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A Balanced Scorecard-Driven DEA Model for Organizational Efficiency

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Abstract: This study introduces a novel framework that integrates the balanced scorecard (BSC) with Data Envelopment Analysis (DEA) to address the critical challenge of aligning organizational strategy with operational efficiency. The BSC, a widely adopted tool for translating strategic objectives into measurable performance indicators, is utilized to define inputs and outputs in the DEA model. This approach facilitates a comprehensive evaluation of the relative efficiency of decision-making units (DMUs) within organizations, while ensuring that performance assessments are aligned with overarching strategic goals. The integration of these methodologies bridges the gap between qualitative strategic insights and quantitative efficiency assessments, offering a holistic perspective on organizational performance. A case study in the banking sector illustrates the framework's applicability, demonstrating its effectiveness in identifying inefficiencies, benchmarking high-performing units, and providing actionable recommendations for resource optimization. The results underscore the robustness of the proposed model, highlighting its ability to enhance data-driven decision-making processes and support sustainable organizational growth. The framework's versatility is further evidenced by its potential for application across diverse sectors, making it a powerful tool for contemporary performance management. The implications of this approach are significant, offering organizations a systematic method for evaluating efficiency while simultaneously ensuring that performance aligns with strategic objectives, thereby fostering long-term organizational success.

Keywords: Balanced scorecard (BSC); Data Envelopment Analysis (DEA); Organizational efficiency; Strategic alignment; Performance management; Resource optimization

1. Introduction

In today's competitive landscape, organizations face increasing pressure to optimize their efficiency while ensuring strategic alignment. Achieving this balance is essential for sustaining long-term success and adapting to dynamic market conditions. Traditional performance evaluation methods, often centered on financial metrics, fail to capture the multidimensional nature of organizational operations. To address these limitations, innovative frameworks that integrate strategic insights with quantitative efficiency measurements have emerged.

In the early 2000s, Robert Kaplan, a professor at the School of Business, Harvard University, and David Norton, then the manager of a research institute, founded the initial plan of the BSC method, which was published in a paper in 2005 (Kaplan & Norton, 2005). In the following years, the publication of the first article, many companies implemented the BSC technique, received consultation from Rahnamay Roodposhti et al. (2019), and presently obtained desirable results. These companies employed the technique not only for performance evaluation but also to control the implementation of their strategies. Kaplan and Norton published their consultation by Harvard University Press (Kaplan & Norton, 1996; Kaplan & Norton, 2007) and Kazmipour published "Examining the BSC model of system dynamics productivity: (Case study: Mahab Quds company)" (Kazmipour, 2024).

DEA was founded by Charnes et al. (1978), which later turned into a scientific management method for performance evaluation. Charnes et al. (1978) developed the CCR model, and Montazeri et al. (2020) developed the BCC method. The BCC and CCR techniques are two fundamental methods in DEA. DEA measures the efficiency of DMUs in an organization, considering various inputs and outputs (Maghbouli & Pourhabib Yekta, 2021). DEA calculates efficiency by determining the efficient frontier. The units lying on the efficient frontier are efficient, and others are inefficient. In other words, efficient units have utilized their inputs properly to convert them into outputs, and inefficient units have to keep up with the efficient ones by decreasing the inputs, increasing the outputs, or a combination of both depending on the orientation of the model (Yekta et al., 2024).

Measuring the efficiency of the organization using DEA gives a comprehensive view of the efficiency to the top managers to understand the status of their organization (Mirzaei & Salehi, 2019). It can be catastrophic for the organization, however, if the information is not in agreement with its strategic objectives. An expert mainly carries out input and output selection, and if the indices are not in agreement with the organization's goals, the accuracy of the outputs can be under question (Ghomashi Langroudi & Abbasi, 2022).

The current paper employs the BSC method to determine the input and output indices regarding the capabilities of BSC in the selection of strategy indices. Moreover, to determine the organization efficiency, a model will be presented by using the BSC-obtained inputs and outputs in the DEA efficiency model (Jaberi et al., 2021).

2. Balanced Scorecard

Financial managers use financial balances to communicate information, engineers utilize plans and designs, and architects use physical models to do their jobs. It seems that people in all professions employ some kinds of methods to put their job into practice to reach the final point and make it usable for the final user.

However, for those involved in the strategic planning of an organization, there seems to remain an unsolved problem. Although strategic planning seems attractive, with comprehensive bar charts and figures, nice covers, and sentences, this is not the case for those who should implement these plans (mid-level managers). Most of the time, putting these plans into practice is accompanied by poor execution and a lack of appropriate evaluation methods. This would have a negative impact on the execution of strategic plans and also on all aspects of the organization. This problem engages not only the senior managers of the organization but also the strategy-making managers and executive managers of the organization at all levels.

In such conditions, the BSC method was proposed by Navabakhsh & Shahsavari Pour (2023) as a novel tool for performance evaluation and was then applied as a tool to help fulfill the strategies. In other words, it is a system of strategy management, which management experts and organization managers greatly accept.

Traditional performance evaluation systems were generally based on financial indices, which assign high values to short-term profits and losses of the companies. In this regard, all activities related to lowering the costs and increasing the profits are considered positive. It should be noted, however, that while many cost-lowering activities, such as halting the staff's educational programs or research and development activities, will increase the profit of the company, they will cause the company to lose competitive opportunities, and the long-term profits will be endangered. Also, an increase in some profit-making items may cost the company the loss of the trust of their customers (Tadris et al., 2022).

In the early 2000s, Kaplan & Norton (2005) conducted a survey to identify the key success factors of 12 leading American companies and explore their performance evaluation approaches. The findings were published in 2005 in the Harvard Business Review in an article titled "Measures that Drive Performance". In their work, they highlighted that successful organizations assess their performance not only through financial metrics but also from three additional dimensions: customer satisfaction, internal processes, and learning and growth. Based on this insight, Kaplan & Norton (2005) proposed that a comprehensive evaluation of organizational performance should encompass four perspectives:

- Financial perspective
- Customer perspective
- Internal processes perspective
- Learning and growth perspective

They also identified four major challenges that organizations face when implementing strategies using the BSC framework:

1. Vision barrier: A lack of clarity or understanding of organizational strategies.
2. People barrier: Misalignment between individual goals and the broader organizational objectives.
3. Resource barrier: Inefficient allocation of time, energy, and budget to critical organizational priorities.
4. Management barrier: Excessive focus on short-term tactical decisions rather than strategic planning.

So, a new method to implement the strategies is needed. Using BSC enables strategic programmers to have a clear idea to implement the strategies.

By using BSC, the strategies will be tangible for everybody. When the strategies are defined with indices, measurements, and goals, all the personnel can understand the reports and practical events of the strategies.

For instance, if you are seeking good financial results, you should have good customer service, and to maintain good customer service, you should have prosperous internal processes (management of customer relationships); if you want to have a comprehensive internal process, you need skilled, educated human resources (mental resources).

The BSC method demonstrates how knowledge and skill of personnel (learning and growth) lead to changes in the structure and modification of internal processes and efficiency (internal processes), which will bring about a specific value in the market (customer) and will finally increase shareholder value or financial improvement (financial) (Najafi et al., 2009).

3. DEA

DEA, introduced by Charnes et al. (1978), is a mathematical programming technique designed to evaluate the relative efficiency of DMUs. This method determines efficiency by comparing multiple units, providing a measure referred to as relative efficiency (Edalatpanah et al., 2020). A key benefit of DEA lies in its ability to estimate the production function, a crucial concept in microeconomics. The production function defines the maximum achievable output for a given combination of inputs, serving as a benchmark for assessing the performance and efficiency of DMUs. With the production function being available, it is possible to assess the performance of a unit and, therefore, the efficiency of the unit. Often, the production function is not available, but using various methods, an approximate production function can be obtained for the observed inputs. There are various methods to approximate this function (Edalatpanah et al., 2024).

For administrators, efficiency data is a critical tool for evaluating and improving the productivity of organizational units. Productivity, within any system, is fundamentally tied to the efficiency and effectiveness of its constituent units (Khodabakhshi & Cheraghali, 2022). By the 1980s, substantial research had been conducted on measuring the efficiency of various systems. Here, a “system” refers to the collection of DMUs being evaluated. The efficiency of a DMU signifies its ability to utilize available resources optimally, ensuring satisfactory performance outcomes (Panahandeh Khojin et al., 2022).

Let *n* represent the total number of DMUs under evaluation, with *j=1, 2, ..., n*, DMU_j indicating the *j-th* unit. Each DMU is characterized by *m* inputs, denoted as $x_{ij}, \dots, x_{mj}$, and *s* outputs, represented by $y_{ij}, \dots, y_{sj}$. Both inputs and outputs are nonnegative values, and at least one input and one output must be greater than zero.

The production possibility set T_c is formulated based on the principles of observation coverage, constant returns to scale, feasibility, and convergence. This set is mathematically defined as:

$$T_c = \left\{ (X,Y) \mid X \geq \sum_{j=1}^{n} \lambda_j X_j, Y \leq \sum_{j=1}^{n} \lambda_j Y_j, \lambda_j \geq 0, j = 1,\dots,n \right\} \quad (1)$$

The set T_c is referred to as the production possibility set (PPS), or the CCR model, and possesses the following characteristics:

• The boundary of T_c is piecewise linear and represents the efficiency frontier. Any DMU situated on this boundary is considered relatively efficient, while those not on the boundary are deemed inefficient.

• If a DMU, such as DMU0, does not lie on the efficiency frontier, it can be adjusted or projected onto the boundary through various methods.

The input-oriented CCR model is mathematically formulated as follows:

$$\begin{aligned} & Min\ \theta \\ & S.t. \sum_{j=1}^{n} \lambda_j X_j \leq \theta X_0 \\ & \sum_{j=1}^{n} \lambda_j X_j \geq Y_0 \\ & \lambda_j \geq 0, \quad j = 1, \dots, n \end{aligned} \quad (2)$$

In this formulation, $\lambda_1, \dots, \lambda_n, \theta$ are the decision variables that must be determined.

4. DEA with BSC Inputs

To construct the proposed model, the foundation of the BSC methodology must first be established, followed by the identification and selection of relevant strategic indices. Subsequently, the data derived from the BSC framework are incorporated into the algorithm underpinning the model. This algorithm is designed to transform the BSC-generated data into inputs and outputs suitable for the DEA framework. The overall solution comprises three sequential steps: the construction of the BSC framework, the implementation of the transformation algorithm, and the application of the DEA model to evaluate efficiency and performance (Shaban et al., 2020).

4.1 Constructing BSC

Developing a clear and effective strategy forms the foundation of creating a BSC. The process begins by addressing a fundamental question: What is the organization's strategy? Once this is clarified, the next step involves constructing a strategic framework, referred to as a "strategy map," that provides a visual representation of the plan (Eilat et al., 2006).

Step 1: Strategic Alignment

The initial step in this phase focuses on crafting a strategy that guides and connects all subsequent processes. While understanding the basics of strategic planning is essential, it is equally important to ensure that the strategic plan is well-defined and precise to serve as a reliable foundation for the BSC. A successful strategy depends on two critical components: clearly defined objectives that direct actions and specific targets that articulate the expected outcomes.

Step 2: Strategic Areas

Before creating a BSC, it is essential to establish a clear boundary, or "fence line," around strategic areas. This helps the organization focus on specific objectives and prevents it from overextending by attempting to address too many goals simultaneously. Strategic planning is fundamentally about making informed decisions—choosing what the organization can realistically achieve and setting aside what it cannot. As the saying goes, achieving a few well-defined successes is far better than encountering numerous failures (Avakh Darestani & Behboodi, 2019).

To create an effective BSC, the organization's strategic efforts should be concentrated on a select number of critical areas. These strategic areas define the "scope" necessary for developing balanced scorecards and aligning them with organizational priorities. Typically, these areas revolve around key stakeholder groups, such as customers, shareholders, and employees. For example, in most public corporations, "shareholder value" serves as a central strategic area and is integrated into the BSC framework.

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Each strategic area aligns with the four perspectives of the BSC: financial, customer, internal processes, and learning and growth. For instance, shareholder value can be broken down into supporting objectives across these perspectives:

- Financial: Revenue growth
- Customer: Acquiring more customers
- Processes: Customer marketing and service programs
- Learning: Developing support systems and personnel

Importantly, each lower layer in the BSC hierarchy directly supports the layers above it. For example, acquiring more customers (customer perspective) naturally drives revenue growth (financial perspective). This interconnected structure ensures that the cause-and-effect relationships among objectives are maintained, a critical factor in constructing a cohesive and effective BSC.

Finally, it is recommended to limit the number of strategic areas to no more than five. This focused approach ensures that organizational resources and efforts remain concentrated on achieving measurable success.

Step 3: Creating Strategic Grids

After defining the strategy and narrowing the focus to specific strategic areas, the next step is to translate these into detailed strategic grids. A strategic grid acts as a structured framework for aligning objectives across the four key perspectives of the BSC: financial, customer, internal processes, and learning and growth.

The process begins with high-level strategic goals and areas. For instance, shareholder value is often identified as a critical strategic area in public corporations. To enhance shareholder value, organizations can pursue goals such as increasing revenue or improving operational efficiency. Once the primary strategy is determined, the next task is to identify how these objectives will flow through each layer of the BSC.

Starting with the *Financial Perspective*, strategies for improving shareholder value—such as revenue growth—are clearly outlined. Moving to the *Customer Perspective*, this involves identifying how customer-focused objectives, like acquiring more customers, support the financial goals. For example, if the organization aims to become a pricing leader in its market, this strategy would directly drive customer acquisition, which in turn contributes to revenue growth.

Next, in the Internal Processes Perspective, specific operational strategies are developed to support customer objectives. These might include improving operational efficiency, reducing costs, or optimizing supply chain management. For example, achieving pricing leadership would require operational efficiency initiatives such as cycle time reductions or cost minimization programs.

Finally, in the Learning and Growth Perspective forms, the foundation for delivering on these objectives. This perspective addresses the competencies, technologies, and cultural changes necessary to support operational excellence. For instance, achieving internal efficiency might involve training staff on cost management best practices, implementing advanced technology systems, or fostering a culture of continuous improvement.

The grid ensures that all objectives across the four perspectives are interconnected, with each layer reinforcing the goals of the one above it. For example, more customers (customer perspective) lead to revenue growth (financial perspective), while improved internal processes enable better customer service and competitive pricing. This cause-and-effect linkage is critical for constructing an effective BSC.

To maintain clarity and focus, it is recommended to limit the number of strategic areas to a manageable scope, ensuring that the strategic grids remain concise and aligned with overarching organizational goals.

4.2 Transformation Algorithm

At this stage, we only need an analysis by which we can learn about issues involved in balanced assessment in terms of its input and output in an organization with regard to definitions. Notice that any item that is considered a strategic objective in the BSC method can be dealt with as either an input or an output in DEA. In fact, we transform all strategic objectives into the inputs of the DEA problem after deciding on the objectives being inputs or outputs.

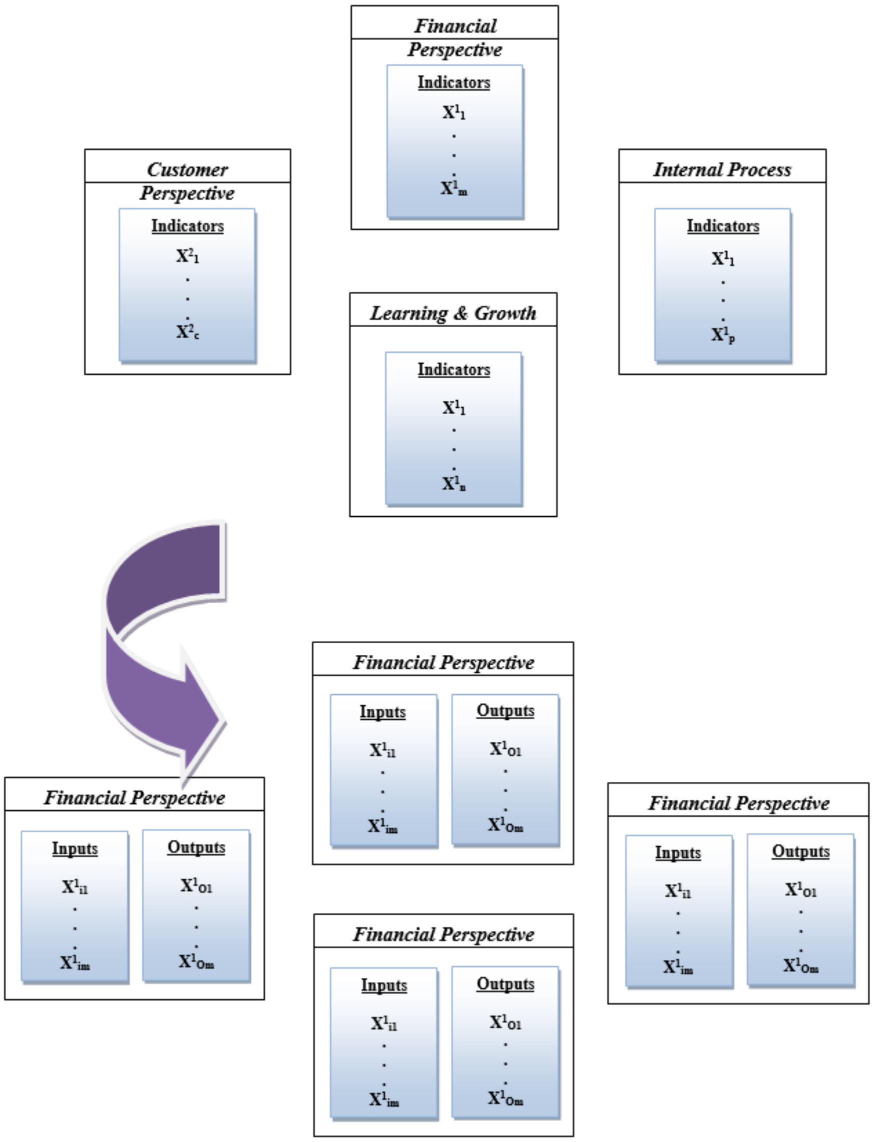

Figure 1. BSC transformation process

For definition, it can be said that an input is an indicator that is given to a system under the name of means and expenses by the use of which a process of production can be carried out. In a banking system, personnel, equipment, and different sorts of expenses can be considered as inputs. On the other hand, outputs are indicators whose increase in the amount can improve the performance of an organization. Similarly, in a banking system, the resources received, the loans granted, the interest received, and the interest due on the loans, the service provided, and customer satisfaction can be regarded as outputs. All these indicators are the results of the work carried out by the bank on resources, expenses, and equipment.

Bear in mind that, in the above-mentioned example of the banking system, in the process of granting loans, there exists an input, i.e., the interest due on the loans, whose increase is not desirable and which is always sought to be deceased. Such an input is called an "undesirable" input. Generally, the most important feature of inputs can be considered the fact that their increase will result in a decrease in the efficiency of the system if it does not lead to an increase in the outputs.

Figure 1 indicates the transformation process.

For instance, in evaluating a commercial organization, like a bank, the strategic objectives can be categorized as follows, with the aim of increasing shareholder value.

Table 1. Inputs and outputs in perspectives

Perspective		Objective	Input / Output
Financial	F1	Capital growth rate	Output
	F2	Returns of the capital	Output
	F3	Interest received	Output
	F4	Interest paid	Input
	F5	Interest on overdue loans	Input
	F6	Total revenue	Output
	F7	Operational expenses	Input
Customer	C1	Competitive pricing	Output
	C2	Customer satisfaction	Output
	C3	High-quality service	Output
	C4	Customer attraction rate	Output
	C5	Quick service	Output
Internal Process	I1	Speeding up the services	Input
	I2	Online services	Input
	I3	Electronic services	Input
	I4	SWIFT branches	Input
Learning & Growth	L1	Motivational expenses	Input
	L2	Increasing personnel proficiency	Input
	L3	Increasing personnel skills	Input

Regarding the definitions, Table 1, and the transformation above, we are facing a DEA problem, which can be solved easily. Here, because we are certain that the inputs and outputs of the DEA problem are in line with the strategy of the organization, the DEA solution will be a reliable one.

4.3 DEA Model with BSC Inputs

After going through the previous two phases, we have a clear DEA problem, which DEA-solving algorithms can solve. Owing to the nature of the DEA method, we collect the data of homogeneous units, such as branches of commercial banks or insurance companies, according to Phase I, and by utilizing Phase II, we convert them to the inputs of Phase III and solve the problem as follows.

Regarding the structure of T_c and the output-oriented DEA, we have:

$$
\begin{aligned}
&BCC \\
&Max \quad \phi + \varepsilon(1s^- + 1s^+) \\
&\text{S.t.} \quad \sum_{j=1}^{n} \lambda_j X_j + s^- = X_k \\
&\qquad \sum_{j=1}^{n} \lambda_j Y_j - s^+ = \phi Y_k \\
&\qquad \sum_{j=1}^{n} \lambda_j = 1 \\
&\qquad \lambda_j \geq 0 \;,\; s^- \geq 0 \;,\; s^+ \geq 0
\end{aligned}
\tag{3}
$$

Or, by controlling the weights, we have:

$$
\begin{aligned}
& RW-BCC \\
& Max \quad U^{\mathrm{T}} Y_k + u_0 \\
& S.t. \quad U^{\mathrm{T}} Y_j - V^{\mathrm{T}} X_j + u_0 \le 0 \quad , \quad \mathrm{j}=1,...,\mathrm{n} \\
& \qquad V^{\mathrm{T}} X_p = 1 \\
& \qquad A\mathrm{U} \le 0 \\
& \qquad B\mathrm{V} \le 0 \\
& \qquad U \ge 1\varepsilon \quad , \quad V \ge 1\varepsilon
\end{aligned} \tag{4}
$$

So, the problem is easily solvable by DEA.

5. Numerical Example

Table 2. The collected data of commercial banks

Perspective			**Financial**		
Objective	Capital growth rate	Returns of the capital	Interest margin	Expenses/Income ratio	Interest on overdue loans
I/O	O1	O2	O3	I1	I2
DMU 1	17.42%	4.81%	1.48%	52.84%	2.68%
DMU 2	12.98%	7.16%	2.62%	42.77%	9.50%
DMU 3	47.59%	7.00%	8.00%	60.00%	15.00%
DMU 4	18.90%	1.40%	2.70%	60.20%	8.50%
DMU 5	20.13%	1.23%	3.00%	57.90%	7.30%
DMU 6	10.2%	10.20%	4.00%	96.00%	14.00%
Perspective			Costumer		
Objective	Competitive pricing	Customer satisfaction	High-quality service	Customer attraction rate	Quick service
I/O	I3	O4	O5	O6	O7
DMU 1	15.70%	3.25%	3.19%	22.91%	3.13%
DMU 2	18.90%	3.21%	3.61%	25.80%	3.41%
DMU 3	34.00%	3.41%	3.34%	29.00%	3.25%
DMU 4	33.50%	3.12%	3.41%	34.50%	3.32%
DMU 5	30.40%	3.43%	3.39%	21.80%	3.25%
DMU 6	12.00%	3.74%	3.50%	13.00%	3.37%
Perspective		Internal Process			
Objective	Speeding up the services	Online services	Electronic services	Advanced services	
I/O	I4	O8	I5	O9	
DMU 1	800	1376	1305	91	
DMU 2	692	1896	1906	57	
DMU 3	718	1842	1758	58	
DMU 4	682	1315	1500	37	
DMU 5	643	787	745	34	
DMU 6	555	510	517	10	
Perspective			Learning & Growth		
Objective	Motivational expenses	Increasing personnel proficiency	Increasing personnel skills		
I/O	I6	I7	O10		
DMU 1	23.03%	12.11%	58.54%		
DMU 2	18.72%	11.96%	30.80%		
DMU 3	18.50%	12.08%	46.25%		
DMU 4	5.30%	12.07%	18.55%		
DMU 5	17.00%	11.96%	39.10%		
DMU 6	30.00%	13.66%	69.00%		

To demonstrate the practical applicability of the proposed Balanced Scorecard-Driven Data Envelopment Analysis (BSC-DEA) model, a numerical example was conducted in the banking sector. The dataset included six DMUs, representing branches of a commercial bank, with their performance evaluated across multiple perspectives as defined by the BSC: financial, customer, internal processes, and learning and growth. The inputs and outputs for the DEA model were derived from the BSC framework, ensuring alignment with the strategic objectives of the bank. Examples of inputs (I_i), included operational expenses, interest paid, and motivational expenses, while outputs (O_i) included revenue, customer satisfaction, and the number of advanced services provided. This mapping ensured a comprehensive representation of each DMU's contribution to the bank's overall strategy. The data, which have been indexed and collected by the BSC method, explained in Table 2.

Now, we have a problem whose input and output indices are selected based on the BSC technique. Using the collected data, the DEA model was applied to calculate the relative efficiency scores for each DMU. The results are summarized in Table 3.

Table 3. The efficiency result

DMU	Efficiency
DMU1	0.86097
DMU2	1
DMU3	1
DMU4	0.79709
DMU5	0.83442
DMU6	0.94068

The efficiency scores reveal significant performance insights across the evaluated branches, with DMU2 and DMU3 achieving optimal efficiency (score of 1.000), positioning them as benchmarks for best practices in resource utilization and strategic alignment. DMU6, with a near-optimal score of 0.941, suggests minor inefficiencies that could be addressed through focused interventions like process optimization or cost management. Conversely, DMU4, with the lowest efficiency score of 0.797, indicates substantial underperformance, likely due to resource misallocation or operational inefficiencies, requiring targeted improvements in areas such as internal processes or customer engagement. These findings provide a strategic roadmap for addressing inefficiencies while leveraging best practices to enhance overall organizational performance.

The results provide critical managerial insights, highlighting the need for targeted interventions in inefficient branches like DMU4, where strategies such as process optimization, employee training, or technological investment could address significant performance gaps. Efficient branches like DMU2 and DMU3 serve as benchmarks, offering best practices in resource utilization and strategic alignment that can be replicated across other units. By leveraging these insights, managers can prioritize resource allocation to branches with the highest improvement potential, ensuring maximum return on investment. Additionally, the integration of BSC and DEA ensures that efficiency assessments are aligned with organizational goals, enabling data-driven decisions that foster sustainable growth and strategic alignment (Golpîra & Mohajeri, 2012).

The numerical example illustrates the practicality and robustness of the BSC-DEA model in evaluating and improving organizational efficiency. By integrating strategic and operational metrics, the model not only identifies inefficiencies but also provides a roadmap for aligning performance with organizational goals. This hybrid approach offers significant potential for enhancing decision-making and achieving sustainable growth in dynamic sectors such as banking.

6. Conclusion

This study introduced a comprehensive framework that integrates the BSC with DEA, effectively bridging the gap between strategic alignment and operational efficiency. The BSC-DEA model facilitates the transformation of strategic objectives into measurable inputs and outputs, ensuring that performance evaluations are consistent with the broader organizational goals. By combining the qualitative insights offered by the BSC with the quantitative rigor of DEA, the proposed approach provides a robust mechanism for assessing and improving the efficiency of DMUs. The practical applicability of the framework was demonstrated through a numerical case study in the banking sector, where efficiency scores highlighted both high-performing units and those requiring targeted improvements. Efficient DMUs, such as DMU2 and DMU3, were identified as benchmarks for best practices, while inefficient units, such as DMU4, emphasized the need for strategic interventions, including process optimization and resource reallocation. These findings validate the model's capacity to offer actionable insights, allowing managers to make informed decisions and prioritize initiatives that enhance both short-term performance and long-term sustainability. The integration of the BSC with DEA not only provides a more holistic perspective on organizational performance but also empowers managers to align operational activities with strategic priorities. This synergy ensures that organizations can remain adaptable in dynamic environments, optimize resource utilization, and achieve sustainable growth. Future research could expand this framework to other sectors, incorporating advanced computational techniques such as machine learning to further enhance scalability, flexibility, and effectiveness. The BSC-DEA model represents a significant advancement in the field of performance management, offering a versatile tool for achieving excellence in both strategic planning and operational execution. By bridging the gap between strategic insights and operational efficiency, the model contributes to the development of a more comprehensive and actionable approach to performance assessment.

Data Availability

The data supporting our research results are included within the article or supplementary material.

Conflicts of Interest

The authors declare no conflict of interest.

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