This informal banking failure's underlying reasons are still not fully understood.

### 2. Identifying Financially Distressed Banks

**Equity Ranking:**Equilibrium ranking is the initial strategy. If x banks are determined to be in financial distress, then x is the number of problem banks on the FDIC list released in that quarter. Each quarter, we rate all U.S. banks based on their core (net) capital ratios.

**Enforcement Action:**

In the second strategy, supervisory action data is manually gathered from the FDIC ED&O database, the Office of the Comptroller of the Currency (OCC) Formal Enforcement Actions Search Engine, and the Federal Reserve's Enforcement

Actions Search Engine. We identify any bank that has received a consent order, cease and desist order, immediate corrective action order, written or formal agreement, or withdrawal order within the preceding two quarters.

#### **Z-Score Ranking:**

Ranking by Z-score is a third strategy. Each quarter, we rank all banks according to their Z-scores, and we then classify the  $x$  banks with the lowest Z-scores as financially distressed, where  $x$  is the number of troubled banks that were included on the FDIC list that quarter.

#### **Failure Probability Ranking:**

Ranking the likelihood of failure is a fourth strategy. Based on the characteristics of the banks and the market at the end of quarter  $t_2$ , for each of the 10 data cross-sections, we estimate a different binomial log to explain bank failure. An explicit logit model is given. Additionally, the estimations of the derived coefficients are close. The number of problem banks on the FDIC list that was published in that quarter is equal to  $x$ . We rank all banks according to their estimated failure probability for each quarter, and the  $x$  institutions with the greatest failure probabilities are then identified as being in financial distress.

### **3. E-Crm in The Banking Sector**

CRM in banks differs significantly from other industries in that it has a wide goal for developing improved services targeted at increasing consumer confidence. To increase the quality of customer service using new-generation technology products and services, the banking sector, one of the service-based sectors, has become the foundation of banking transactions around the world. According to research conducted from the perspective of the customer on the consequences of e-CRM system implementation in the Thai banking sector, bank customers saw variations in six essential areas. These components include up-to-date information, contact with banks from anywhere, accurate information, complete information, fast access to customized information and service, and one-stop service. On the other hand, it has suggested an e-CRM model for Iran's banking industry that will boost client services while also lowering expenses and increasing bank revenue. The proposed model, which has ten fundamental principles and six tiers, is focused on finding the aspects that make e-CRM effective. While e-CRM was being considered by Indian banks, it was discovered that they employed several e-CRM strategies when introducing fresh goods and services to clients. One of the most competitive, prosperous, and dynamic industries is finance. Because banking services are so intricate, competitive, and dynamic, implementing e-CRM systems presents many difficulties for banks and other financial firms. The issue of low internet usage by people must be addressed. According to a report by the International Telecommunication Union, 2,351,000 people in Jordan used the internet in 2010—38% of the country's population.

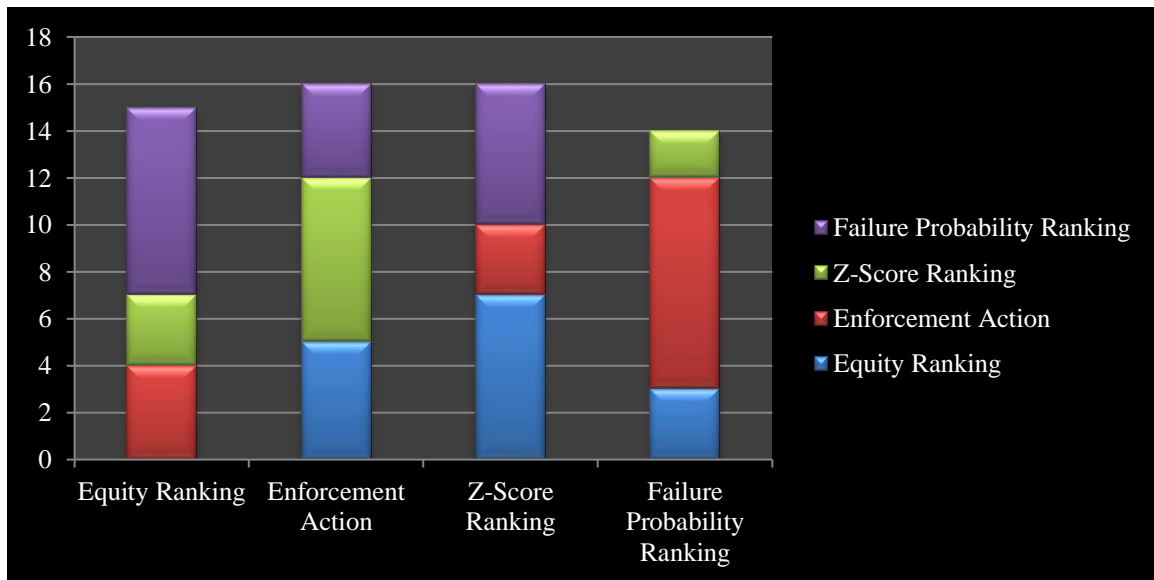
### **4. Dematel Method**

Modelling this structure Approach adopts the form of a driven diagram, which is a causal effect for presenting values of influence between interrelated relationships and factors. By analyzing the visual relationship of conditions between systemic Factors, all components of A causal group and the effect are divided into groups. It also provides researchers with Structure between system components Better understanding of the relationship and complexity for troubleshooting computer problems Can find ways. The DEMATEL system is integrated with Emergency management together with Manage. In the manner proposed, it is not necessary to defuzzify obscure numbers before using the DEMATEL method. Therefore, this method is uncertain of whether evaluation will truly reflect the character. Finally, to get the final results from different aspects Twice in each integrated PPA We use DEMATEL, which is ours. Decision Testing and Assessment Laboratory (DEMATEL). The DEMATEL method is a powerful method of gathering team knowledge to build a structured model and visualize the causal relationship of subsystems. But crisp values The ambiguity of the real world Is adequate reflection. DEMATEL explores the interdependence between equity The number of investment factors and factors and ANP to assess their dependencies Integrated. This section is, first of all, DEMATEL Establishes network relationships through, secondly, for each factor ANP to increase weight compared to Uses. Third, a systematic data collection process is provided. The DEMATEL method effectively calculates the consequences between criteria, which efficiently separates the set of complicated elements right into a sender organization and a recipient institution and transforms it right technique to choosing a management gadget Between alternate configurations Explicit Priority Weights come from in addition, the ZOGP model allows companies to make full use of limited resources for planning to implement optimal management systems. DEMATEL methods. This influence and causal Group barriers pro or Source for affected group barriers Can be considered due. Therefore, to effectively implement electronic waste management, barriers belonging to a causal or an influential group Should be considered on a priority basis. Therefore, decision-makers need to determine obstacles. The legal framework is strong. Make sure it is controllable to minimize impact or influence barriers. Therefore, derived from ISM and DEMATEL methods the results are somewhat consistent. Integrated ISM DEMATEL Results for e-waste management constraints determines not only the structure but also the structure and the interactions between these barriers.

**TABLE 1, Bank**

|                             | Equity Ranking | Enforcement Action | Z-Score Ranking | Failure Probability Ranking | Sum |
|-----------------------------|----------------|--------------------|-----------------|-----------------------------|-----|
| Equity Ranking              | 0              | 5                  | 7               | 3                           | 15  |
| Enforcement Action          | 4              | 0                  | 3               | 9                           | 16  |
| Z-Score Ranking             | 3              | 7                  | 0               | 2                           | 12  |
| Failure Probability Ranking | 8              | 4                  | 6               | 0                           | 18  |

Table 1 shows that DEMATEL Decision making trail and evaluation laboratory in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking sum of the pair in the value zero.



**FIGURE 1. Bank**

Figure 1 shows that DEMATEL Decision making trail and evaluation laboratory in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking sum of the pair in the value zero.

**TABLE 2, Normalizing of direct relation matrix**

| Normalizing of direct relation matrix |                |                    |                 |                             |
|---------------------------------------|----------------|--------------------|-----------------|-----------------------------|
|                                       | Equity Ranking | Enforcement Action | Z-Score Ranking | Failure Probability Ranking |
| Equity Ranking                        | 0              | 0.277778           | 0.388889        | 0.16666667                  |
| Enforcement Action                    | 0.222222       | 0                  | 0.166667        | 0.5                         |
| Z-Score Ranking                       | 0.166667       | 0.388889           | 0               | 0.111111111                 |
| Failure Probability Ranking           | 0.444444       | 0.222222           | 0.333333        | 0                           |

Table 2 shows that the Normalising of direct relation matrix in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking. The diagonal value of all the data set is zero.

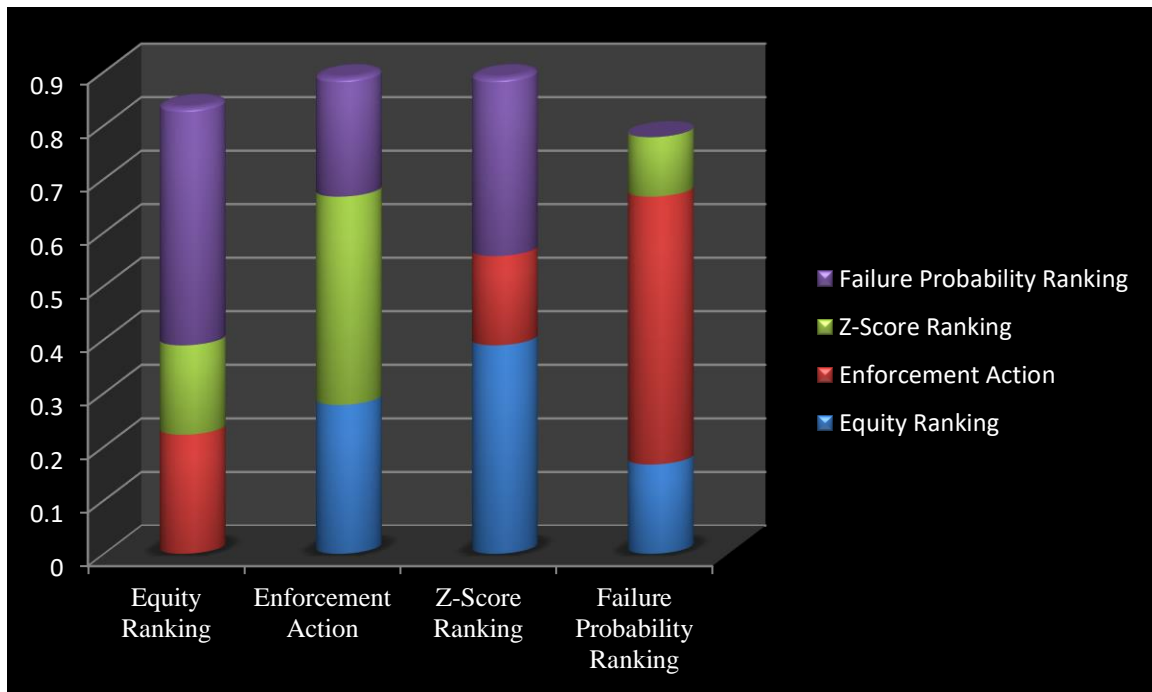


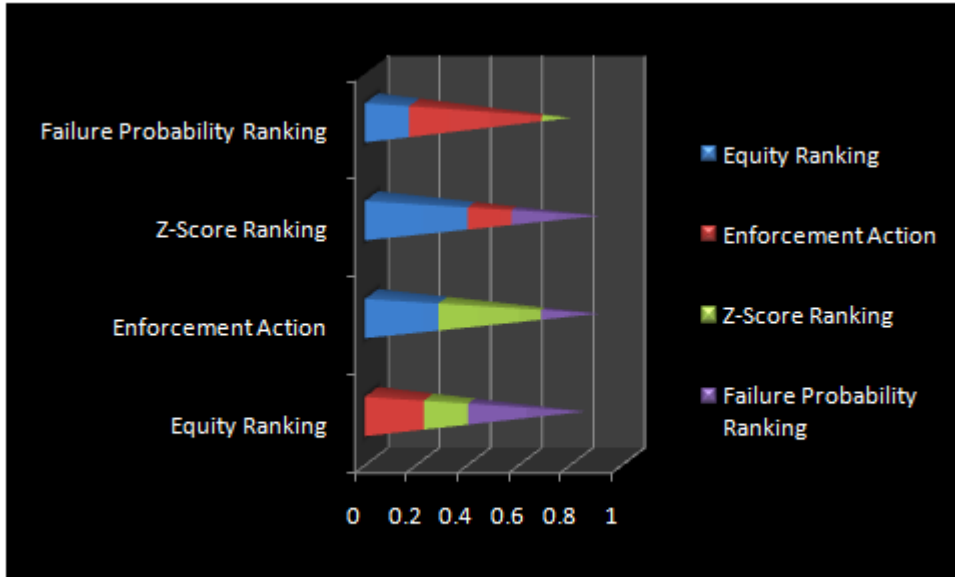
FIGURE 2. Normalizing of direct relation matrix

Figure 2 shows that the Normalising of direct relation matrix in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking. The diagonal value of all the data set is zero.

TABLE 3. Calculate the total relation matrix

| Calculate the total relation matrix |                |                    |                 |                             |
|-------------------------------------|----------------|--------------------|-----------------|-----------------------------|
|                                     | Equity Ranking | Enforcement Action | Z-Score Ranking | Failure Probability Ranking |
| Equity Ranking                      | 0              | 0.27777778         | 0.38888889      | 0.16666667                  |
| Enforcement Action                  | 0.22222222     | 0                  | 0.16666667      | 0.5                         |
| Z-Score Ranking                     | 0.16666667     | 0.38888889         | 0               | 0.11111111                  |
| Failure Probability Ranking         | 0.44444444     | 0.22222222         | 0.33333333      | 0                           |

Table 3 Shows the Calculate the total relation matrix in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking Calculate the Value.



**FIGURE 3.** Calculate the total relation matrix

Figure 3 Shows the Calculate the total relation matrix in Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking Calculate the Value.

**TABLE 4.**  $T = Y(I - Y)^{-1}$ , I= Identity matrix

| I |   |   |   |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 1 |

Table 4 Shows the  $T = Y(I - Y)^{-1}$ , I= Identity matrix in Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking is the common Value.

**TABLE 5.** Y

| Y          |          |          |          |
|------------|----------|----------|----------|
| 0          | 0.277778 | 0.388889 | 0.166667 |
| 0.22222222 | 0        | 0.166667 | 0.5      |
| 0.16666667 | 0.388889 | 0        | 0.111111 |
| 0.44444444 | 0.222222 | 0.333333 | 0        |

Table 5 Shows the Y Value in Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking is the Calculate the total relation matrix Value and Y Value is the same value.

**TABLE 6.** I-Y Value

| I-Y      |          |          |          |
|----------|----------|----------|----------|
| 1        | -0.27778 | -0.38889 | -0.16667 |
| -0.22222 | 1        | -0.16667 | -0.5     |
| -0.16667 | -0.38889 | 1        | -0.11111 |
| -0.44444 | -0.22222 | -0.33333 | 1        |

Table 6 Shows the I-Y Value Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking table 4  $T = Y(I-Y)^{-1}$ , I= Identity matrix and table 5 Y Value Subtraction Value.

**TABLE 7.** (I-Y)-1 Value

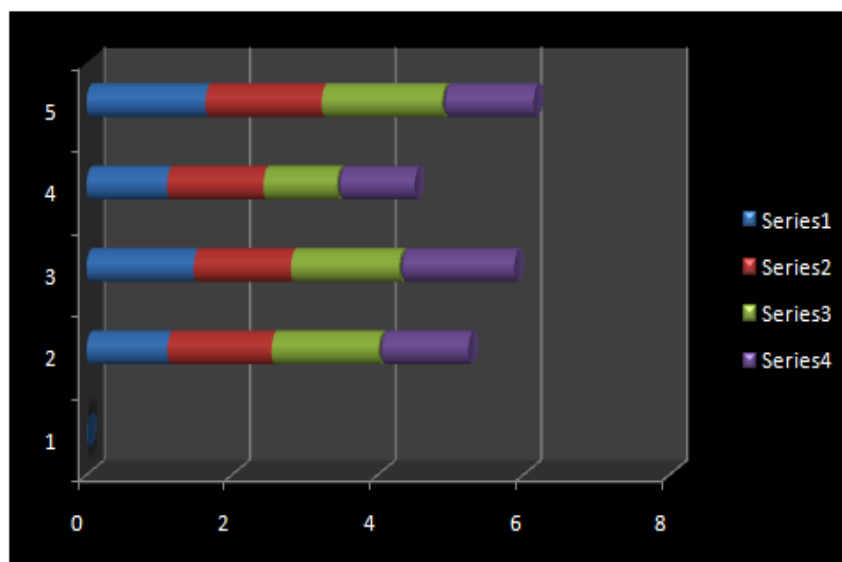
| (I-Y)-1  |          |          |          |
|----------|----------|----------|----------|
| 2.109233 | 1.43033  | 1.468607 | 1.229882 |
| 1.468607 | 2.336877 | 1.486738 | 1.5784   |
| 1.103973 | 1.324566 | 2.006491 | 1.069222 |
| 1.631785 | 1.59653  | 1.651931 | 2.253777 |

Table 7 shows the (I-Y)-1 Value Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking Table 6 shown the Min verse Value.

**TABLE 8.** Total Relation Matrix (T)

| Total Relation matrix (T) |          |             |          |
|---------------------------|----------|-------------|----------|
| 1.109233                  | 1.43033  | 1.468606603 | 1.229882 |
| 1.468607                  | 1.336877 | 1.486737549 | 1.5784   |
| 1.103973                  | 1.324566 | 1.006491326 | 1.069222 |
| 1.631785                  | 1.59653  | 1.65193061  | 1.253777 |

Table 8 shows the Total Relation Matrix the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.



**FIGURE 4** Total Relation Matrix (T)

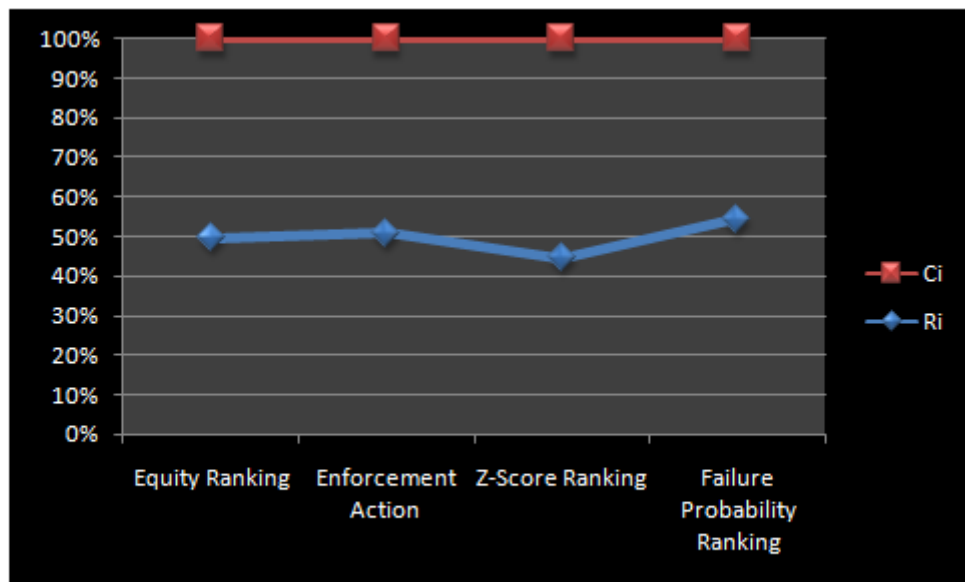
Figure 4 shows the Total Relation Matrix the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.



**TABLE 9.** Ri, Ci Value

|                                    | Ri       | Ci       |
|------------------------------------|----------|----------|
| <b>Equity Ranking</b>              | 5.238053 | 5.313598 |
| <b>Enforcement Action</b>          | 5.870621 | 5.688304 |
| <b>Z-Score Ranking</b>             | 4.504253 | 5.613766 |
| <b>Failure Probability Ranking</b> | 6.134024 | 5.131281 |

Table 9 shows the Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking Ri, Ci Value. Failure Probability Ranking is showing the Highest Value for Ri and Z-Score Ranking is showing the lowest value. Failure Probability Ranking is showing the Highest Value for Ci and Enforcement Action showing the lowest value.



**FIGURE 5.** Ri, Ci Value

Figure 5 shows the Bank of the Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking Ri, Ci Value. Failure Probability Ranking is showing the Highest Value for Ri and Z-Score Ranking is showing the lowest value. Failure Probability Ranking is showing the Highest Value for Ci and Enforcement Action showing the lowest value.

**TABLE 10.** Calculation of Ri+Ci And Ri-Ci To Get The Cause And Effect

|                                    | Ri+Ci    | Ri-Ci    | Rank | Identity |
|------------------------------------|----------|----------|------|----------|
| <b>Equity Ranking</b>              | 10.55165 | -0.07555 | 3    | effect   |
| <b>Enforcement Action</b>          | 11.55893 | 0.182317 | 1    | cause    |
| <b>Z-Score Ranking</b>             | 10.11802 | -1.10951 | 4    | effect   |
| <b>Failure Probability Ranking</b> | 11.2653  | 1.002742 | 2    | cause    |

Table 10 shows the Calculation of Ri+Ci and Ri-Ci to Get the Cause and Effect. Bank Equity Ranking, Enforcement Action, Z-Score Ranking, Failure Probability Ranking. Current got the first rank whereas Former, has the lowest rank.

**TABLE 11.** T Matrix Value

| T matrix |          |          |          |
|----------|----------|----------|----------|
| 1.109233 | 1.43033  | 1.468607 | 1.229882 |
| 1.468607 | 1.336877 | 1.486738 | 1.5784   |
| 1.103973 | 1.324566 | 1.006491 | 1.069222 |
| 1.631785 | 1.59653  | 1.651931 | 1.253777 |

Table 11 shows the T Matrix Value Calculate the Average of the Matrix and Its Threshold Value (Alpha) Alpha **1.359184** .If the T matrix value is greater than threshold value then bolds it.

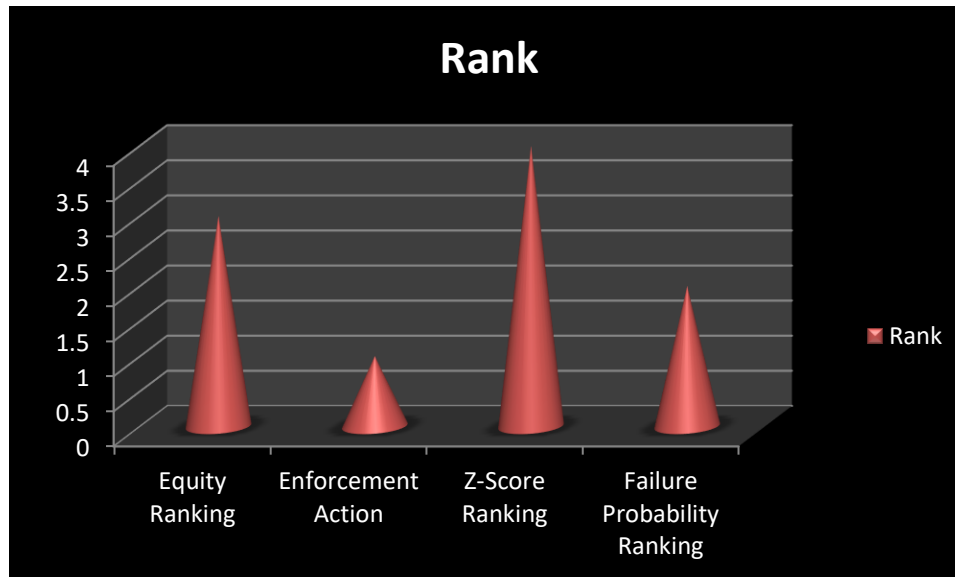
**FIGURE 6.** Shown the Rank

Figure 6 shows the Rank using the DEMATEL for Enforcement Action got the first rank whereas Z-Score Ranking has the lowest rank.

### 5. Conclusion

US commercial banks are now more dependent on fee-based activities as a result of the present financial collapse, and it is generally agreed among banking researchers that the earnings from these activities are more unstable than the earnings from conventional interest-based banking companies. Therefore, it is only natural to wonder whether fee-based banking practices contributed significantly to any of the numerous commercial banks that failed during the global crisis. Our findings have two significant ramifications for commercial bank research. First, researchers building models of bank financial performance should categorize non-interest income into groups like traditional fees and shareholder and service fees in light of our results that various non-interest income streams have varying implications on bank failure. Second, bank financial performance models should try to gauge bank managers' risk preferences outside of the product mix in light of our findings that risk-taking emerges concurrently in conventional and nonconventional banking activities. To better their relationships with consumers, several financial institutions are adopting the phrase "Customer is the king and queen" by making various adjustments to their working environment. Websites and mobile applications, among other technologies that rely on the web and mobile technologies, are being utilized more frequently to attract and keep clients (eg email, call center, FAQ, etc.).

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