EVALUATING THE EFFICIENCY AND TOTAL FACTOR PRODUCTIVITY IMPROVEMENT OF AGRIBANK DISTRICT-LEVEL BRANCHES IN DAK LAK PROVINCE

Vuong Hong Linh[1], Hoang Minh Tuan[2], Le Duc Niem[3]

ABSTRACT

The main objective of this study is to develop a performance model that assesses the relative efficiency and the potential for total factor productivity improvement of bank branches. By comparing this model to the traditional evaluation method used by Agribank Dak Lak, the study aims to identify strengths and weaknesses and draw managerial implications from the comparison. Valuable insights into branch performance are obtained through the assessment of efficiency scores. The findings indicate that with improved management and utilization of given inputs, all branches can enhance their performance by 24% in 2020, 35.2% in 2021, and 29.4% in 2022 without input modifications. However, it is noteworthy that due to the impact of the COVID-19 pandemic and unfavorable conditions, most branches could not increase their total productivity between 2020 and 2022. Only two branches, namely the Tay Nguyen University Branch and the Buon Don Branch, improved their Total Factor Productivity (TFP) from 2021 to 2022. Considering these findings, several managerial implications can be derived for Agribank Dak Lak.

Keywords: *Bank's Branches, Efficiency, Performance, Total Factor Productivity, JEL Classification: L23, L25, G21.*

1. INTRODUCTION

Measuring performance of banks or branches of banks is a critical aspect of effective management, serving as the compass that guides decision-making, strategy formulation, and organizational development (DeYoung & Rice, 2004). A precise understanding of a bank's financial health, operational efficiency, and market position is quintessential for sustained success in the highly competitive financial services industry (Berger & Humphrey, 1997). This assertion is grounded in both practical observations and academic research, underscoring the indispensable role of performance measurement in banking management (Clark et al., 2006). There are several methods for branch measurement. Data Envelopment Analysis (DEA) is a standard method used to assess relative efficiency and potential improvements of branches(Balfour et al., 2015; Eken & Kale, 2011). DEA can evaluate production and profitability, revealing relationships between branch size, scale efficiency, and performance (Eken & Kale, 2011). A two-stage DEA model has been proposed to evaluate overall branch performance, considering profitability, efficiency, and effectiveness (Lotfi et al., 2012). This model addresses the limitations of previous studies by presenting efficient benchmark units and relative efficiency scores. Alternative approaches include integrating cognitive maps with categorical-based evaluation techniques to create performance indices (Ferreira et al., 2014). These methods aim to enhance transparency in decision-making processes and serve as learning mechanisms for banks, particularly in the context of economic pressures on business margins.

The banking sector dominates Vietnam's financial markets. In Vietnam, banks are the main organizations that promote household savings and provide company loans, among other financial services (Le et al., 2020). In recent years, the COVID-19 pandemic has wreaked devastation on both businesses and economies. Compared to other companies, agriculture has rebounded exceptionally well from the outbreak. Agriculture is one of Vietnam's key export areas, and the country leads the globe in products such as shrimp, pangasius, coffee, rice, cashew nuts, and pepper. Vietnam has managed to maintain strong economic growth despite the current crises caused by the COVID-19 epidemic and global conflicts. Vietnam's Agricultural and Rural Development Bank (Agribank) serves a distinctive role. Agribank Dak Lak, which has 19 branches in different districts, is considered a case study for this research project*. These branches have essential roles in encouraging people in the community to save money and stimulating the agricultural sector, particularly in cultivating

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There are 19 branches of the level II. There are sub-branches with a branch of level II.

coffee, pepper, and cashew nuts. Regarding the district-level branches of commercial banks, there is a shortage of research on potential policy implications in academic literature and empirical economics. At the same time, there is a pressing requirement to encourage the growth of the banking industry. This fact suggests the study aims to close this scholarly and practical knowledge gap.

In this research, the two main objectives are to assess the efficiency of Agribank branches in Dak Lak Province by measuring their productive efficiencies and the changes in total factor productivity, and to develop targeted policies that would enhance overall bank performance within the Agribank system in the province. These objectives aim to identify areas for improvement in branch operations and to implement strategies that optimize resource use, thereby improving the financial health and service quality of Agribank branches in Dak Lak Province.

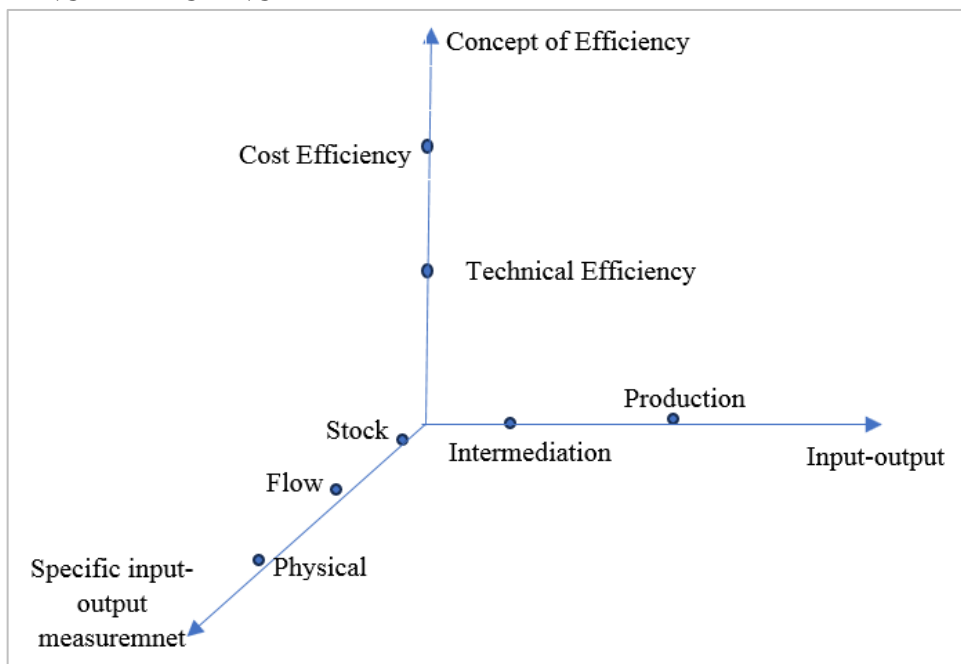## 2. THE MULTIDIMENSIONAL NATURE OF BANK BRANCH EFFICIENCY

Bank branch efficiency is a complex concept that involves multiple dimensions crucial for achieving optimal performance. While traditional metrics like cost reduction and revenue generation are important, a truly effective approach considers a broader spectrum of factors. These two general approaches can be adapted in various ways based on specific outputs and inputs. Berger and Humphrey (1992) identify the two methods: the "user cost" approach and the "value-added" approach. The user cost approach categorizes financial products as inputs or outputs based on their net revenue contribution, while the value-added approach allocates operating costs to key outputs, enhancing financial management and performance. Some studies consider the value-added and user-cost approaches as variations of the *production approach*, while others include them in the *intermediation approach* (Camanho & Dyson, 2005; Kim & McKenzie, 2010). However, the boundaries between these approaches are somewhat subjective and not as well-defined.

Figure 1. The multidimensionality of bank branch efficiency (Quaranta et al., 2017)

3. METHODOLOGY AND DATA

3.1. Methodology

Data Envelopment Analysis (DEA) encompasses several quantitative performance assessment and benchmarking models that employ linear programming to gauge the relative effectiveness of decision-making units (DMUs). Numerous management, economics, education, and healthcare studies have used these models (Cinemre et al., 2006). DEA is a non-parametric method because it makes no assumptions about the underlying production function weights. The linear planning issue is the basis for the DEA

models developed by (Charnes et al., 1978) (or CCR) and (Banker et al., 1984) (or BCC) as follows:

We consider n decision-making units denoted by DMU_j $(j = 1,2,..,n.)$. Each DMU_j uses a vector of inputs x_{ij} $(i = 1,2,..,m)$ to produce s outputs y_{rj} $(r = 1,2,..,s)$. The primal linear programming for CCR and BCC models with input-oriented methods can be written as follows:

$$\theta^* = \min \theta$$

Subject to

$$\sum_{j=1}^{n} \lambda_j x_{ij} \leq \theta x_{io} \quad i = 1,2,..,m;$$

(1)
$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{ro} \quad i = 1,2,..,s;$$

$$L \leq \sum_{j=1}^{n} \lambda_j \leq U ;$$
$$\lambda_j > 0 \quad j = 1,2,..,n.$$

where x_{i0} and y_{r0} are respectively the ith input and rth output of the DMUo under evaluation for its efficiency score calculation.

This DEA model will be the CCR model when $L \geq 0$ and $U < \infty$ are included as linear programming constraints. This model is sometimes called the CRS (Constant Returns to Scale) DEA model. The BCC model is obtained if L=1 and U=1. This model is also called the VRS (Variable Returns to Scale) DEA model.

The formulated problem is a fractional non-convex programming challenge, which can be converted into a linear program (LP) and solved relatively quickly.

This research used the DEAP 2.1 program to calculate the technical efficiency (TE) and Total Factor Productivity Improvement score (TFPCH). These indicators are used to evaluate the performance of bank branches of Agribank of Dak Lak.

3.2. Data

This proposed study employs bank inputs and outputs data from 19 Agribank Dak Lak district-level branches. The inputs include number of employees, bank capital, value of fixed assets, and deposits. The outputs are loans, off-balance sheet assets, and non-performing loans.

4. OVERVIEW OF THE AGRIBANK DAK LAK

4.1. History of Agribank Dak Lak

In 1996, the State Bank Governor enacted Decision No. 280/QD-NH5, reinstating the Vietnam Bank for Agriculture and Rural Development (Agribank) as a state-owned corporation, symbolizing a new era of robust financial support for agriculture and rural development. Demonstrating visionary leadership, the State Bank of Vietnam established Agribank Dak Lak as a strategic branch of Agribank Vietnam on June 2, 1998, through Decision No. 198/1998/QD-NH5. As a dedicated subsidiary of Agribank Vietnam, Agribank Dak Lak stands as a testament to our unwavering commitment to economic growth and prosperity (State Bank of Vietnam, 1996, 1998). As a commercial bank, it mobilizes capital from inside and outside the province to provide loans to customers. In addition to credit activities, the Bank also conducts foreign exchange operations and other banking services, emphasizing safety, efficiency, well-organized accounting and payment, treasury management, and other tasks as specified by the CEO of Agribank Vietnam.

4.2. Organization of the Agribank Dak Lak
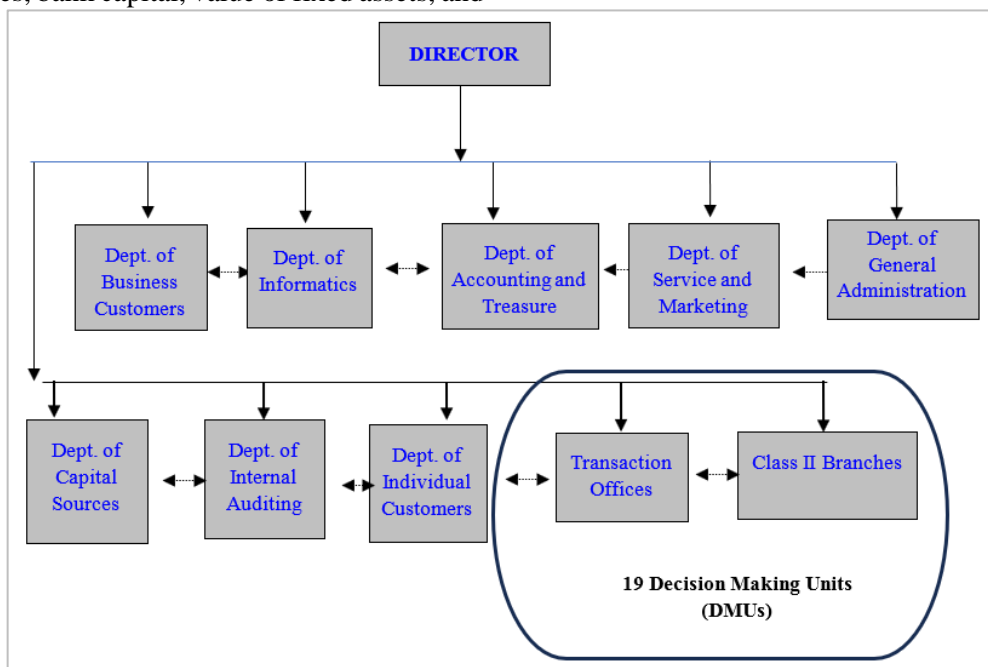
Note:

→ : Directing Relation

- - → : Functional Relation

Figure 2. Organizational Structure of Agribank Dak Lak

Dak Lak Province's Branch currently has a vast network of operations throughout the province, including Class III branches and transaction offices under Class III branches and offices. *Class II branches:* subordinate to and under the direct management of the Director. The business shall

comply with regulations and regulations of the Chairman of the Members' Council of the Bank of Vietnam and Rural Development. With the strength of a broad network, the Agribank Dak Lak province has a basis for affirming its position in capital mobilization and credit investment, especially in the agricultural-rural area. However, managing, limiting risks, and increasing business efficiency is difficult with such a large workforce.

4.3. Human resources

The number of personnel of the branch is added annually according to the requirements, workload, and targets allocated by the Bank of Vietnam and Rural Development. The total number of employees increased by 05 people (1.2%) in 2020 and 2021. This increased number shows that the need to expand the Bank's business throughout the province is growing. Going into details, the number of employees working in the credit department tends to increase significantly higher than in other departments (an increase of 10 credit officers, compared to a decrease of 5 people from different departments in 2020), showing the orientation of expanding the Bank's operations in a wide range targeting rural areas of the province.

Table 1. Human resources of Agribank Dak Lak

Unit: People

ITEMS	2020		2021		2022		2022/2020		2021/2020	
	No.	%	No.	%	No.	%	+/-	%	+/-	%
Total	**415**	**100**	**420**	**100**	**425**	**100**	**5**	**1.2**	**5**	**1,19**
1. Master	85	20.48	90	21.42	95	22.35	5	5.88	5	5.55
2. University	318	76.62	321	76.42	322	75.76	3	0.94	1	0.31
3. College	10	2.90	9	2.16	8	1.89	-1	-10	-1	11.11
4. Other	0	0	0	0	0	0	0	0	0	0

Source: Agribank Dak Lak

Table 2. Criteria for Performance of Bank Branches

No	Criteria	Description
1	Total Capital	The total capital allocated to the branch reflects its financial strength and capacity to support lending activities.
2	Total Outstanding Credit	The loan amount the branch extends to borrowers reflects its role in providing financial support to customers.
3	Soured Credit	The proportion of non-performing loans in the branch's credit portfolio, indicating its ability to manage credit risk effectively
4	Debt Restructuring	Restructuring and managing debt is crucial for maintaining a healthy loan portfolio.
5	Loans in Group 2	Assesses the branch's notable loans (below standard)
6	Revenue from Handling Credit Risk	Reflects the income the branch generates through credit risk management activities, such as credit insurance or risk mitigation services.
7	Revenue from Services	Measures the branch's earnings from providing additional banking services beyond lending, such as fees from account maintenance or remittances.
8	Interest on Overdue Loans	The income generated from interest on overdue loans indicates the branch's ability to recover outstanding amounts.
9	Percentage of Interest Received	The branch's success in collecting interest on loans indicates its efficiency in managing loan repayments.
10	Net Revenue	After deducting operating expenses, the overall income generated by the branch reflects its profitability and cost management.

Source: Agribank Dak Lak

4.4. Traditional method for performance measurement of Branches in Agribank Dak Lak

Agribank Dak Lak branches currently gauge their operational efficiency and effectiveness through a performance measurement system of ten key indicators. This system assesses each branch's performance by comparing actual results with the assigned or planned targets. The evaluation uses a four-point scale, which includes the following categories: Excellence, Good, Fair, and Bad. By monitoring and analyzing these indicators, Agribank Dak Lak can identify areas of strength and weakness, make informed decisions to improve performance and align branch activities with the Bank's overall objectives. It also enables the branch to provide better services to customers and contribute to the economic development of the Dak Lak region. Agribank Dak Lak assesses the

performance of its branches and determines their rankings by comparing the assigned levels of each indicator. However, due to the individual nature of these indicators and the difficulty in accurately estimating all ten of them, the performance measurement process becomes subjective and challenging for Agribank Dak Lak. The performance evaluation system at Agribank Dak Lak has its share of advantages and shortcomings.

One of the main advantages is its simplicity, making it easy to apply within the context of Agribank. The method is widely understood and intuitive, allowing CEO of bank branches to identify ways to enhance their ranking by improving specific criteria. However, there are several shortcomings. Firstly, the evaluation process heavily relies on subjective assessments, leaving it vulnerable to bias and inconsistent judgments. This aspect raises concerns about the fairness and accuracy of the evaluations. Secondly, the evaluation criteria are treated separately, overlooking potential interdependencies between them. As a result, this fragmented approach may not provide a comprehensive picture of a branch's overall performance, hindering the Bank's ability to identify areas that need improvement. Lastly, the process lacks a robust benchmarking system among branches, which is crucial for making accurate comparisons and assessing performance in a meaningful context. Without proper

benchmarks and comprehensive considerations, the evaluation may lack a solid foundation for decision-making. Addressing these shortcomings and incorporating a more objective and interconnected evaluation approach, including benchmarking, would enable Agribank Dak Lak to enhance its performance evaluation system's accuracy, fairness, and effectiveness, leading to better identification of improvement areas and overall optimization of the Bank's performance.

5. APPLYING DEA TO EVALUATING PERFORMANCE OF THE BANK BRANCHES

In this section, we have sought to utilize the methodologies of Data Envelopment Analysis (DEA) to calculate performance indices for the bank branches of Agribank Dak Lak. To achieve this, we considered a vector of inputs comprising the Number of Employees and Operating Costs. On the other hand, the outputs considered in the analysis encompass Loan Total Raised Capital and Net Revenue. By employing DEA, we aim to assess the efficiency and effectiveness of each branch in transforming these inputs into valuable outputs, providing valuable insights into the overall performance, and identifying areas for potential optimization and enhancement within the organization. To calculate the efficiency score and TFP change indexes, we use the DEAP program, Version 2.

Table 3. Inputs and outputs of branches of Agribank Dak Lak

Branches	The year 2020				The Year 2021				The Year 2022			
	Inputs		Outputs		Inputs		Outputs		Inputs		Outputs	
	NS	OC	R	NR	NS	OC	R	NR	NS	OC	R	NR
1.	10	3	116	9194	9	3	117	6278	9	4	151	10252
2.	11	4	148	8438	10	4	190	14281	11	5	228	19514
3.	11	4	297	14921	10	4	325	16602	11	5	349	19811
4.	40	10	733	53627	42	10	803	62854	42	10	876	66795
5.	34	9	798	43324	35	10	910	51996	36	10	1025	66104
6.	26	7	587	39923	27	8	704	50862	29	8	774	64501
7.	19	6	489	10	19	6	524	24883	19	7	561	54489
8.	25	6	476	31665	27	6	536	35616	27	7	586	50143
9.	20	6	348	33934	20	6	424	42923	20	7	431	49070
10.	27	9	428	37945	29	9	542	49605	29	11	665	63119
11.	12	4	265	10008	11	4	252	17225	11	4	266	20928
12.	10	3	226	2799	9	4	229	14346	9	4	240	21842
13.	10	3	221	5033	10	4	249	11698	10	5	290	15237
14.	10	4	232	10	10	4	291	17830	10	4	302	21592
15.	13	5	275	8965	11	4	301	12560	11	5	334	24164
16.	16	5	431	25249	16	5	470	29734	16	5	523	40166
17.	12	5	279	24529	12	5	319	28148	12	5	342	31113
18.	12	5	226	10743	11	5	239	19085	11	5	260	20044
19.	25	7	380	29565	27	7	485	31725	27	7	493	43932

Note: NS: Number of Employees (people) and OC: Operating Cost, R: Raising Capital (VND, and NR: Net Revenue (VND1,000 million)

Source: Agribank Dak Lak

Table 4. The Efficiency Scores of Branches

Branches	2020 Efficiency	2020 Evaluation	2021 Efficiency	2021 Evaluation	2022 Efficiency	2022 Evaluation
1.	1	Excellent	1	Excellent	1	Excellent
2.	1	Excellent	0.821	Good	0.828	Good
3.	0.525	Poor	0.504	Poor	0.647	Poor
4.	0.658	Poor	0.68	Poor	0.804	Good
5.	0.585	Poor	0.5	Poor	0.62	Poor
6.	0.552	Poor	0.499	Poor	0.629	Poor
7.	1	Excellent	0.533	Poor	0.568	Poor
8.	0.661	Poor	0.655	Poor	0.773	Medium
9.	0.667	Poor	0.613	Poor	0.779	Medium
10.	0.793	Medium	0.696	Poor	0.732	Medium
11.	0.71	Medium	0.619	Poor	0.694	Poor
12.	0.887	Good	0.681	Poor	0.629	Poor
13.	0.814	Good	0.716	Medium	0.841	Good
14.	1	Excellent	0.536	Poor	0.556	Poor
15.	0.796	Medium	0.666	Poor	0.565	Poor
16.	0.494	Poor	0.443	Poor	0.513	Poor
17.	0.663	Poor	0.611	Poor	0.589	Poor
18.	0.871	Good	0.816	Good	0.726	Medium
19.	0.77	Medium	0.724	Medium	0.919	Excellent
All branches (Geo. Means)	**0.76**	**Medium**	**0.648**	**Poor**	**0.706**	**Medium**

Table 5. The TFP Improvement of Branches of Agribank

No.	Branches	2021 TFP	2021 +/-	2022 TFP	2022 +/-	2020-2022 TFP	2020-2022 +/-
1	Thanh Cong	0.973	-	0.795	-	0.88	-
2	Buon Mre	0.779	-	0.988	-	0.877	-
3	Tay Nguyen University	0.9	-	1.022	+	0.959	-
4	Ea Kar	0.943	-	0.917	-	0.93	-
5	Krông Păk	0.893	-	0.86	-	0.876	-
6	Krông Ana	0.854	-	0.977	-	0.913	-
7	Krông Bông	0.015	-	0.773	-	0.106	-
8	M'drak	0.959	-	0.905	-	0.932	-
9	Buon Don	0.821	-	1.008	+	0.91	-
10	Lak	0.825	-	0.869	-	0.847	-
11	Phan Chu Trinh	0.782	-	0.947	-	0.861	-
12	Le Hong Phong	0.446	-	0.917	-	0.64	-
13	Hoa Khanh	0.634	-	0.91	-	0.76	-
14	Hoa Thang	0.018	-	0.915	-	0.129	-
15	Ea Tam	0.63	-	0.704	-	0.666	-
16	Ea Knốp	0.902	-	0.867	-	0.885	-
17	Ea Phê	0.875	-	0.933	-	0.903	-
18	Le Thanh Tong	0.863	-	0.919	-	0.891	-
19	Cư Kuin	0.881	-	0.966	-	0.922	-
	All Branches	**0.535**	**-**	**0.901**	**-**	**0.695**	**-**

Note: "-" means decreasing, and "+" means increasing.

5.1. Technical Efficiency of Bank Branches of Agribank Dak Lak

Table 4 indicates that branches receiving an efficiency value of 1 are optimal or efficient. Four branches achieved efficiency in 2020 and received "excellent" ratings. One branch, nevertheless, attained this level in both 2021 and 2022. This fact indicates that the pandemic adversely affected the agribank's operations. In 2021, the performance of the branches was deemed poor. However, the

performance of all branches was considered "moderate" in 2020 and 2022.

By effectively managing the resources provided, it is possible to enhance the performance of all branches by 24.4 percent in 2022, 35.2 percent in 2021, and 24.4 percent in 2020. In other words, without adjusting its inputs, all branches of Aribank Dak Lak can increase their profits by 24% in 2020, 35.2 percent in 2021, and 29.4 percent in 2022 by using their inputs better.

5.2. Total Factor Productivity Improvement of Branches of Agribank Dak Lak

The outcomes of estimating the change in total factor productivity across all branches of Dak Lak Agribank are displayed in Table 5. Overall, the operational performance of branches is unfavorable because of the severe repercussions of the COVID-19 epidemic. Notably, in 2021 and 2022, the total factor productivity of most branches declined. Only two branches had TFP expanded in 2021. Compared to 2020, the TFP of all branches in 2021 fell by nearly half, to 53.5 percent. By 2022, performance will still be reducing at 90.1% compared to 2021. During the entire duration, the TFP dropped by 69.5 percent. This somewhat modest level indicates that Dak Lak Agribank encountered operational challenges throughout the period. Two branches, Buon Don and Tay Nguyen University, have done admirably due to their TFP increase in 2022.

5.2. Comparision of Agribank Performance Evaluation with DEA Method

Many disparities arise when contrasting the performance evaluation method applied at Dak Lak Agribank with those presented in this research. One of the advantages of the traditional evaluation method is that it is easy to understand. The intuitive nature of the assessment is enhanced by the discreteness based on the ten criteria in Table 2. Affiliates might leverage this intuitiveness to improve the indicators for interest to attain a higher evaluation result. One significant drawback of the conventional evaluation method

employed by Agribank Dak Lak is its lack of synthetic nature, which prevents it from providing precise suggestions about the input and output of branches. This rating system does explicitly not impose significant ramifications on bank administrators.

Although more abstract, the DEA-based assessment method delivers a wealth of managerial information. First, it enables managers to assess the efficiency with which branches have utilized resources. Does resource reduction improve productivity? Furthermore, the manager is informed of the overall growth or decline in performance and efficiency of the branches. These conclusions are not only general; instead, they are incredibly branch specific. Thus, implications for Agribank Dak Lak's CEO are essential for decision-making.

6. CONCLUSION

This study constructed a performance model to gauge the relative efficiency and potential for total factor productivity improvement within bank branches. The juxtaposition of this model with the conventional evaluation method employed by Agribank Dak Lak served as a lens through which strengths and weaknesses were seen, paving the way for insightful managerial implications. Considering these discernments, a trove of managerial implications surfaces for Agribank Dak Lak. Notably, the study accentuates the importance of embracing efficient management practices and strategic paradigms to enhance performance in the coming years substantially. The prescription for Agribank Dak Lak's optimization lies in a targeted approach—directing attention to branches with suboptimal productivity, thereby identifying and capitalizing on opportunities for improvement. This strategic focus holds the key to elevating the overall performance of Agribank Dak Lak and fortifying its competitive stance within the dynamic landscape of the banking sector.

ĐÁNH GIÁ HIỆU QUẢ HOẠT ĐỘNG VÀ CẢI THIỆN NĂNG SUẤT NHÂN TỐ TỔNG HỢP CỦA CÁC CHI NHÁNH AGRIBANK CẤP HUYỆN TẠI TỈNH ĐẮK LẮK

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TÓM TẮT

Mục tiêu chính của nghiên cứu này là xây dựng một mô hình đánh giá hiệu quả tương đối và tiềm năng cải thiện năng suất nhân tố tổng hợp (TFP) của các chi nhánh ngân hàng. Bằng cách so sánh mô hình này với phương pháp đánh giá truyền thống được Agribank Đắk Lắk sử dụng, nghiên cứu nhằm mục đích xác định điểm mạnh, điểm yếu và đưa ra những hàm ý quản lý từ sự so sánh đó. Những hiểu biết sâu sắc về hiệu quả hoạt động của các chi nhánh đã được rút ra thông qua việc đánh giá các điểm hiệu quả. Kết quả cho thấy, với việc cải thiện quản lý và tận dụng các yếu tố đầu vào sẵn có, tất cả các chi nhánh đều có thể nâng cao hiệu quả hoạt động lên 24% vào năm 2020, 35,2% vào năm 2021 và 29,4% vào năm 2022 mà không cần thay đổi đầu vào. Tuy nhiên, đáng chú ý là do tác động của đại dịch COVID-19 và các điều kiện bất lợi, hầu hết các chi nhánh đều không thể tăng tổng năng suất từ năm 2020 đến 2022. Chỉ có hai chi nhánh, là Chi nhánh Đại học Tây Nguyên và Chi nhánh Buôn Đôn, đã cải thiện được Năng suất nhân tố tổng hợp (TFP) từ năm 2021 đến 2022. Căn cứ vào những phát hiện này, một số hàm ý quản lý có thể được rút ra cho Agribank Đắk Lắk.

Từ khóa: Chi nhánh ngân hàng, Hiệu quả hoạt động, Năng suất nhân tố tổng hợp, Phân loại JEL: L23, L25, G21.

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