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Evaluating and Improving Relative Efficiency The Banking Sector in Iraq Using Data Envelopment Analysis of The Output-Oriented VRS Model With Application

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Abstract:

The banking sector is one of the important sectors in Iraq, and the last stage witnessed the emergence of several private banks in the competition market, and in order to determine the efficiency of existing banks, the resources available to government and private banks were analyzed and compared with two international banks to determine their efficiency ratios for the surveyed banks using data envelopment analysis, the research problem was diagnosed in the lack of interest in measuring the efficiency of banks by exploiting the resources available to maximize profits, the aim of the research is to determine the efficiency of the banks studied according to the direction of outputs and to conduct continuous analysis of the results in order to come up with recommendations that contribute to improving the banking sector. The research focused on the direction of increasing outputs with constant inputs in order to maximize returns. The(Deap2.1) data analysis program was used, and the research adopted data for 2022 to measure efficiency. For 22 banks operating in Iraq (governmental and private) and two banks outside iraq, the variable volume returns (VRS) model was used, and the most prominent results achieved were the achievement of banks The following banks (Rasheed, industrial, TBI, Al-Ahli, Asia, National,trans-Iraq, Jordanian capital, Lloyds Banking Group London) achieved high efficiency100% as they used their resources optimally. The investment bank achieved 90.8%, which is a good percentage, with the ability to benefit from the expertise of industrial and national banks, Jordanian capital, and Lubd's Banking Group London to reach 100% efficiency in 2022.

1.Introduction:

The banking sector is one of the important sectors due to its contribution to the development of the economy, as Performing this function efficiently would reflect positively on the volume of investments and hence the gross output. The efficiency of the functioning of the banking system depends on factors that cannot be limited only to the management, but all the entities whose decisions the bank is affected by contribute to this. The importance of the research emerged from the intellectual foundations of the data envelopment Analysis model in order to establish a well-established methodology to be employed in measuring the efficiency of banks and then draw conclusions, and this overall was the starting point for conducting the current research. The research problem was centered on the lack of interest in measuring the efficiency of banks by exploiting the available resources to maximize Profits. based on the research Problem, a set of goals was identified, the most prominent of which were measuring the efficiency of the examined banks according to the direction of the outputs as well as analyzing the continuous results in order to come up with recommendations that contribute to the improvement of the banking sector, And achieving the maximum amount of outputs using available resources or achieving specific outputs with the minimum amount of inputs in terms of size and quantity." Banking efficiency, as is the case with other organizations, is represented by the relationship between the bank's inputs and its outputs. We can say that the bank works efficiently if it is able to direct its available resources. In order to achieve the greatest possible returns by producing multiple services, with the least amount of waste of those resources.

1.1 Literature Review:

There are many studies that have been discussed Assess and Improve Efficiency:

Yazmi et al. (2011) measured relative efficiency through a two-stage data envelopment Analysis was applied to 27 companies in the banking sector in the United States. The identification of border points for ineffective DMU units was achieved within the framework of two-stage operations. And the extension to measure variable-size returns (VRS).

Atwa et al. (2017) used the DEA Data Envelopment Analysis, which was applied to most commercial banks operating in Iraq by 36 banks, and it was concluded that government banks operate at high efficiency levels because they receive great support from the government by limiting public sector transactions with these banks, which is reflected positively on their outputs.

Shochrul et al. (2018) conducted the efficiency of large and medium-scale food and beverage industrial Production in East Java: Data Development Analysis (DEA) and stochastic frontier analysis (SFA) approaches the efficiency of large and medium-scale food and beverage industrial production in east java: Data ocean analysis (DEA) The horological methods of forward analysis (SFA) were applied in East Java, a province of indonesia, and it was found that the improvement of normative indicators has implications for development policies. One such indicator is technical competence, which describes the input contribution proportionally.

Jazar et al.(2021) used the method of data envelopment analysis to measure and improve the relative efficiency of Islamic banks: A comparative study with traditional banks and mixed banks, which was applied in some arab countries (Bahrain, the UAE, Kuwait, Oman, Saudi Arabia, Egypt, and Jordan), which Provide both traditional and Islamic banking activities together, and it was found that traditional banks are more efficient than Islamic banks in the model 1.According to the BCC model, there were significant differences between the efficiency of mixed banks and traditional banks, as well as between the efficiency of traditional banks and Islamic banks.

Akber et al. (2019) studied on whether sustainable banks are efficient and productive. The Analysis of the data envelopment and the Analysis of the productivity index 2019 were applied to 45 banks of the Commonwealth countries (Spain, Japan, Chile, Singapore, etc.). It was concluded that the Productivity of banks is affected by internal factors, such as the bank's ability to take advantage of its own factors, such as resources, to increase profitability. Regions differ in determining efficiency. Unsustainable banks are of different specialties and also differ in efficiency and productivity.

Tibi (2022) used a case study on commercial insurance companies and measured the efficiency of 20 insurance companies in Algeria .The FDEA fuzzy data envelopment analysis method was adopted, which allows integrating FL fuzzy logic and the DEA data envelopment Analysis method.It was concluded that the models of the traditional or fuzzy data envelopment Analysis method are possible Through Which to Accurately Identify The Required Improvements for inefficient companies.

Motie (2022) used fuzzy data environment analysis method and balanced scorecard model in evaluating supply chain efficiency. Using the fuzzy data envelopment analysis method and the balanced scorecard model in evaluating the efficiency of the supply chain was requested in six large furniture companies in western China, and it was found that the survival of companies and institutions in any Economic System Depends on creating added Value.

Da Silva et al. (2023) employed on a new analysis of multi-criteria data packaging with a variable return to scale Application of two-dimensional representation and super efficiency analysis in automotive companies in Brazil. The NMCDEA-VRS model was adopted to build an NMCDEA-CRS model that proved its effectiveness in solving problems in the company, generating management effects of fundamental importance for making the right decision ,The Primary difference between the NMCDEA-CRS model and the NMCDEA-VRS model relates to the types of returns to volume considered, but both are models that can be used in problems where the greatest discrimination power of DMU units is.

Francisco et al. (2024) published research on the effective use of water and reuse processes in the Spanish regions to identify unwanted inputs through the analysis of the data envelopment applied to the research in the regions of Spain, and the most prominent results were the inclusion of treated and reused wastewater. As an output, it forms the gross domestic product of the region and is an input to the production process. The unequal distribution of water resources across regions has also been addressed by considering the percentage of reserves.

Vikas et al. (2024) published research on the efficiency assessment and improvement in renewable energy systems using data envelope analysis. A comprehensive life cycle assessment of the environmental impacts of a product, process, or service has been evaluated throughout its entire life cycle, starting from the extraction of raw materials to their disposal.

Chiang (2024) measured the basis of the efficiency of networks using the analysis of network data in the case study of clothing manufacturing. The research was applied to sewing laboratories in the Republic of China (Taiwan).The most striking conclusions were that when a request comes to design clothes, the first Process is Proofing, and the various Pieces of fabric used to make clothes are arranged on a roll of fabric for cutting so that waste is minimized.

The research problem boils down to the level of relative efficiency of the examined banks based on the analysis of the data envelopment .What is the level of efficiency in the banks studied? The importance of the research is highlighted in highlighting one of the latest quantitative methods to measure efficiency, namely the data envelopment analysis (DEA) method, and then reaching results and recommendations that contribute to improving the performance of banks in general and their technical efficiency in Particular, thereby contributing to increasing their market share. The aim of the research is to try to achieve the applied results obtained by it.

in order to calculate the relative efficiency of the banks in the study sample, clarify the concept of efficiency ,the mechanisms for measuring it define the method of analyzing the data envelopment (DEA),and analyze the continuous results in order to come up with recommendations that contribute to improving the banking sector, the model was adopted (Deap-2.1),astatistical program as well as excel (2010), and the spatial boundaries were represented in some banks operating in iraq and compared with two banks outside Iraq for 2022.

2.Materials and Methods:

The (Deap2.1) program was adopted, which is a statistical program as well as the Excel Excel-2010 Program. The spatial boundaries were represented in some banks operating in iraq and compared to two banks outside Iraq for 2022.

2.1 Method of Data Envelopment Analysis:

The emergence of the method of data envelopment analysis is due to the doctoral Student Eduardo Rhodes at Carnegie university USA, with the support of the federal government. The student's goal was to evaluate the Performance of educational programs for academically struggling Students (Negroes and Hispanics)in a group of identical schools in one of the Provinces, so he adopted fuzzy data Envelopment Analysis .The Analysis of the data envelope is a common translation of data environment Analysis),and there are those who use the term data envelopment analysis, or the term data envelopment analysis, and note that the difference in the translation of environment(Al-Tibi,2022),He defined it(Al-Rahi,2020)as a mathematical method that uses linear programming to measure the relative efficiency of a group of identical economic units by determining the optimal combination of a set of inputs and outputs based on their actual performance.

2.1.1 Data Envelopment Application Requirements:

Data envelopment application requirements the data envelopment application needs several requirements, which are as follows (Hussein, 2014).

• The units included in the assessment should be homogeneous (i.e.,work in the same environment and conditions), as well as doing the same business.

• The Data on inputs and outputs should be accurate because The Model is very sensitive to error especially if there are extreme points in the data.

• There should be a direct correlation between inputs and outputs that is, an increase in inputs should contribute to an increase in outputs, and vice versa.

• The number of organizations selected for evaluation should be three times the Total inputs and outputs.

2.1.2 Pros and Cons of The Data Envelopment:

The Data Envelopment is one of the modern methods although its appearance dates back to 1987due to the delay in its application and dependence on its results, as well as other methods it is not without pros and cons, the most important of which are listed below (Khalifa,2017).

1.**The Pros:**

• Dependence of the solution on linear programming.

• Applies to all views.

• Easy way to set up a curved.

• Determines the efficiency of each view or organization compared to other views or organizations.

• Identify the gaps between the real value and the expected value.

• Easy integration between inputs and outputs.

• Flexibility of data processing is also not affected by units of measurement.

• Easy conversion of inputs and outputs to a fixed number that expresses the efficiency of the organization.

2.**Disadvantages**
- It relies on highly efficient organizations when drawing the efficiency curve.
- Its Dependence on weights may show an incompetent organization, but it is the opposite.
- After calculating the number of variables involved, it does not distinguish between lack of efficiency and statistical error, and it also depends on the number of inputs; the more inputs, the more efficient the organization.
- He can't calculate the random error.
- It doesn't rely on hypothesis testing.

2.2 The Efficiency:

Researchers differ on the definition of the term efficiency because of the multiplicity of Points of view, Where The concept of efficiency is seen as overlapping with other concepts, such as efficiency, quality, and productivity, as well as efficiency, which expresses the extent to which the economic unit succeeds in using the resources used (inputs) for the purpose of maximizing the target (outputs).(Abdul Hamid, 2010).The beginnings of the use of the concept of efficiency date back to The Economist (Farrell), who shows that it is the ability of a unit to obtain the Maximum Possible amount of output using the available amounts of inputs (Farrell,1957).Linguistically, it is defined as" the state in which one thing is equal to another"(AL-Munajjid,2018)(Ibrahim,2018).

The concept of efficiency dates back to 1923, when Pareto expressed it as "allocation that is efficient or inefficient"(Rahmani,2019).It can be seen as expressing How Successful the Economic Unit is in Judging the Relationship between the Resources used and the outputs in an efficient way aimed at maximizing outputs and reducing inputs. It can be said that the terms efficiency and productivity are sometimes used interchangeably, and this is due to the significant overlap of the two concepts. If we calculate productivity (for a set of economic units) and determine the least or best productive unit, efficiency can be defined as an indicator that can be used to rank productivity values. so productivity is a value that indicates the percentage of inputs that were used in production, and efficiency is an indicator of various values.(Mohammadi,2015).

2.2.1Methods For Measuring Efficiency:

Efficiency can be measured in several ways, including (Volumes,2020):

1-By measuring the actual performance ratio, where the percentage is determined, which represents the extent of the organization's success in reaching the standard target levels.

Actual Performance Ratio = (actual performance ÷ standard performance) × 100.

2-By measuring productivity it is the relationship between the Output and one of the Input elements (the Work Element).

2.3Data Envelopment Analysis Model:

A Quantitative technique based on the method of mathematical programming to assess the relative efficiency of decision-making units that use a set of inputs in order to Produce a set of outputs. (Ashi,2017).

2.3.1Variable Volume Returns (VRS):

The model focuses on the multiplicity of inputs and the singularity of outputs.The unit operates under increasing volume returns if the relative increase of all inputs is accompanied by a larger relative increase in output. Let us denote by α for the relative increase in the input and by λ for the relative increase in the output the returns of increasing volume (IRS) if λ α and decreasing volume returns (DRS).If λ α the data envelope analysis model was proposed by the two scientists (Banker and Charneso Cooper in 1984 and then Banker and Thrall in 1992), which works under the expression of volume returns and is called (VRS), We assume that there are six decision units, namely W1, W2, W3, W4, W5, W6, and one input (input) is used to obtain only one output (output). Figure 1 shows the efficiency limit curve according to the variable volume returns model.
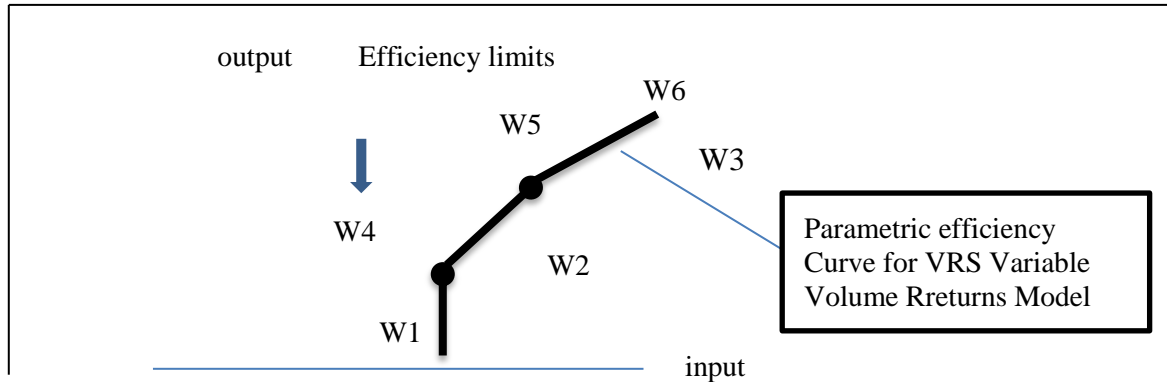
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output   Efficiency limits

W6
W5
W3
W4
W2
W1

Parametric efficiency Curve for VRS Variable Volume Rreturns Model

input

Figure1: Model of Fixed and Variable Volume Returns.(Coelli et al.,2005)

According to The VRS Model, The units W1, W4,W5,W6 are The units that form the efficiency limit curve, they are the efficient units, while the units W2, W3 are located below the efficiency limit curve; they are incompetent categories.

2.3.2 Mathematical Derivation Of The Data Envelopment Analysis:
The efficiency can be calculated for n organizations that have one input and one output according to the Data envelopment Concept According to the following formula (Ramana, 2003,Sherman et al.,2006)

Efficiency index = $\dfrac{\text{The actual director } j}{\text{Actual entrance } j}$ (1)

To find the total eff... s and outputs, we assume that the input represents and the c... output vectors will be according to my:

$$xi = \begin{bmatrix} x_1^j \\ .. \\ x_{m_1}^j \end{bmatrix}, \ y^j = \begin{bmatrix} y_1^j \\ .. \\ y_{m_2}^j \end{bmatrix}, \ j = 1,2,...,n \qquad (2)$$

Since the X^j, Y^j input and output are the same, let's $\sigma_1,...\sigma m_2, \pi_1....\pi m_1$ assume that they represent the weights of the input and output, respectively. To calculate the efficiency index of the institution, j^* will be my machines:

$$E = \frac{\sigma_1 y_1^{j^*} + ...\sigma_{m2} y_{m_2}^{j^*}}{\pi_1 x_1^{j^*} + ...\pi_{m1} x_{m_1}^{j^*}} \qquad (3)$$

Equation (3) can be written as follow:

$$E = \frac{(\sigma . y^{j^*})}{(\pi . x^{j^*})} \qquad (4)$$

Based on the above equations, the mathematical linear programming model is used to find the efficiency index as a machine (Baha El Din, 2006).

$$\text{Max } (\sigma . y^{j^*}) \ / \ (\pi .. x^{j^*})$$

S.T $\qquad (5)$

$$\frac{(\sigma . y^{j^*})}{(\pi .. x^{j^*})} \leq 1 \qquad j = 1,2,..n$$

The Model in relation (5) is a Fractional Programming Model and can be converted to a linear Programming Model according to the following formula:

(6)

$$Max(\sigma.y^{j*})$$
S.T
$$-(\pi..x^{j*})+(\sigma.y^{j*})\le 0, \quad j = 1,2 \ldots n$$

The Mathematical Formula of the (VRS) Model in Terms of input Orientation:

(7)

$$\max(\sigma.y^{j*})$$
$$s.t.$$
$$(\sigma.y^{j}) - (\pi.x^{j}) \le 0; j = 1,....,n$$
$$(\pi.x^{j*}) = 1$$
$$\pi, \sigma \ge 0.$$

Therefore, the formula for linear programming according to the theory of the corresponding model of this model is as follows:

(8)

$$\min \theta$$
$$s.t$$
$$\sum_{j} x^{j} \lambda_{j} - x^{j*} \theta \le 0; j = 1,..., n$$
$$\sum_{j} y^{j} \lambda y_{j} \ge y^{j*}$$
$$\lambda \ge 0$$

The Mathematical Formula of The (VRS) Model in Terms of output Orientation

$$
\begin{aligned}
&\min(\pi.x^{j^*}) \\
&s.t. \\
&(\pi.x^j) - (\sigma.y^j) \geq 0; \ j = 1,....,n : \\
&(\sigma.y^{j^*}) = 1 : \\
&\pi, \sigma \geq 0.
\end{aligned}
\qquad (9)
$$

The Mathematical formula of the above linear Programming Model According to The Corresponding Model Theory will take the following form:

$$
\begin{aligned}
&\max \phi \\
&s.t \\
&\sum_j x^j \lambda_j \leq x^{j^*}; \ j = 1,...,n \\
&\sum_j y^j \lambda_j - y^{j^*} \phi \geq 0 \\
&\lambda \geq 0.
\end{aligned}
\qquad (10)
$$

The goal of the decision-making units in this approach is to focus on maximizing output levels while taking into account maintaining the level of input consumption, that is, increasing output with constant inputs. (Hussein et al., 2021)

3 . Discussion and Results:

A Conceptual review of any topic is considered incomplete if it does not have real realism and the ability to apply it to reality, and we often find our shadow in Practical application in research and studies. In order to be able to develop a solution to the studied problem, the impact indicator on the output vector is an indicator of increasing outputs while the level of inputs remains constant; that is, the decision-making unit is efficient if it manages to increase outputs without increasing inputs, and to reach full efficiency, it is necessary to obtain the maximum Possible output using a specified amount of (22) local and (2) Ashur Bank international banks have been accredited, as shown in Table 1.

Table 1: Shows The Efficiency index According to the output-oriented VRS Model and the Ratio of Inefficiency For local and International Banks

No	Banks for the year of 2022	Efficiency	Inefficiency	Bank (Reference)	Most banks used (for reference)
1	Al Rasheed Bank	100%	0%	1	1
2	Industrial Bank	100%	0%	2	15
3	TBI Bank	100%	0%	3	7
4	National Bank	100%	0%	4	5
5	Asia Bank	100%	0%	5	6
6	National Bank	100%	0%	6	2
7	Bank across Iraq	100%	0%	7	4

8	Jordan Capital Bank	100%	0%	8	13
9	Lloyd's Banking Group London	100%	0%	9	12
10	Iraqi Investment Bank	90.80%	9%	9 8 4 2	0
11	Ashur Bank	69.40%	31%	8 7 5 2	0
12	Rafidain Bank	61%	39%	9 8 2	0
13	Mosul Bank	56.40%	44%	9 8 4 3 2	0
14	Gulf Commercial Bank	55.60%	44%	8 7 2	0
15	Bank of Baghdad	54.20%	46%	9 8 4 3 2	0
16	Mansour Bank	54%	46%	9 8 5 3 2	0
17	United Bank	53.10%	47%	9 8 4 2	0
18	Economy Bank	45.20%	55%	9 5 2	0
19	Spectrum Bank	34.70%	65%	8 7 2	0
20	Middle East Bank	23.20%	77%	9 8 3 2	0
21	Elaf Bank	21.70%	78%	9 8 5 3 2	0
22	Sumer Commercial Bank	14.70%	85%	9 5 4 2	0
23	Commercial Regional Bank	10.70%	89%	9 8 5 3 2	0
24	Cihan Bank	0.80%	92%	6 2	0

Source: Prepared by the researcher based on the (Deap2.1) Program

By analyzing the Results Contained in Table1 for the year 2022:

1-The banks (Al-Rasheed, industrial, TBI, Al-Ahli, Asia, National, trans-Iraq, Jordanian capital, Lloyds Banking Group London) have achieved a 100% efficiency rate, which indicates that they are using their resources optimally, making them distinguished in the competitive market.

2- The investment bank has achieved an efficiency rate of 90.8% and an inefficiency rate of 9.2%, so it needs to take advantage of the expertise of banks (industrial, national, Jordanian capital, Lloyds Banking Group London) in order to reach the optimum.

3- Ashour Bank achieved an efficiency of 69.4% and an inefficiency rate of 30.6%. It can benefit from the expertise of banks (industrial, Asia, across Iraq, Jordanian capital) to increase its efficiency.

4- Rafidain Bank has achieved a technical efficiency rate of 61% and an inefficiency rate of 39%, so it needs to take advantage of the expertise of banks (industrial, Jordanian capital, Lloyds Banking Group London) in order to increase its efficiency.

5- Mosul Bank achieved an efficiency rate of 56.4% and an inefficiency rate of 43.6%. The bank must benefit from the expertise of banks (industrial, TBI, Ahli, Jordan Capital, Lloyds Banking Group London) to raise its technical capabilities through changing operational policies.

6- Gulf Commercial Bank achieved an efficiency of 55.6% with an inefficiency rate of 44.4%, which means that the bank should benefit from the experience of banks (industrial, Jordanian capital, Lloyds Banking Group London) in order to raise its efficiency.

7- Baghdad Bank achieved a ratio of 54.2. With an inefficiency rate of 45.8%, Can benefit from the expertise of banks (industrial, TBI, Ahli, Jordan Capital, Lloyds Banking Group London) to stay competitive in the market.

8- Al Mansour Bank has achieved an efficiency rate of 54% and an inefficiency rate of 46%, so it needs to take advantage of the expertise of banks (industrial, TBI, Asia, Jordan Capital, Lloyds Banking Group London) to stay competitive in the market.

9: The United Bank achieved an efficiency of 53.1% and an inefficiency rate of 46.9%, which means that the bank must benefit from the experience of banks (industrial, national, Jordanian capital, Lloyds Banking Group London) to be able to survive and withstand in light of strong competition to avoid difficult situations that the bank may be exposed to.

10- Banks achieved (Economy, Spectrum, Middle East ,Elaf,Sumer Commercial ,Commercial Regional, Cihan) Efficiency below 50%.
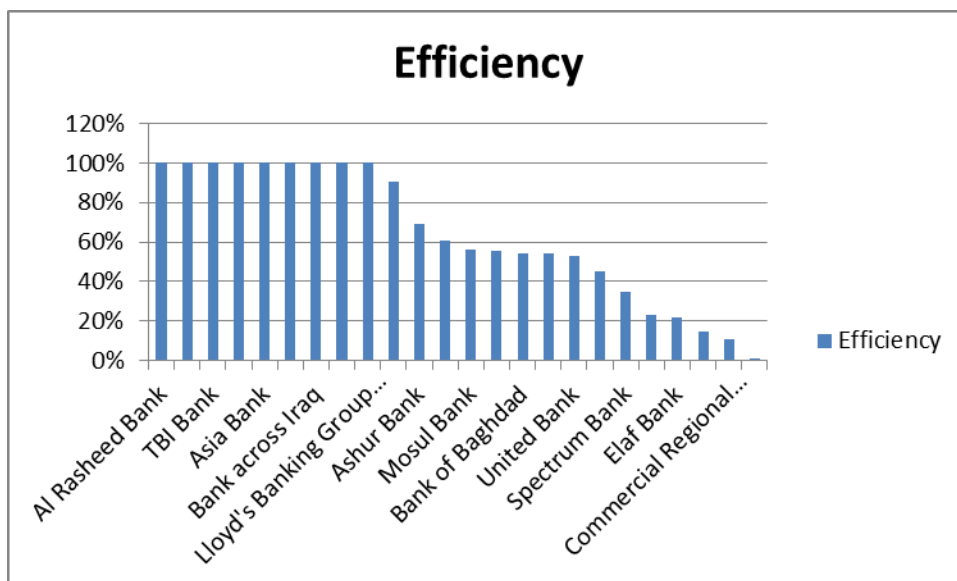 Figure 2 shows the efficiency levels for 2022

Figure 2 :The Efficiency levels for 2022
Source: Prepared by the researcher based on Table (1)
Table 2: Shows the outward trend in millions of Iraqi dinars.
Table 2: With the Direction of the Output Amounts in Mllions of Iraqi Dinars

No	Banks for 2022	Real Value Advance Loans	Target Value Advance Loans	Real Value Profits	Target Value Profit
1	Al Rasheed Bank	3501485	3501485	376.025	376.025
2	Industrial Bank	899202.6	899202.6	2909.188	2909.188
3	TBI Bank	7059706	7059706	277631.1	277631.1
4	National Bank	1057937	1057937	30636.03	30636.03
5	Asia Bank	94449.03	94449.03	1660.963	1660.963
6	National Bank	118441.2	118441.2	1008524	1008524
7	Bank across Iraq	191.35	191.35	7.7875	7.7875
8	Jordan Capital Bank	8046523	8046523	219557.4	219557.4
9	Lloyd's Banking Group London	892914750	892914750	14616328	14616328
10	Iraqi Investment Bank	353727.2	389676.2	97.9	9793.9
11	Ashur Bank	254147.3	366317.3	42455.23	61193.23
12	Rafidain Bank	24573145	40056936	507411.3	827136.3
13	Mosul Bank	181770.3	322357.3	6098.725	10814.73
14	Gulf Commercial Bank	210815.4	379311.4	5708.238	10687.24
15	Bank of Baghdad	995126.8	1837600	59133.83	109195.8
16	Mansour Bank	213405.3	395054.3	16580.7	30693.7
17	United Bank	404996.7	763161.7	3852.588	19507.59

18	Economy Bank	178657.5	395412.5	2688.913	10394.91
19	Spectrum Bank	250676.3	722796.3	3206.225	20902.23
20	Middle East Bank	227383.9	981071.9	42724.45	184338.5
21	Elaf Bank	178657.5	284844.1	2190.513	10106.51
22	Sumer Commercial Bank	33956.84	231609.8	1149.213	7838.213
23	Commercial Regional Bank	79415.81	739816.8	11704.61	109036.6
24	Cihan Bank	887.775	12048.78	8109.013	101142

Source: Prepared by The Researcher based on the (Deap2.1) Program

We note from the results of the table the outputs (2) for the year 2022 extracted from the program of the (Deap.2.1) mayati in order to reduce the inefficiency of the banks listed below to reach high efficiency, they must maximize the outputs by investing deposits by granting loans and advances to reach the highest profit as indicated below:

1- The banks (Al-Rasheed, industrial, TBI Al-Ahli, Asia, National, trans-Iraq, Jordanian capital, Lloyds Banking Group London) have used their resources optimally, resulting in the real value equal to the target value sought by banks to achieve the highest profit.

2- The Iraqi investment bank must invest its deposit by increasing credit of all kinds (advances and loans) in the amount of 389676.1625) to reach a profit of 58675.

3-Ashour Bank is required to invest deposits by increasing credit of all types (advances and loans) in the amount of $366317.2875 (to reach a profit of $61193.225).

4-Rafidain Bank is required to invest deposits by increasing credit of all types (advances and loans) in the amount of (40056935.75) to reach a profit of (827136.25).

5-Mosul Bank must invest deposits by increasing credit of all types (advances and loans) in the amount of 322357.2625, to reach profits of 30693.7.

6- Gulf commercial bank must invest deposits by increasing credit of all types (advances and loans) by an amount of $3793.1125 to reach profits (10687.2375).

7- The Bank of Baghdad must invest deposits by increasing credit of all kinds (advances and loans) by 1837599.8 to reach a profit percentage of 109195.825.

8-Al Mansour Bank is required to invest deposits by increasing credit of all types (advances and loans) in the amount of 395054.3125 to reach profits in the amount of 30693.7.

9- The United Bank must invest deposits by increasing credit of all kinds (advances and loans) in the amount of 763161.725 to reach profits in the amount of 19507.5875.

10- The real value and the target value of banks(Economy, Spectrum, Middle East ,Elaf,Sumer Commercial ,Commercial Regional, Cihan) See Table No. (2)
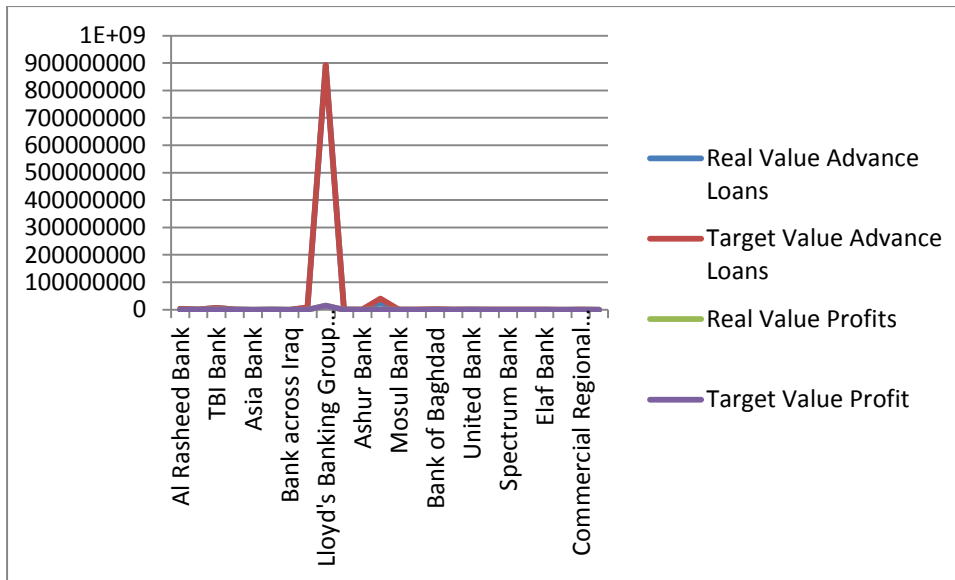
Figure 3 : The Real Value and the Target Value
Source: Prepared by the Researcher based on Table (2)

4.Conclusions:

The following banks (Rasheed, industrial, TBI, Al-Ahli, Asia, National,trans-Iraq, Jordanian capital, Lloyds Banking Group London) achieved high efficiency as they used their resources optimally. The investment bank achieved 90.8%, which is a good percentage, with the ability to benefit from the expertise of industrial and national banks, Jordanian capital, and Lubd's Banking Group London to reach 100%.Ashour and Rafidain banks achieved more ratios than the average, where they were 69.4% and 61% on the takeover, which is a good percentage, but you need the expertise of banks that have achieved 100% efficiency. The ratio of the United Bank, Baghdad, Commercial Bay, and Mosul to the center was average (53.1%, 54%, 55.6%, 56%). Accordingly, we must rely on efficient banks. the economy Banks achieved a percentage of 45.2, and spectrum banks achieved 34.7%,which is a few Percentages. Elaf and Middle East banks reached 21.7% and 23.2%, respectively.The banks Ceyhan, the commercial region, and Sumer achieved very few ratios that are alarming for the imminent danger, namely 14.7% ، 10.7% ،0.8%).

We recommend that banks(Economy, Spectrum, Middle East ,Elaf,Sumer Commercial ,Commercial Regional, Cihan) change their operational policies and make sure that their employees understand the requirements for their implementation through holding seminars, arranging workshops, and meeting senior departments with employees).Benefit from the experience of banks that have used their resources correctly and reached 100% efficiency. the adoption by the bank departments of the standards of merit and quality in the completion of work, relying on teamwork in the completion of tasks, and urging them to make the phrase "the customer is our goal" the prevailing culture in the work of those banks. providing allocations that enable bank departments to avoid weak operational processes, because this weakness may be negatively reflected in the level of excellence of the services of these banks. Relying on how to deal with resources, which enables the bank to achieve high technical efficiency, which is 100%.changing its policy by attracting more deposits and investing them by granting loans and advances. Banks that have achieved efficiency of 30% and less must take an emergency plan for the purpose of Promoting them in light of the Acceleration of competition and the electronic revolution, and in succession will find themselves outside the banking market.

Authors Declaration:
Conflicts of Interest: None
-We Hereby Confirm That All The Figures and Tables In The Manuscript Are Mine and Ours. Besides, The Figures and Images, Which are Not Mine, Have Been Permitted Republication and Attached to The Manuscript.
- Ethical Clearance: The Research Was Approved By The Local Ethical Committee in The University.

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تقييم وتحسين الكفاءة النسبية للقطاع المصرفي في العراق باستخدام تحليل مغلف البيانات لنموذج Vrs ذو التوجه الاخراجي مع التطبيق

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مستخلص البحث:

ان القطـاع المصـرفي مـن القطاعـات المهمـه في العـراق وشـهدت المرحلـه الاخيـرة ظهـور مصـارف اهليـة عـدة فـي سـوق المنافسـة ومـن اجـل الوقـوف علـى مـدى كفـاءة المصـارف الموجـودة تـم تحليـل المـوارد المتاحـة للمصـارف الحكوميـة والاهليـه ومقارنتهـا مـع مصـرفين عـالميين للوقـوف علـى نسـب الكفـاءه للمصـارف المبحوثـة باسـتخدام تحليـل مغلـف البيانـات، تـم تشـخيص مشـكلة البحـث فـي قلـة الاهتمـام بقيـاس الكفـاءه للمصـارف مـن خـلال اسـتغلال المـوارد المتاحـة لتعظيـم الاربـاح . حيـث ان هـدف البحـث الـى تحديـد الكفـاءة للمصـارف المبحوثـة وفـق اتجـاه المخرجـات و تحليـل النتـائج المتواصـل إليهـا مـن أجـل الخـروج بتوصـيات تسـهم فـي تحسـين القطـاع المصـرفي وركـز البحـث علـى الاتجـاه لزيـادة المخرجـات مـع ثبـات المـدخلات بغيـة تعظيـم العوائـد, وتـم اسـتخدام برنـامج (Deap2.1) لتحليـل البيانـات وقـد اعتمـد البحـث بيانـات عـام 2022 لقيـاس الكفـاءة. لـ(22) مصـرف عاملـة فـي العـراق (حكوميـة والاهليـة) ومصـرفين خـارج العـراق وتـم اسـتخدام نمـوذج عوائـد الحجـم المتغيـرة (VRS) التوجـه الاخراجـي ، وكانـت ابـرز النتـائج التـي تـم التوصـل اليهـا هـو تحقـق المصـارف (الرشـيد، الصـناعي، TBI، الاهلـي، اسـيا، الـوطني، عبـر العـراق، مصـرف كابيتـال الاردنـي، مجموعـة لويـدز المصـرفية لنـدن) حققـت كفـاءة عاليـة 100% حيـث اسـتخدمت مواردهـا علـى النحـو الامثـل , وحقـق مصـرف الاسـتثمار نسـبة 90.8% وهـي نسـبة جيـدة مـع القـدرة علـى الاسـتفادة مـن خبـرات المصـارف (الصـناعي والاهلـي وكابيتـال الاردنـي ومجموعـة لويـدز المصـرفية لنـدن للوصـول كفـاءة 100% في عام 2022.

نوع البحث: ورقة بحثية .

المصطلحات الرئيسة للبحث : الكفاءة النسبية للمصارف، تحليل مغلف البيانات