EFFICIENCY OF BANK-LINKED ZAKAT INSTITUTIONS IN INDONESIA: A DEA APPROACH

Khoirun Nisak[1], M. Thoha Ainun Najib[2], Endah Setyowati[3]
UIN Kiai Ageng Muhammad Besari Ponorogo
[1]khoirunnisak@iainponorogo.ac.id, [2]thoha.ainun@iainponorogo.ac.id,
[3]endahsetyowati@iainponorogo.ac.id

Abstract: The remarkable potential of zakat in Indonesia has not been fully realized due to an optimal collection rate, necessitating more efficient management. One strategic step is the integration of zakat institutions with banking to leverage the network, technology, and governance of banks in enhancing the collection and distribution of zakat. However, the efficiency performance of zakat institutions affiliated with banks is still rarely studied using a quantitative approach. This study aims to measure the efficiency of zakat management institutions affiliated with banks in Indonesia and compare their performance using the Data Envelopment Analysis (DEA) method. This research utilizes data from the period 2017–2023, with the unit of analysis being two bank zakat institutions: Baitul Maal Muamalat (BMM) and YBM BRILiaN. Input variables include annual salaries, operational costs, and socialization costs, while output variables consist of collected and distributed zakat funds. The analysis was conducted using the DEA BCC (Banker, Charnes, Cooper) and CCR (Charnes, Cooper, Rhodes) models to identify technical and scale efficiency. The research results show that Baitul Maal Muamalat (BMM) was only at an optimal efficiency level during the 2017–2019 period, while its performance declined in the 2020–2022 period. On the other hand, YBM BRILiaN consistently achieved full efficiency throughout 2021–2023. These findings provide an empirical basis for managerial improvements and the strengthening of the capacity of bank zakat institutions, while also reinforcing the integration of zakat with the banking system in Indonesia.

Keywords: Zakat institutions, Data Envelopment Analysis, Islamic social finance, Banking integration.

INTRODUCTION

Zakat stands as one of the central pillars of Islam. Beyond its religious dimension, zakat serves as a redistributive mechanism intended to narrow income inequality, reduce poverty, and strengthen the economic position of marginalized groups. Due to this dual role, zakat has been increasingly discussed not only as a matter of faith but also as a vital instrument within the broader landscape of Islamic social finance (Al-Ayubi et al., 2018). In Indonesia, home to the largest Muslim population in the world, the potential of zakat is substantial. Estimates from BAZNAS (2024) suggest that zakat could reach more than IDR 327 trillion annually. Yet, the amount actually collected remains below five percent of this figure, a persistent gap that raises questions about institutional performance and management capacity.

Scholars often point to recurring institutional challenges as one explanation for this underperformance. Administrative costs tend to be high. Digital platforms are not fully embraced. Donor engagement strategies remain weak (Muslimah & Akbar, 2021; Widyaningrum, 2018). These factors prevent zakat institutions from reaching the scale that would allow them to function optimally. Against this backdrop, efficiency analysis becomes highly relevant. Methods such as *Data Envelopment Analysis* (DEA) provide a systematic way to evaluate how inputs such as staff salaries, outreach expenses, or administrative resources are translated into tangible outcomes. These outcomes are the

amount of zakat collected and distributed (Rustyani & Rosyidi, 2019; Rusydiana & Al Farisi, 2016).

Although DEA has been applied in numerous studies of zakat institutions, most of these investigations focus on national or local organizations (Chen & Zhu, 2019; Fakhri et al., 2023; Rusydiana & Al Farisi, 2016). Much less attention has been given to zakat bodies connected to the banking sector. Wahyudi & Susetyohadi (2021), for instance, examined zakat entities linked to Islamic banks. Their analysis did not extend beyond that. To date, there has been no comparative study that brings together zakat institutions attached to both Islamic and conventional banks. Considering the growing integration of zakat with formal finance, this represents a significant gap in the literature.

The urgency of such research is not merely academic. Closer integration of zakat with banking systems could expand the donor base through bank networks, accelerate the use of digital payment platforms, and improve monitoring under regulatory frameworks (Pimada, 2024). Insights from efficiency benchmarking would therefore be valuable for regulators such as BAZNAS and OJK, as well as for banks seeking to position zakat within their financial services. At a broader level, findings from this type of study can guide zakat institutions in refining their management practices so that zakat can contribute more effectively to inclusive development.

This study responds to that gap by examining the efficiency of two bank-affiliated zakat institutions in Indonesia: Baitul Maal Muamalat (BMM), which operates under Bank Muamalat as an Islamic bank, and Yayasan Baitul Maal BRILiaN (BRILiaN), which is

associated with Bank Rakyat Indonesia, a conventional bank. Employing DEA with CCR, BCC, and scale efficiency models over the period 2017–2023, the study seeks to compare the relative performance of these two institutions and to identify the main sources of inefficiency. Ultimately, the research aims to provide evidence-based recommendations that may enhance institutional governance, widen the reach of zakat collection, and reinforce the role of zakat within the national financial system.

METHODS

The DMUs (decision-making units) in this research are two zakat institutions connected to Islamic banking in Indonesia, Baitul Maal Muamalat (BMM) and Yayasan Baitul Maal BRILiaN (BRILiaN). Their efficiency is evaluated using Data Envelopment Analysis (DEA). Depending on full data availability, the research period spans the years 2017–2022 for BMM and 2021–2023 for BRILiaN.

DEA is a non-parametric technique that assesses the relative efficiency of decision-making units (DMUs) using numerous input and output variables. This study examines efficiency using two conventional DEA models: The CCR model (Charnes, Cooper, and Rhodes) measures overall technical efficiency under the assumption Constant Returns to Scale (CRS) (Charnes et al., 1978), while the BCC model (Banker, Charnes, and Cooper) measures pure technical efficiency under the assumption of Variable Returns to Scale (VRS) (Cooper et al., 2007). Comparing CCR dan BCC scores enables the calculation of scale efficiency, which helps identify whether inefficiency arises from managerial factors or the scale of operations.

Sherman and Zhu (2006) formulated the DEA formula in mathematics as follows:

$$\frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}}$$

Where:

j number of DMUs

Y_{rj} the sum of output r produced by DMU j

X_{rj} number of inputs i used by DMU j

i the number of inputs used by the DMU

r the number of outputs produced by the DMU

U_r the weight assigned by DEA to output r

V_i the weight assigned by DEA to input i

m   number of inputs

s number of outputs

The variables selected for the DEA model are grounded in the operational structure of zakat management and are consistent with existing literature on Islamic social finance efficiency studies. The DEA model has three input variables and two output variables, as shown in Table 1. This study focuses on two zakat institutions linked with banks: Baitul Maal Muamalat (BMM) and Yayasan Baitul Maal BRILiaN. The decision is based on the availability of audited financial records with consistent and comparable data throughout the study period. Despite the small sample size, these two institutions are

considered representative cases for investigating efficiency in both Islamic and traditional banking contexts.

Table 1. Description of Input and Output Variables in the DEA Model

No	Variable Name	Type	Description	Source
1	Amil Salary	Input	Personnel expenditure reflecting human resource capacity	Al-Ayubi, et al. (2018) Atiya et al. (2020) Ryandono et al. (2023)
2	Socialization Cost	Input	Costs related to donor engagement and public awareness	Al-Ayubi, et al. (2018) Atiya et al. (2020) Ryandono et al. (2023)
3	Operational Cost	Input	Non-salary expenses such as administration, logistics, and utilities	Al-Ayubi, et al. (2018) Atiya et al. (2020) Ryandono et al. (2023)
4	Zakat Funds Collected	Output	Total funds raised from zakat contributors	Al-Ayubi, et al. (2018) Atiya et al. (2020) Ryandono et al. (2023)
5	Zakat Funds Distributed	Output	Total zakat distributed to eligible beneficiaries	Al-Ayubi, et al. (2018) Atiya et al. (2020) Ryandono et al. (2023)

Source: data processed by the author

Table 1 presents the input and output variables used in the DEA model to evaluate the efficiency of zakat institutions. Inputs represent

the resource utilization in operations, while outputs reflect the institution's effectiveness in mobilizing and distributing zakat funds. The efficiency scores are generated using OSDEA, an open-source software specifically designed for DEA computation. The results are presented as scores ranging from 0 to 1, where a score of 1 indicates that the institution operates on the efficiency frontier for the given period.

RESULT AND DISCUSSION
RESULT

Based on the established criteria-namely, zakat organizations affiliated with banking institutions that have consistently published financial statements between 2017 and 2023 and report comparable input and output indicators, this study focuses on two institutions: Baitul Maal Muamalat (BMM) and Yayasan Baitul Maal BRILiaN (BRILiaN). Both organizations fulfill the requirements for Data Envelopment Analysis (DEA) and are included in the efficiency assessment presented in the following figure.

Table 1 shows the efficiency scores for the BCC, CCR, and scale efficiency (SE) models. The table indicates that BMM was able to maintain full efficiency (1.000) across all models for the first three years (2017–2019). However, since 2020, there has been a sharp decline. The BCC BMM score fell to 0.501, while the CCR score dropped to 0.468. This decline continued until 2021, with BCC scoring 0.302 and CCR 0.275. Although there was a partial recovery in 2022, with the BCC score increasing to 0.397 and CCR to 0.366, these figures remained far from the efficiency frontier. Conversely,

BRILiaN, which has only been included in the analysis period since 2021, has shown very consistent performance. For three consecutive years (2021–2023), BRILiaN achieved full efficiency (1.000) in both the BCC, CCR, and SE models.

Table 1. Efficiency Scores and Scale of Zakat Institutions (2017-2023)

No	DMU	BCC Score	CCR Score	Scale Efficiency (SE)
1	BMM 2017	1.000	1.000	1.000
2	BMM 2018	1.000	1.000	1.000
3	BMM 2019	1.000	1.000	1.000
4	BMM 2020	0.501	0.468	0.934
5	BMM 2021	0.302	0.275	0.911
6	BMM 2022	0.397	0.366	0.922
7	BRILiaN 2021	1.000	1.000	1.000
8	BRILiaN 2022	1.000	1.000	1.000
9	BRILiaN 2023	1.000	1.000	1.000

Source: data processed by the author

DEA analysis is conducted using two models: BCC and CCR. The BCC model measures pure technical efficiency, while the CCR model measures efficiency assuming constant returns to scale. Comparing these two models provides a more comprehensive picture of the sources of inefficiency, whether they stem from technical or managerial limitations, or from suboptimal operating scale.

The development of the BCC efficiency score is visualized in Figure 1. A clear pattern of decreasing BMM is evident, starting in 2020, in contrast to BRILiaN, which consistently scores 1.000.
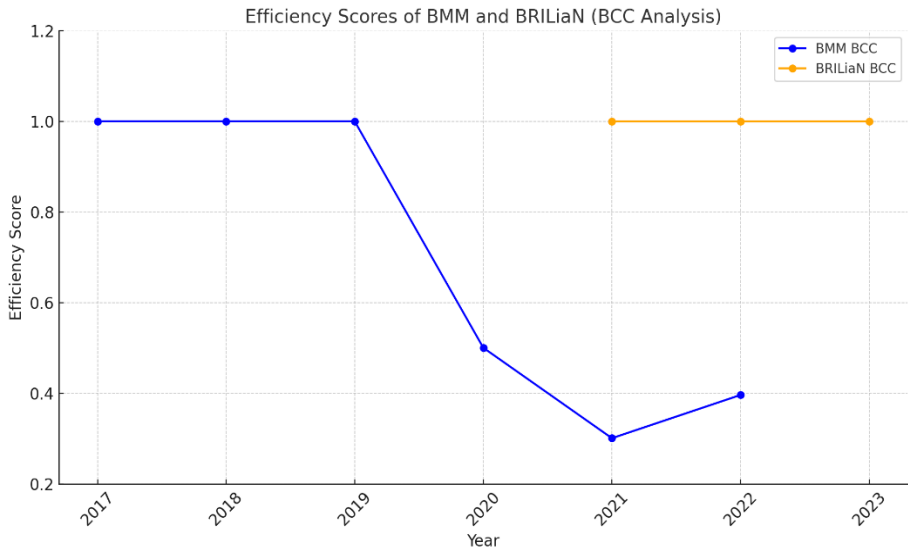
Figure 1. BCC Efficiency of BMM and BRILiaN from 2017 to 2023
Source: processed by the author

The results of the CCR model shown in Figure 2 confirm the same trend. BMM was fully efficient in the early period, but after 2019, it experienced a sharper decline compared to the BCC model. BRILiaN once again showed perfect and consistent scores.
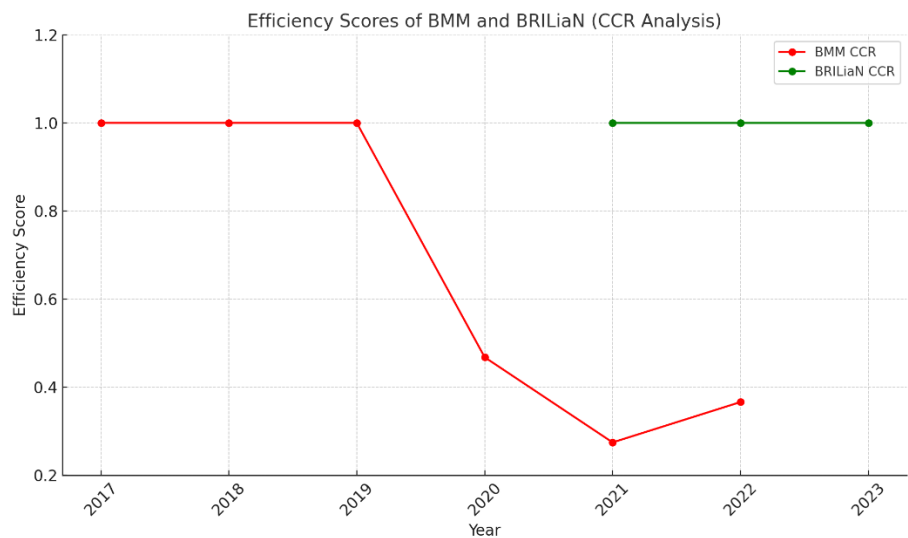
Figure 2. CCR Efficiency of BMM and BRILiaN from 2017 to 2023

Source: processed by the author

To compare the two models, Figure 3 presents the BCC and CCR scores simultaneously. It can be seen that the CCR score for BMM is always lower than BCC, indicating scale efficiency issues in addition to technical problems.
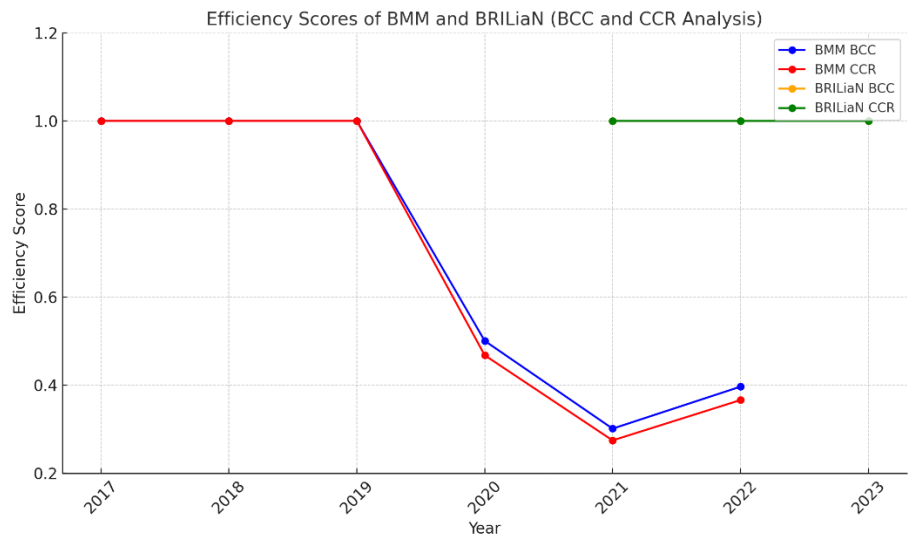
Figure 3. Comparative Efficiency Scores of BMM and BRILiaN Based on BCC and CCR Models (2017-2023)

Source: processed by the author

A more comprehensive analysis is shown in Figure 4, where BCC, CCR, and Scale Efficiency (SE) are combined. This result confirms that BMM's inefficiency after 2019 stems from a combination of technical and scale issues. Conversely, BRILiaN continued to demonstrate perfect efficiency across all indicators.
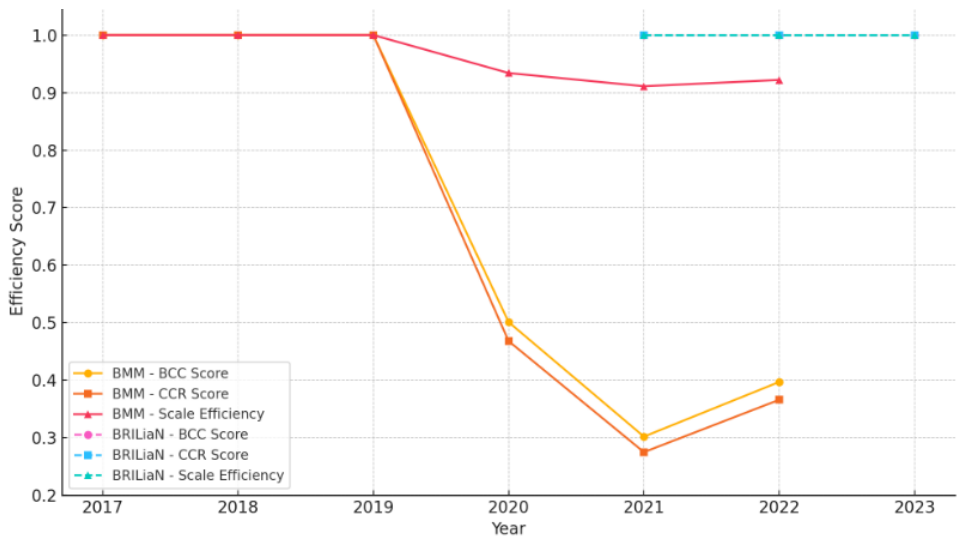

Figure 4: Efficiency Scores of Zakat Institutions (BCC, CCR, SE)

Source: data processed by the author

Figure 5 presents a network visualization of peer group relationships among the DMU based on the BCC model. Each node represents a zakat institution in a specific year, while directed edges indicate that a particular DMU (origin node) refers to another DMU (target node) as its efficiency benchmark of the peer group. The layout demonstrates the interconnectedness of reference patterns across the sample.

The visualization shows that BRILiaN 2023 is the most frequently referenced peer, receiving incoming links from multiple underperforming DMUs, including BMM 2020, BMM 2021, BMM 2022, BRILiaN 2021, BRILiaN 2022, and others. BMM 2017 and BMM 2019 are also observed to be common references, albeit to a lesser extent. In contrast, DMUs such as BMM 2021 and BMM 2020 primarily function as referencing units, drawing upon more efficient peers rather than serving as benchmarks themselves.
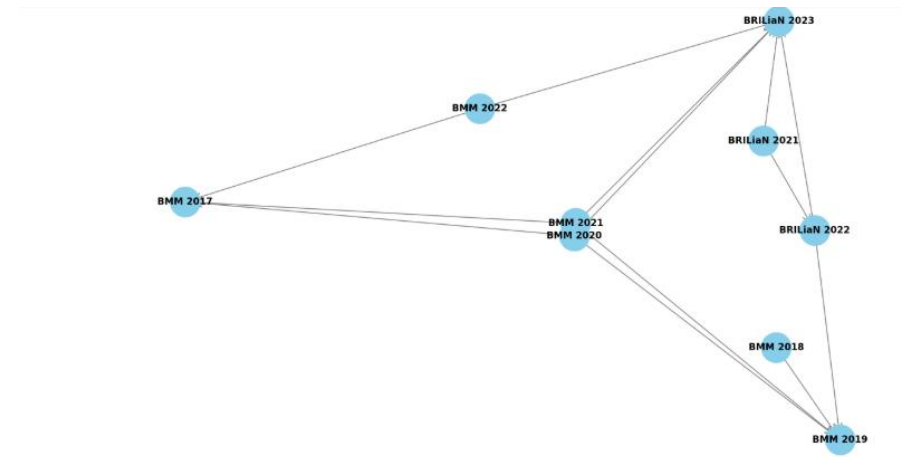

Figure 5. Peer Group Relationships among Zakat Institutions
Source: data processed by the author

Figure 5 shows how BRILiaN 2023 plays a crucial role in the BCC model's efficiency benchmarking methodology. This DMU was regularly mentioned as a reference by other underperforming units, indicating its consistency and operational robustness. Research indicates that peer-based learning can significantly improve institutional performance. Ryandono et al. (2023) discovered that using DEA-derived peer groups can assist zakat organizations in identifying

operational techniques, such as staff training, digital fundraising, or consumer targeting, that can be reproduced to increase efficiency.

Additional insights from Fajar et al. (2023) emphasize the importance of identifying and learning from peer institutions during crises. Their two-stage DEA and Tobit regression study on zakat organizations across Indonesia (2017-2021) revealed that efficiency was largely driven by performance relative to peers and that institutional size and branch network significantly influenced outcomes. This aligns with the findings indicating frequent referencing to BRILiaN 2023, it is not only a consistency marker for high managerial efficiency but also a practical performance benchmark during and after disruptions such as the COVID-19 pandemic.

DISCUSSION

The results of the DEA analysis show a significant difference in the efficiency performance of BMM and BRILiaN throughout the study period. BMM, which was initially at full efficiency in 2017–2019, experienced a significant decline since 2020. This decline coincides with the COVID-19 pandemic, which limited face-to-face interactions with donors and slowed down the process of zakat distribution. However, the difference in scores between the BCC and CCR models also indicates that the inefficiency of BMM is not only caused by external factors, but is also related to the suboptimality of the scale of operations. This means that in addition to managerial and technical constraints, BMM faces limitations in expanding its institutional capacity, making it unable to maintain efficiency when facing external shocks. The partial recovery that occurred in 2022

indicates adaptation efforts, but it is not yet significant enough to restore performance to previous levels.

Conversely, BRILiaN demonstrates full efficiency consistency across all models and throughout the observation period. This condition reflects strong structural support from Bank Rakyat Indonesia as the parent institution. A wide customer network, established digital infrastructure, and more professional institutional governance have enabled BRILiaN to maintain efficiency performance even during crisis periods. This stability indicates that zakat institutions affiliated with conventional banks have a competitive advantage in terms of scale and management, making them more resilient to external challenges compared to zakat institutions affiliated with Islamic banks.

The comparison of these two institutions confirms that the form of banking affiliation affects the performance of zakat institutions. BMM, which is related to Islamic banks, is more susceptible to a decline in efficiency, while BRILiaN, which is related to conventional banks, has consistently maintained its efficiency. This finding expands on previous research, such as Wahyudi & Susetyohadi (2021), which only examined zakat institutions in Islamic banks, by adding a new perspective on the differences in zakat performance in conventional banks. On the other hand, these results also support Widyaningrum's (2018) finding that limited managerial and institutional capacity is a major obstacle to the efficiency of zakat in Indonesia.

Based on these findings, several strategic recommendations can be proposed to improve the efficiency of zakat institutions, particularly for BMM. First, budget allocation needs to be optimized by reducing operational costs that are disproportionate to fundraising results. The

use of more cost-effective digital channels, such as QRIS, e-wallets, and integration with electronic payment platforms, has proven to increase donor engagement while reducing inefficiencies (Ali, 2024). Second, investment in digital transformation is essential to strengthen transparency and accountability. An end-to-end digital platform for zakat collection, recipient verification, and real-time distribution tracking can improve technical efficiency while building public trust (Ali, 2024).

Third, the scale inefficiency experienced by BMM indicates the need for organizational capacity adjustments. Rationalizing branch offices, restructuring the number of employes, and adjusting operational budgets to be proportional to the potential zakat collected can prevent inefficient operational scales. Fourth, institutional capacity building is an important foundation. The lack of standard operating procedures (SOPs) and weak managerial capabilities are recurring factors that keep BMM below the efficiency frontier. Benchmarking against efficient institutions like BRILiaN 2023 and consistent implementation of SOPs, along with intensive training in digital technology and financial reporting, can improve long-term performance (Ardiani, 2023).

BRILiaN's consistent efficiency underscores the benefits of integrating zakat into the banking system. Structural support in the form of a broad network, digital infrastructure, and regulatory governance makes this institution relatively resilient to external shocks, including pandemics. This indicates that bank-based zakat offers a competitive advantage, both in terms of fund mobilization and maintaining optimal operational scale. This integration aligns with

Pimada's (2024) findings that zakat collected through formal banking and fintech channels can accelerate poverty reduction and improve household economic resilience.

Furthermore, zakat-bank collaboration also allows for more productive utilization of zakat. Not limited to consumption needs, zakat distributed through bank financing mechanisms can be directed toward empowering micro-enterprises, skills training, and strengthening productive assets. This strategy is consistent with the objectives of Islamic law because it is oriented toward improving the welfare and economic sustainability of society (Fakhri et al., 2023). Thus, integrating zakat institutionalization into the banking framework not only improves efficiency but also expands the function of zakat as an instrument for inclusive development.

The limitation of this research is the sample size, which only includes two bank zakat institutions due to limitations in financial statement data. Nevertheless, both institutions are representative in providing a comparative overview of zakat affiliated with Islamic and conventional banks. Going forward, regulations need to mandate that all zakat management institutions consistently publish audited financial reports, as mandated by Law Number 23 of 2011. This step will not only expand the research database but also strengthen the accountability and transparency of zakat institutions in Indonesia. Additionally, future studies could expand the scope by adding non-financial factors such as the number of zakat collectors, the number of service offices, and the digitalization of zakat services. The addition of these variables will provide a more comprehensive picture of the efficiency of bank-based zakat institutions.

CONCLUSION

This research shows that there is a significant difference in efficiency performance between zakat institutions affiliated with Islamic banks and conventional banks. BMM, which is connected to Bank Muamalat, has experienced a decline in efficiency since 2020 due to a combination of external factors (the COVID-19 pandemic) and internal factors (scale inefficiency and managerial limitations). Conversely, BRILiaN, affiliated with Bank Rakyat Indonesia, successfully maintained full efficiency throughout the analysis period, thanks to structural support including an extensive network, digitalization, and professional governance. This finding confirms the importance of integrating zakat with the banking system to maintain institutional stability and strengthen the role of zakat in inclusive development.

Theoretically, this research confirms that DEA can be used as a strategic tool for Islamic social financial governance. By analyzing technical, scale, and inter-agency efficiency comparisons, DEA enables researchers and regulators to identify structural weaknesses, design managerial strategies, and establish more objective zakat performance standards. Thus, this research not only provides empirical evidence regarding the performance of BMM and BRILiaN, but also expands the theoretical framework on how efficiency can be used as an indicator of good zakat governance.

From a policy perspective, the results of this study provide recommendations for zakat institutions to strengthen managerial capacity, expand the donor base through digitalization, and adjust operational scale to remain efficient. For regulators like BAZNAS and

OJK, this study underscores the need to promote the zakat-bank integration model and establish national zakat efficiency standards. The limitation of this research lies in the sample size, which only includes two bank-based zakat institutions due to the limited availability of financial statement data. Therefore, future studies could expand their scope by including more zakat institutions and adding non-financial factors such as the number of zakat collectors, the number of service offices, and the digitalization of zakat services. Thus, future research will be able to provide a more comprehensive picture of the efficiency of bank-based zakat institutions in Indonesia.

REFERENCES

Al-Ayubi, S., . A., & Possumah, B. T. (2018). Examining the Efficiency of Zakat Management: Indonesian Zakat Institutions Experiences. *International Journal of Zakat*, *3*(1), 37–55. https://doi.org/10.37706/ijaz.v3i1.66

Ali, M. M. (2024). The Role of Digital Technology in Facilitating Zakat Collection and Distribution in the Modern Era Peran Teknologi Digital dalam Memudahkan Pengumpulan dan Distribusi Zakat di Era Modern. *Proceedings OnInternational Conference On Islam EducationmManagement and Sharia Economics*, 651–664. https://prosiding.stainim.ac.id/index.php/prd/article/view/570/304

Ardiani, N. (2023). Efficiency and Productivity of Zakat Management Organization Before and During Pandemic Covid-19. *Indonesian Journal of Cultural and Community Development*, *14*(2), 1–12.

Atiya, N., Widiastuti, T., Cahyono, E. F., Zulaikha, S., & Mawardi, I. (2020). A Techno-Efficiency Analysis of Zakat Institutions in Indonesia. *International Journal of Zakat*, *5*(3), 30–43. https://doi.org/10.37706/ijaz.v5i3.249

BAZNAS. (2024). *OUTLOOK ZAKAT INDONESIA 2024*. 1–103. www.baznas.go.id;

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. In *European Journal of Operational Research* (Vol. 2, Issue 6). https://doi.org/10.1016/0377-2217(78)90138-8

Chen, K., & Zhu, J. (2019). Scale efficiency in two-stage network DEA. *Journal of the Operational Research Society*, *70*(1), 101–110. https://doi.org/10.1080/01605682.2017.1421850

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). Data envelopment analysis: A comprehensive text with models, applications, references and DEA-solver software: Second edition. In *Data Envelopment Analysis: A Comprehensive Text with Models,*

Applications, References and DEA-Solver Software: Second Edition. https://doi.org/10.1007/978-0-387-45283-8

Fajar, M., Prakoso, D., Kurnia, A. I., & Ikhwan, I. (2023). Efficiency of Indonesian Zakat Institutions in Times of Covid-19: A Two-Stage DEA Analysis. *International Journal of Zakat*, *8*(2), 2023–2067.

Fakhri, M. Y., Bahri, E. S., & Wulan, M. (2023). Efficiency Of Zakat Institutions In Indonesia During 2017-2021: An Application Of Data Envelopment Analysis. *Jurnal Akuntansi Dan Keuangan Islam*, *11*(1), 101–135. https://doi.org/10.35836/jakis.v11i1.456

Muslimah, A. I., & Akbar, N. (2021). The Efficiency of Zakat Collection and Distribution in Indonesia. *JESI (Jurnal Ekonomi Syariah Indonesia)*, *11*(1), 28. https://doi.org/10.21927/jesi.2021.11(1).28-40

Pimada, N. P. and L. M. (2024). Zakat vs. Islamic Banking: Examining the Differential Impact on Inclusive Growth in Indonesia. *Journal of Economic Cooperation and Development*, *4*, 235–269.

Rustyani, S., & Rosyidi, S. (2019). Measurement of Efficiency and Productivity of Amil Zakat Institutions in Indonesia By Using. *Jurnal Ekonomi Syariah Teori Dan Terapan*, *6*(2), 270–287.

Rusydiana, A. S., & Al Farisi, S. (2016). The Efficiency of Zakah Institutions Using Data Envelopment Analysis. *Al-Iqtishad: Journal of Islamic Economics*, *8*(2), 213–226. https://doi.org/10.15408/aiq.v8i2.2876

Ryandono, M. N. H., Widiastuti, T., Cahyono, E. F., Filianti, D., Qulub, A. S., & Al Mustofa, M. U. (2023). Efficiency of zakat institutions in Indonesia: data envelopment analysis (DEA) vs free disposal hull (FDH) vs super-efficiency DEA. *Journal of Islamic Accounting and Business Research*, *14*(8), 1344–1363. https://doi.org/10.1108/JIABR-05-2021-0144

Sherman, H. D., & Zhu, J. (2006). Service productivity management: Improving service performance using data envelopment analysis (DEA). In *Service Productivity Management: Improving Service*

Performance using Data Envelopment Analysis (DEA). https://doi.org/10.1007/0-387-33231-6

Wahyudi, R., & Susetyohadi, A. (2021). The efficiency of Amil Zakat Institutions (LAZ) in Indonesian Islamic Banks: Data Envelopment Analysis Approach. *Madania: Jurnal Kajian Keislaman*, 25(2), 169. https://doi.org/10.29300/madania.v25i2.4978

Widyaningrum, N. (2018). Efisiensi Organisasi Pengelola Zakat Nasional di Indonesia dengan Metode Data Envelopment Analysis. *Jurnal Pendidikan Ekonomi*, 7(4), 316–325. https://doi.org/10.20885/ncaf.vol5.art41