

How Efficient are Islamic Banks in Indonesia, Saudi Arabia, and the United Kingdom?

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Abstract. *This research aims to analyze the efficiency level of 13 Islamic Banks in Indonesia, Saudi Arabia, and the United Kingdom from 2015 to 2019. The calculation of the efficiency level in this study is relative, not absolute. This study uses the Data Envelopment Analysis (DEA) method and source data from Bankscope and Bank Focus. This research consists of 3 input variables that are Total of Assets (X1), Staff Expenses (X2) and Total Deposit (X3), and 2 Output that is Income (Y1) and Loan (Y2). This research finds that the overall efficiency level of 13 Islamic banks in Indonesia, Saudi Arabia, and the United Kingdom are fluctuating. According to the result, the Islamic banks in Saudi Arabia is more efficient than in Indonesia and the United Kingdom. There are some inefficient variables—the solution for this inefficiency problem achieve by employing managerial simulation generated by DEA. This study implies that Islamic banks should reduce wasteful variables and optimize the variables that improve the efficiency.*

Keywords: *Islamic bank, efficiency, stability, data envelopment analysis (DEA)*

JEL Classification: C1, F30, G20, G21

Abstrak. *Penelitian ini bertujuan untuk menganalisis tingkat efisiensi 13 Bank Syariah di Indonesia, Arab Saudi, dan Inggris dari 2015 hingga 2019. Perhitungan tingkat efisiensi dalam penelitian ini adalah relatif, tidak absolut. Penelitian ini menggunakan metode Data Envelopment Analysis (DEA) dan sumber data dari website Bankscope dan Bankfocus. Penelitian ini terdiri dari 3 variabel input yaitu Total Aset (X1) Biaya Staf (X2) dan Total Deposit (X3); dan 2 Output adalah Pendapatan (Y1) dan Pinjaman (Y2). Penelitian ini menemukan bahwa tingkat efisiensi bank syariah secara keseluruhan di Indonesia, Arab Saudi, dan Inggris berfluktuasi. Berdasarkan hasilnya, secara keseluruhan bank syariah di Arab Saudi lebih efisien daripada di Indonesia dan Inggris. Ada beberapa variabel yang tidak efisien. Solusi untuk masalah inefisiensi ini dapat dicapai dengan menggunakan simulasi manajerial yang dihasilkan oleh DEA. Hasil dari penelitian ini bisa dijadikan acuan di tahun berikutnya bagi bank syariah untuk mengurangi variabel yang boros dan mengoptimalkan yang masih kurang untuk meningkatkan efisiensi.*

Kata Kunci: *bank syariah, efisiensi, stabilitas, analisis data envelopment (DEA)*

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Introduction

Many banking transformations have taken place from the start of standard human resource operations worldwide in recent years. This transformation has made a significant contribution to the performance of banks in the world. A functioning and healthy credit is not only crucial for the process of improving the economy of various markets but also can improve efficiency and operations, and can increase economic growth. Conversely, unhealthy banking will experience financial difficulties. Therefore, research into the factors that determine banking performance has attracted academic researchers and banking improvement.

According to Farrell (1957), to measure a bank's performance can be seen from the efficiency level, the company's efficiency consists of two components: technical efficiency and allocative efficiency. Although the conventional financial system still dominates worldwide, the Islamic banking system is quite interesting to researchers and banking practitioners' attention, and this evidence by the Islamic Banks that survived the crisis. Many countries (for example, the United Kingdom) have adopted the Islamic banking model because inherent characteristics are seen through real and transparent economic transactions free of interest, uncertainty, and gambling, and supported by assets (Belouafi & Chachi, 2014). Since the 2007-2009 financial crisis, many banking institutions have gone bankrupt, and many regulatory reforms are enacted. The 2008 subprime mortgage crisis found potential weaknesses of the conventional banking system and appeared to reveal Islamic banks (Mollah & Zaman, 2015).

When the 2008 global crisis, many financial institutions that collapsed, even financial institutions as big as Lehman Brothers, who were more than 100 years old, were not saved. However, it turns out that Islamic financial institutions can survive and even continue to grow amid the crisis, which is one reason why investment transactions in the Islamic financial system base on clear and real assets. Fourth, Islamic banks are free from the negative spread, which is the negative difference between deposit interest and loan interest. In other words, the interest that must be paid by the Bank to deposit customers is far greater than the interest on loans. This condition contributed to the banking sector is stuck in 1998. On the other hand, Islamic banks that are more profit-oriented are certainly free from the negative spread.

However, it does not mean that Islamic banking is without risk, if management does not work well, then there is a possibility that problems can occur. If there is a mismanaged Islamic bank, it will damage the public's view of the image of Islamic banking, the plan to develop Islamic banking can also disrupt, and its impact can worsen the world economy, this is where the need for research on factors that affect the overall performance of Islamic banking in the world.

In a study conducted by Sufian & Kamarudin (2015), examining Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) of domestic Islamic banks in Southeast Asia, namely Malaysia, Indonesia, and Brunei, compared to Foreign Islamic Banks from the Middle East in period 2006-2014. The study found that domestic Islamic

banks are more efficient than foreign Islamic banks with a significance level of 1% and 5%. Overall domestic and foreign Islamic banks are less efficient in terms of operational costs, compliance with Islamic law, and double taxation to reduce Islamic banks' efficiency. (Detail shows in Table 1).

Table 1. Efficiency Score of Domestic Islamic Banks and Foreign Islamic Banks

No	Domestic Islamic Bank	TE	PTE	SE	No.	Foreign Islamic Bank	TE	PTE	SE
1	Affin Islamic Bank Berhad	0.752	0.762	0.986	1	Al Rajhi Banking & Investment Corporation (Malaysia) Berhad	0.630	0.712	0.833
2	Alliance Islamic Bank Berhad	0.965	1.000	0.965	2	Asian Finance Bank Berhad	0.487	0.750	0.668
3	AmlIslamic Bank Berhad	0.949	0.978	0.970	3	HSBC Amanah Malaysia Berhad	0.838	0.901	0.932
4	Bank Islam Brunei Darussalam Berhad	0.478	0.528	0.904	4	Kuwait Finance House (Malaysia) Berhad	0.770	0.876	0.872
5	Bank Islam Malaysia Berhad	0.897	0.974	0.909	5	OCBC Al-Amin Bank Berhad	0.921	0.945	0.975
6	Bank Muamalat Malaysia Berhad	0.792	0.856	0.918	6	Standard Chartered Saadiq Berhad	0.722	0.905	0.814
7	CIMB Islamic Bank Berhad	0.899	0.950	0.947					
8	EONCAP Islamic Bank Berhad	0.831	0.892	0.928					
9	Hong Leong Islamic Bank Berhad	1.000	1.000	1.000					
10	Maybank Islamic Berhad	1.000	1.000	1.000					
11	PT Bank of BRI Sharia	0.652	0.805	0.815					
12	PT BJB Sharia	1.000	1.000	1.000					
13	PT Maybank Sharia Indonesia	0.938	1.000	0.938					
14	PT Bank of Mega Sharia	0.860	1.000	0.860					
15	PT Bank of Muamalat Indonesia Tbk	0.775	0.898	0.854					
16	PT Bank of Panin Sharia	0.766	0.886	0.876					
17	PT Bank of BNI Sharia	0.757	0.875	0.846					
18	PT Bank of Sharia Bukopin	0.689	0.867	0.789					
19	PT Bank of Sharia Mandiri	0.728	0.945	0.764					
20	PT Bank of Victoria Sharia	1.000	1.000	1.000					
21	PT BCA Sharia	0.598	0.914	0.678					
22	Public Islamic Bank Berhad	0.860	0.870	0.988					
23	RHB Islamic Bank Berhad	0.864	0.927	0.934					
	AVERAGE	0.828	0.905	0.910		AVERAGE	0.716	0.840	0.842

Islamic banking is still considered less competitive with conventional banking in terms of efficiency. In 2010-2012, Conventional Commercial Banks' efficiency reached 98.43%, while Islamic banks' efficiency only reached 82.1% (Wahab, 2015). According to Hidayat (2014), one of Islamic banking's operational efficiency determines a very high cost and initial investment. This condition affects the low profits distributed to depositors. Besides, Islamic Bank financing equivalent rates are relatively higher than conventional bank loans. This condition can lead to decreased interest in financing customers in Islamic Banks (Syafriada & Aminah, 2015).

An increasing Amount (US Dollar) of literatures observed evaluating Islamic banks' efficiency by adopting different methods, such as profit efficiency, output efficiency, and cost-efficiency. There are mainly two components of efficiency analysis, i.e., technical efficiency and allocative efficiency, where the former maximize output with a given level of input, and the latter minimizes input for achieving a given level of output. The existing literature in efficiency analysis can divide into a few categories that measure the efficiency of merely Islamic banks or conventional banks by focusing on single or multiple countries (Hassan et al., 2018).

Based on previous research in Table 2, almost discuss Islamic banking's efficiency is still only in areas with the same characteristics. On a global scale, it is essential to compare wider regions. The difference between this study and previous research in the area of coverage is that this study compares three countries with different regions and characters: Indonesia, United Kingdom, and Saudi Arabia. The study's selection in the study was because these three countries list in the Top Islamic Global Financial Report (2019). The selection of Islamic banks in this study is based on banks that already have a reputation in the country and banks whose majority ownership is owned by the state.

Islamic banks in Indonesia have the character of using a dual banking system. In 2019, Indonesia became the top-ranking country in the 2019 Islamic Financial Country Index. The factors that led to its rise to the top were high-level political support from President Joko Widodo himself, who led the Sharia National Economic and Financial Committee (KNEKS) to promote Islamic finance in this country. Indonesia is also the largest economy with the largest GDP in the Organization of the Islamic Conference and the country with the largest Muslim population in the world. The development of regulations is also beneficial for this country with the collaboration between the Financial Services Authority and Bank Indonesia.

Table 2. Recent Studies About the Efficiency of Islamic Banks

Studies	Sample Countiers	Research Method
Non-Comparative studies-Islamic Banks		
Noor & Ahmad (2012)	25 countries	DEA
Zainal & Ismail (2012)	Malaysia	DEA
Akhtar & Sadaqat (2011)	Pakistan	DEA
Non-Comparative studies-Conventional		
Ajlouni & Hmedat (2011)	Jordan	DEA
AlKhathlan & Malik (2010)	Saudi Arabia	DEA
Almazari & Almumani, (2012)	Saudi Arabia	Regression, ANOVA
Al-Jarrah (2007)	Jordan, Egypt, Saudi Arabia and Bahrain	DEA
Comparative studies-Islamic banks and conventional banks-Mixed Results		
Sillah & Harrathi (2015)	GCC Countries	DEA
Islamic banks are more efficient than conventional banks		
Ferhi & Chkoundali (2015)	MENA	SFA & DEA
Al-Muharrami (2008)	GCC; Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain	DEA
Johnes et al. (2013)	Bahrain, Bangladesh, Yamen, Bahrain, UAE, Turkey, Egypt, Sudan, Palestine, Indonesia, Tunisia, Jordan, Saudi Arabia, Kuwait, Qatar, Malaysia, Pakistan	MFA, DEA
Local Islamic banks are more efficient than foreign Islamic banks		
Zainal & Ismail (2012)	Malaysia	DEA
Islamic banks are less efficient than conventional banks		
Srairi (2010)	GCC: Saudi Arabia, UAE, Kuwait, Qatar, Oman, Bahrain	SFA
Saeed et al. (2013)	Pakistan	DEA
Hassan (2006)	MENA and ASEAN	DEA
No significant difference between efficiency of Islamic and conventional banks		
Bader et al. (2008)	Africa; Algeria, Tunisia, Senegal, Gambia and Sudan. Asia: Malaysia, Indonesia. Middle East: UAE, Bahrain, Kuwait, Lebanon, Iran, Jordan, Turkey, Saudi Arabia and, Yemen	DEA
Abdelkader & Salem (2013)	MENA countries	DEA
Hassan et al. (2018)	Saudi Arabia	DEA
Rozzani & Rahman (2013)	Malaysia	SFA
Comparing efficiency at full-fledged Islamic banks and Islamic branches of conventional banks		
Mokhtar et al. (2008)	Malaysia	DEA
Siddique & Rahim (2013)	Pakistan	DEA
Kamaruddin et al. (2008)	Malaysia	DEA

Studies	Sample Countiers	Research Method
Studies measuring efficiency of Islamic banks only		
Bahrini (2017)	MENA	DEA
Rosman et al. (2014)	Bahrain, Yemen, Iraq, Iran, Lebanon,Philippine, Indonesia, Palestine, Malaysia, Jordan, Turkey, Kuwait, Sudan, Brunei Darussalam, Saudi Arabia, Pakistan, United Arab Emirates, Singapore, Syria and Qatar	DEA
Rahim et al. (2013)	MENA and Asian countries	DEA
Sufian (2009)	Sixteen countries: Bahrain; Bangladesh; Egypt; Pakistan; Saudi Arabia; Turkey; UAE; Gambia; Indonesia; Iran; Kuwait; Malaysia; Qatar; South Africa; Sudan; Yemen	DEA
Viverita et al. (2007)	Thirteen countries: Algeria; UAE; Yemen; Bahrain; Bangladesh; Brunei; Egypt; Indonesia; Jordan; Kuwait; Malaysia; Qatar; Sudan;	DEA
Yudistira (2004)	18 Islamic Banks from MENA and ASEAN Countries	DEA
Hassan (2005 & 2006)	Twenty one countries: Brunei; Egypt; Gambia; Algeria; Bahamas; Bahrain; Bangladesh; Indonesia; Iran; Jordan; Kuwait; Lebanon; Malaysia; Mauritania; Qatar; Saudi Arabia; Sudan; Tunisia; UAE; UK; Yemen	DEA

Source: Data processed by the author

Islamic banks in Saudi Arabia have the characteristics of a country system in the form of a kingdom. Saudi Arabia is one of the world’s largest Islamic banking and financial markets. Saudi Arabia contributed significantly to Islamic financial assets totaling 1.6 trillion dollars. The Kingdom of Saudi Arabia is a member of the Gulf Cooperation Council, which has the most dominant economic conditions among the five other member countries, namely the United Arab Emirates, Qatar, Kuwait, Bahrain, and Oman. Saudi Arabia also received quite a lot of income apart from oil, namely from the Hajj and Umrah pilgrimage sector and the halal tourism sector, which was being developed to look for new income sources. Even so, Islamic banking is still control by a few people in Saudi Arabia. In 2019, Saudi Arabia was ranked 4th in the 2019 Islamic Financial Country Index.

The hallmark of Islamic banks in the UK is that although they are not Muslim-majority countries, the UK is the reference and center of Islamic world finance. The success and stability of the development of Islamic banks have attracted the attention of many parties. Several financial institutions in non-Muslim countries (such as United Kingdom, Luxembourg, and Switzerland) have also begun to accommodate the public and investors who want to carry out sharia financial transactions as long as they meet the requirements of the local financial authority. London’s popularity as a center for Islamic finance emerged in 2013 when Prime Minister David Cameron announced plans to develop the British city as the financial capital of Western Islam. In 2019, the UK was ranked 17th in the Islamic Financial Country Index 2019.

Therefore, it shows that previous research on efficiency measurement dominates by research with the same regional characteristics. This research tries to contribute this novelty by examining Islamic banks' efficiency in three countries with different regional characteristics but with the same Islamic bank category and size. Hence, the researcher seeks to compare Islamic banks' efficiency levels in Indonesia, Saudi Arabia, and the United Kingdom.

Methods

Farrell first introduced the Data Envelopment Analysis (DEA) in 1957 (Firdaus & Hosen, 2013). DEA is one of the analytical tools used to measure organizations' efficiency in profit-oriented and non-profit-oriented organizations where operations use several inputs to produce some outputs. The DEA technique makes efficient banking frontier sets and compares them with other inefficient banks. This technique does make scores or efficiency scores (Hidayat, 2014). Furthermore, the bank efficiency score limit between 0 and 1. The most efficient bank has a score of 1, while the bank with the most inefficient score is 0.

Some research has discussed Islamic banking's efficiency level, such as Firdaus & Hosen (2013) and Wahab (2015). Research with the DEA method is to use domestically and abroad, as Almunani (2013) examined the efficiency of Islamic banking in Saudi Arabia and research conducted by Salami & Adeyemi (2015) level of Islamic banking in Malaysia international bank.

According to Tanjung & Devi (2013), the DEA method uses two commonly used model approaches, namely the Charnes, Chooper, and Roodes (CCR) model developed in 1978 and the Banker, Charnes, and Cooper (BCC) model in 1984. The first is the model Charnes, Chooper, and Roodes (CCR) This model was developed in 1978. The DEA-CCR model is known as the Constant Return Scale (CRS) model because it assumes that the production process follows the CRS. The CRS assumption assumes that each increase in one input will increase one output. This assumption applies to business units that have been producing at their maximum capacity (optimum scale). Then there is the Banker, Charnes, and Cooper (BCC) model, and the second model developed in 1984. This model assumes the Variable Return Scale (VRS), which is the previous model's development. The VRS assumption is that if there is an increase in one input, it will not affect the output increase because it does not operate at its optimal scale.

The variables used for performance analysis by looking at efficiency are using input and output variables. The approach in this study is the intermediation approach. This approach views an institution as an intermediary, changing or transferring surplus units to deficit units. The model used in this study is the Constant Return to Scale (CRS). This study consists of 3 input variables: total assets, staff costs, and total deposits, and two outputs are revenue and loans. The main data source is secondary data obtained from Bankscope and Bank Focus, the data portal of bank financial statements worldwide with the same financial statement format and units equated in US dollars. This variable study's object includes 13 financial statements of Islamic Banks in Indonesia, Saudi Arabia, and the United Kingdom from 2015-2019. Measurement of efficiency with DEA is as follows (Rusydia, 2013):

Maximize:

$$Z_k = \sum_{r=1}^s U_{rk} Y_{rk}$$

With limitations or constraints:

$$\sum_{i=1}^s (U_{rk} Y_{rk}) - \sum_{i=1}^m (V_{ik} X_{ij}) \leq 0 ; j = 1, 2, 3, \dots, n$$

$$\sum_{i=1}^m (V_{ik} X_{ik}) = 1$$

$$U_{rk} \geq 0 ; r = 1, 2, 3, \dots, s$$

$$V_{ik} \geq 0 ; i = 1, 2, 3, \dots, m$$

y_{rk} : total output r generated by Decision Making Unit (DMU) k

X_{ij} : number of inputs i used subDMU j

Y_{rj} : total output r generated by DMU j

X_{ik} : number of inputs i used by DMU k

s : the number of DMU analyzed

m : number of inputs used

U_{rk} : weighted weight of output r generated by each DMU k

V_{ik} : the weighted weight of the input used for DMU k

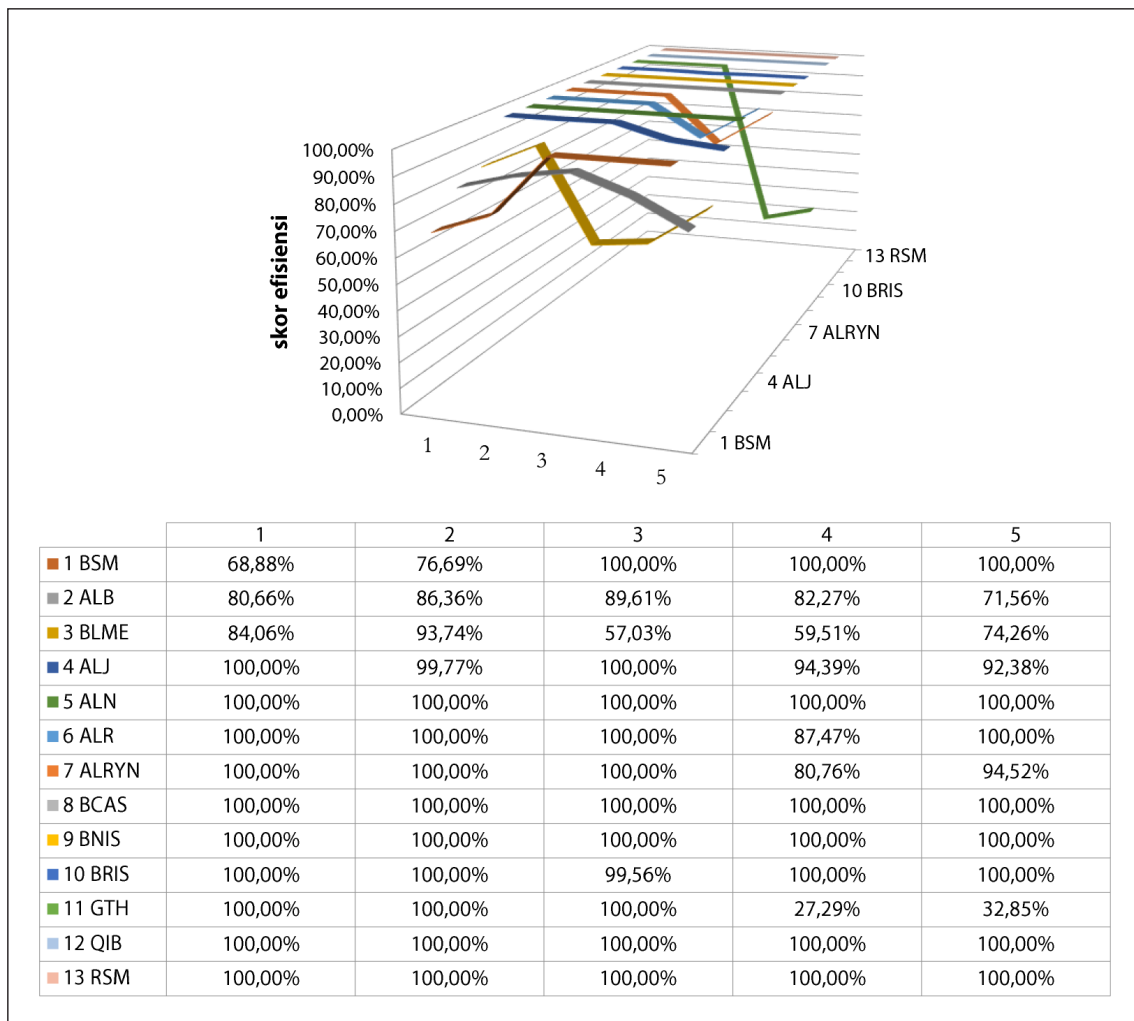
Z_k : optimal value as an indicator of the relative efficiency of subDMU k

DEA has several managerial values. First, DEA results in efficiency for each Decision-Making Unit (DMU), relative to the other DMUs in the sample. This efficiency figure allows an analyst to recognize the DMU most in need of attention and plan corrective actions for DMU, which is less efficient. Second, the DEA shows a number DMU which has excellent efficiency and a set of multipliers that can be used by the policymaker to devise an improvement strategy, so that a decision-maker policy not only recognizes inefficient DMUs but also knows how much inputs and outputs that must adjust in order to have high efficiency. Third, DEA provides a cross-efficiency matrix. The cross efficiency of DMU A to DMU B is the ratio of Weighted output divided by weighted input calculated using input levels and DMU A outputs and DMU B input and output weights. Cross efficiency analysis can help one policymaker recognize efficient DMUs but use a combination of inputs and resulting in a combination of outputs that are very different from other DMUs.

Result and Discussion

Based on the efficiency analysis results using the Data Envelopment Analysis (DEA) analysis tool, with the Warwick Win DEA software and Islamic bank financial statement data sources from bank scope and bank focus, each Islamic Bank's efficiency values are as shown in Figure 1.

Figure 1. Results of the Efficiency Scores of Islamic Banks in Indonesia, Saudi Arabia, and the United Kingdom in 2015-2019 (1-5)



Source: Results of processing by Warwick win DEA

Based on Figure 1, the classification of efficiency categories in this study is divided into three parts: the Green, Amber, and Red categories. Green range is 100%, amber range is 90% -99.99% and range red is 0% - 89.99%. Understanding the Green classification is an Islamic bank in an efficient condition and must be maintained in the following year. The understanding of the Amber classification is an Islamic bank is approaching an efficient point. However, it might also be risky if the inefficiency problem, not addresses, and attention is needed. Understanding Red's classification is a risky Islamic bank because it is far from an efficient limit to achieve. Here, management action is immediately needed to improve inefficiency from calculating Islamic banks' efficiency in Indonesia, Saudi Arabia, and the United Kingdom as many as 13 Islamic banks in 2015-2019.

Data Envelopment Analysis can provide repair values for units that experience inefficiency, then banks that experience inefficiency can be calculated based on managerial simulations conducted by the DEA.

1. Gatehouse Islamic Bank United Kingdom

During the years from 2015-2019, the Gatehouse Syariah Bank UK's efficiency level reached 100% in 2015, 2016, and 2017 but experienced an inefficiency in 2018 of 27.29% due to inefficiencies in the fixed assets variable, staff expenses, and total deposits and loans. In 2019 the value was 32.85% inefficiencies occurred in fixed assets, staff expenses, and total deposits and income. The average efficiency is 72.028%. The efficiency improvement of the UK's 2019 Islamic gatehouse bank shows in Figure 2.

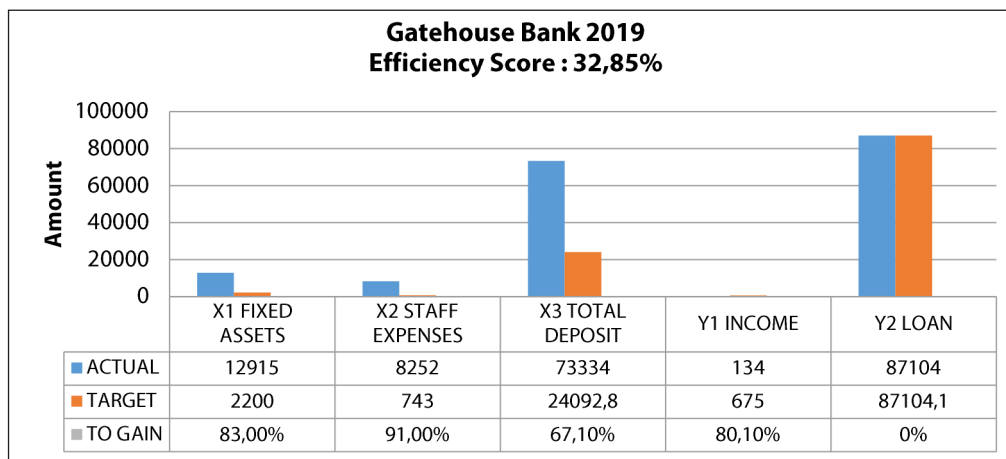
Table 3. Efficiency Scores and Improvement of Gatehouse Islamic Bank 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	14223	14223	0.0%	100%
	X2 Staff Expenses	5770	5770	0.0%	100%
	X3 Total Deposits	2760	2760	0.0%	100%
	Y1 Income	4079	4079	0.0%	100%
	Y2 Loans	95029	95029	0.0%	100%
2016: 100%	X1 Fixed Assets	13869	13869	0.0%	100%
	X2 Staff Expenses	6582	6582	0.0%	100%
	X3 Total Deposits	2637	2637	0.0%	100%
	Y1 Income	121	121	0.0%	100%
	Y2 Loans	91820	91820	0.0%	100%
2017: 100%	X1 Fixed Assets	13056	13056	0.0%	100%
	X2 Staff Expenses	5963	5963	0.0%	100%
	X3 Total Deposits	11514	11514	0.0%	100%
	Y1 Income	1573	1573	0.0%	100%
	Y2 Loans	56891	56891	0.0%	100%
2018: 27,29%	X1 Fixed Assets	13031	1494,5	88.5%	11.5%
	X2 Staff Expenses	5647	466,5	91.7%	8.3%
	X3 Total Deposits	58239	15893,7	72.7%	27.3%
	Y1 Income	374	374	0.0%	100.0%
	Y2 Loans	48564	52264,3	7.6%	92.9%
2019: 32,85%	X1 Fixed Assets	12915	2200	83.0%	17.0%
	X2 Staff Expenses	8252	743	91.0%	9.0%
	X3 Total Deposits	73334	24092,8	67.1%	32.9%
	Y1 Income	134	675	80.1%	19.9%
	Y2 Loans	87104	87104.1	0.0%	100.0%

Source: Data processed by Warwick Win DEA

Based on Table 3. Gatehouse Bank PLC (Gatehouse) is an official bank in the UK, based in Mayfair, London. Founded in 2008, the bank operates according to Shariah principles and offers savings and financial products for commercial and residential real estate in the UK and seeks and advises UK real estate investors focusing on development for rent or lease in the private sector. The efficiency value obtained by the Gatehouse Islamic bank UK 2019 is 32.85 percent (see Figure 2). This result includes the red category, which means that Islamic banks are at risk because they are far from the efficient limit.

Figure 2. Improved Efficiency of UK Gatehouse Islamic Bank 2019



Source: Data processed by Warwick Win DEA

Through a detailed calculation, the Gatehouse Bank UK experienced inefficient waste in fixed assets, staff expenses, and total deposits. It shows the difference in actual data that does not balance with the target data or its ideal form. Spending on fixed assets must be reduced by 83.0 percent, while expenses for staff expenses must reduce by 91.0 percent, and total deposits must reduce to 67.1 percent. Through the same weighting, Gatehouse Islamic Bank United Kingdom 2019, it should be able to get income 403.8 percent more than what happened, while in terms of Loans, it is following the actual Amount (US Dollar) and target. This insignificant result of Gatehouse bank United Kingdom is relevant to Öndeş (2019). Their study shows an insignificant result for the UK, including Gatehouse Bank, and significant in Turkey Islamic banks in asset quality and management quality.

2. Al-Bilad Islamic Bank Saudi Arabia

Based on Table 4, during five years from 2015-2019, the efficiency level of Islamic Bank A-Bilad Saudi Arabia has fluctuated, reaching 80.66% in 2015 due to inefficiencies in fixed assets, staff expenses, and total deposits, reaching 86.36% in 2016. variable, fixed assets, staff expenses, and total deposits, reaching 89.61% in 2017, there was an inefficiency on the fixed assets variable, staff expenses, and total deposits and income, reaching 82.27% in 2018 inefficiency on the fixed assets variable, staff expenses, and total deposits and income, and 71.56% in 2019 incurred inefficiencies on fixed assets, staff expenses, and total deposits variables. The average total efficiency is 82.092%.

Al Bilad Bank is a Saudi Islamic bank that establishes in 2004. The efficiency value obtained by Al-Bilad Islamic Bank of Saudi Arabia in 2019 based on DEA calculation shows 71.56 percent and includes in the Red category. This calculation means that Islamic banks are at risk because it is far from the efficient limit to achieve. With this condition, management action immediately needs to improve efficiency. In 2019 Saudi Arabia Al-Bilad Islamic Bank experienced inefficient waste in fixed assets, staff expenses, and total deposits through a detailed calculation. Spending on fixed assets must be reduced by 28.4 percent, while staff expenses must reduce to 28.4 percent, and total deposits must reduce to 28.4 percent.

Table 4. Efficiency Level of Al-Bilad Islamic Bank in Saudi Arabia 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015 : 80,66%	X1 Fixed Assets	792084	638880	19.3%	80.7%
	X2 Staff Expenses	853106	688100	19.3%	80.7%
	X3 Total Deposits	42179460	29859735.9	29.2%	70.8%
	Y1 Income	788423	788423	0.0%	100%
	Y2 Loans	42637280	42637280	0.0%	100%
2016 : 86,36%	X1 Fixed Assets	802424	693002,8	13.6%	86.4%
	X2 Staff Expenses	902222	779192	13.6%	86.4%
	X3 Total Deposits	40234715	34748174.6	13.6%	86.4%
	Y1 Income	809023	809023	0.0%	100.0%
	Y2 Loans	44129231	44129231	0.0%	100.0%
2017 : 89,61%	X1 Fixed Assets	875424	784447.3	10.4%	89.6%
	X2 Staff Expenses	953585	854485.6	10.4%	89.6%
	X3 Total Deposits	47782959	38459246.8	19.5%	80.5%
	Y1 Income	936167	994631.3	6.2%	94.1%
	Y2 Loans	51153811	51153811	0.0%	100.0%
2018 : 82,27%	X1 Fixed Assets	1146848	943648,4	17.7%	82.3%
	X2 Staff Expenses	1052360	866157	17.7%	82.3%
	X3 Total Deposits	57175594	47041667.1	17.7%	82.3%
	Y1 Income	612693	1379662.3	55.6%	44.4%
	Y2 Loans	58922399	58922399	0.0%	100.0%
2019 : 71,56%	X1 Fixed Assets	1866329	1335512	28.4%	71.6%
	X2 Staff Expenses	1146785	820619	28.4%	71.6%
	X3 Total Deposits	66797565	47799154,6	28.4%	71.6%
	Y1 Income	1243740	1243740	0%	100%
	Y2 Loans	63404287	63404287	0%	100%

Source: Data processed by Warwick Win DEA

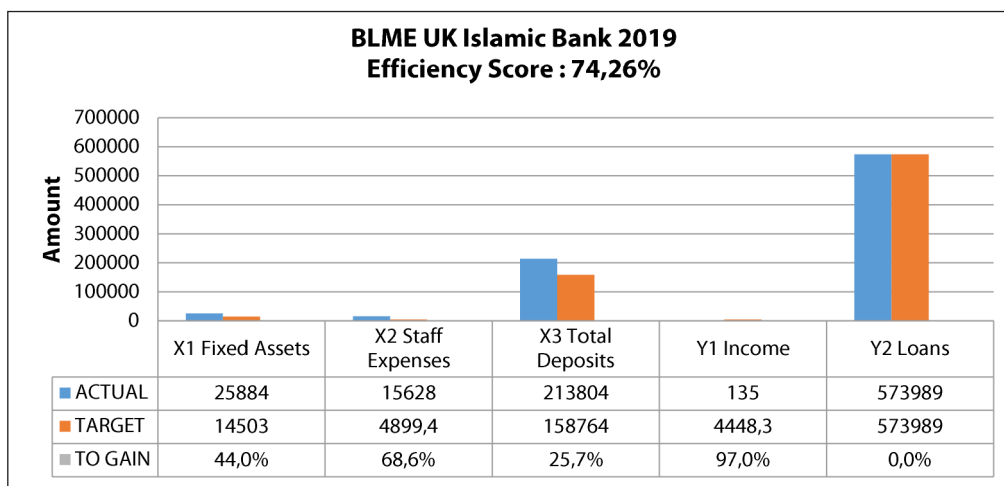
Through the same weighting, Al-Bilad Saudi Arabia Islamic Bank 2019, in terms of income and Loans are following the actual Amount (US Dollar) and target. Miah &

Uddin (2017), that study about the comparative study between Islamic and conventional banks efficiency in GCC, said that Al-Bilad Bank also have some inefficient results in recent years, but there is much room for Islamic banks to increase their productive efficiency, like from cost-efficiency. This finding supports earlier studies from Hassan et al. (2018) that try to measure Islamic banks' performance in Saudi Arabia. Bank Al-Bilad is found least efficient in decreasing costs by decreasing input for achieving a particular output level. The findings are consistent with Almumani (2013) that bank Al Bilad is relatively less efficient in technical efficiency.

3. BLME Islamic Bank United Kingdom

Based on Table 5, during five years from 2015-2019, the efficiency level of the UK BLME Islamic Bank has fluctuated. In 2015 the values reached 84.06% due to inefficiencies in fixed assets, staff expenses, total deposit, and income variables. The value was reaching 93.74% in 2016. There was an inefficiency in the fixed variable. assets, staff expenses, and total deposits. For 2017, the value is 57.03%, there were inefficiencies in fixed assets, staff expenses, total deposits, and income variables. In 2018, the calculation reaching 59.51%. There were inefficiencies in fixed assets, staff expenses, and total deposit and income. Finally, in 2019, the value reached 74.26% due to the fixed assets' inefficiencies, staff expenses, total deposit, and income variables. The average total efficiency was 73.72%. The efficiency improvement of the UK BLME Islamic bank 2019 shows in Figure 3.

Figure 3. Efficiency Improvements to the BLME UK Islamic bank 2019



Source: Data processed by Warwick Win DEA

BLME (Bank of London and The Middle East Plc) is an independent wholesale Islamic bank independent from the UK and is the largest Islamic Bank in Europe. The efficiency value obtained by the UK BLME Islamic bank 2019 based on DEA calculation shows 74.26 percent and include in the Red category, which means that Islamic banks are at risk because it is far from the efficient limit to achieve. Here management action is immediately needed to improve inefficiency.

Table 5. Efficiency Levels of BLME UK Islamic Bank 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015 : 84,06%	X1 Fixed Assets	31842	26765.4	15.9%	84.1%
	X2 Staff Expenses	19226	16160.8	15.9%	84.1%
	X3 Total Deposits	263022	221088.5	15.9%	84.1%
	Y1 Income	111	8984.1	98.8%	1.2%
	Y2 Loans	706121	706121	0.0%	100%
2016 : 93,74%	X1 Fixed Assets	77651	35090,7	54.8%	45.2%
	X2 Staff Expenses	13405	12565.3	6.3%	93.7%
	X3 Total Deposits	308530	289204.2	6.3%	93.7%
	Y1 Income	4315	4315	0.0%	100.0%
	Y2 Loans	669284	669284	0.0%	100.0%
2017 : 57,03%	X1 Fixed Assets	52585	29988	43.0%	57.0%
	X2 Staff Expenses	16644	9293.7	44.2%	55.8%
	X3 Total Deposits	471444	268853.6	43.0%	57.0%
	Y1 Income	974	3451.1	254.3%	28.2%
	Y2 Loans	782204	782204	0.0%	100.0%
2018 : 59,51%	X1 Fixed Assets	41752	17988,3	56.9%	43.1%
	X2 Staff Expenses	16518	5614.6	66.0%	34.0%
	X3 Total Deposits	321473	191303.4	40.5%	59.5%
	Y1 Income	357	4501,6	92.1%	7.9%
	Y2 Loans	629074	629074	0.0%	100.0%
2019 : 74,26%	X1 Fixed Assets	25884	14503	44.0%	56.0%
	X2 Staff Expenses	15628	4899,4	68.6%	31.4%
	X3 Total Deposits	213804	158764	25.7%	74.3%
	Y1 Income	135	4448,3	97.0%	3.0%
	Y2 Loans	573989	573989	0.0%	100%

Source: Data processed by Warwick Win DEA

A detailed calculation shows that the 2018 BLME UK Syariah Bank experienced inefficient waste in fixed assets, staff expenses, and total deposits. Spending on fixed assets must be reduced by 44.0 percent, while staff expenses must reduce to 68.6 percent, and total deposits must reduce to 25.7 percent.

Through the same weighting of the UK BLME Islamic bank 2019 in terms of income, 3195.0 percent of the actual data must be added. This condition is because the UK BLME Islamic bank categorizes as just beginning to develop in the UK, while in terms of the loan, it is following the actual number and target. The efficiency value of BLME banks in the previous year from 2015-2019 was relatively quite efficient. This value is relevant because BLME became the Best Islamic Bank in Europe (2008) and Best Islamic Bank in the UK (2009, 2010, 2011, 2012, and 2013). This result is relevant to the study of Khan (2009)

about the profitability of conventional and Islamic banks in the UK. The study finds that Islamic banks in the United Kingdom, including BLME Islamic Bank, are less geared, less liquid, but more efficient in terms of their capital than the Conventional banks and the Conventional banks are more stable than Islamic banks.

4. Al-Jazira Islamic Bank Saudi Arabia

Based on Table 6, during five years from 2015-2019, the overall efficiency level of Islamic Bank Al-Jazira has shown a good trend, reaching 100.00% in 2015, 99.77% in 2016 due to inefficiencies fixed assets, staff expenses, and total deposit variables. Back 100.00% efficient in 2017, down to 94.39% in 2018 due to inefficiencies in fixed assets, staff expenses, total deposit, and income variables, and 92.38% in 2019 due to inefficiencies fixed assets variable, staff expenses, and the total deposit. The average Amount (US Dollar) of efficiency is 97.30%. Improvements in the efficiency of Islamic Bank Al-Jazira Saudi Arabia 2019 shows in Figure 4.

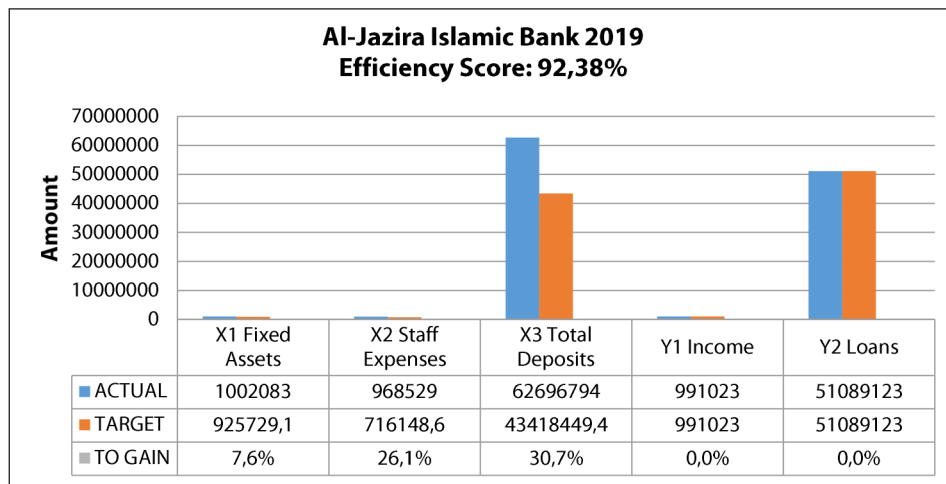
Table 6. Efficiency Levels of Al-Jazira Islamic Bank Saudi Arabia 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	679088	679088	0.0%	100.0%
	X2 Staff Expenses	908901	908901	0.0%	100.0%
	X3 Total Deposits	49673599	49673599	0.0%	100.0%
	Y1 Income	1287119	1287119	0.0%	100.0%
	Y2 Loans	46555011	46555011	0.0%	100.0%
2016 : 99,77%	X1 Fixed Assets	701659	700050.6	0.2%	99.8%
	X2 Staff Expenses	894313	892262.9	0.2%	99.8%
	X3 Total Deposits	51602354	49140929.7	4.8%	95.2%
	Y1 Income	871942	871942	0.0%	100.0%
	Y2 Loans	43436473	43436473	0.0%	100.0%
2017 : 100%	X1 Fixed Assets	640928	640928	0.0%	100.0%
	X2 Staff Expenses	856884	856884	0.0%	100.0%
	X3 Total Deposits	50278366	50278366	0.0%	100.0%
	Y1 Income	857514	857514	0.0%	100.0%
	Y2 Loans	40159095	40159095	0.0%	100.0%
2018 : 94,39%	X1 Fixed Assets	606973	572933,9	5.6%	94.4%
	X2 Staff Expenses	896716	846428,1	5.6%	94.4%
	X3 Total Deposits	51804098	25740688	50.0%	49.7%
	Y1 Income	378276	622809	64.6%	60.7%
	Y2 Loans	42194640	42194640	0.0%	100.0%
2019 : 92,38%	X1 Fixed Assets	1002083	925729.1	7.6%	92.4%
	X2 Staff Expenses	968529	716148.6	26.1%	73.9%
	X3 Total Deposits	62696794	43418449	30.7%	69.3%
	Y1 Income	991023	991023	0.0%	100.0%
	Y2 Loans	51089123	51089123	0.0%	100.0%

Source: Data processed by Warwick Win DEA

Bank Aljazira recognize as one of the leading fast-growing sharia financial institutions in Saudi Arabia, a Saudi-oriented and client-oriented Financial Group that provides individuals, businesses, and institutions with innovative financial services according to Sharia through the professional and dedicated staff. The efficiency value obtained by Al-Jazira Bank of Saudi Arabia in 2019 shows 92.38 percent and belongs to the Amber category, meaning that the Islamic Bank is approaching the point of efficiency. However, it may also be risky if inefficiency problems, not addresses, and attention are needed.

Figure 4. Efficiency Improvement of Al-Jazira Islamic Bank of Saudi Arabia 2019



Source: Data processed by Warwick Win DEA

5. Al Rayan Islamic Bank United Kingdom

Based on Table 7, during five years from 2015-2019, Al-Rayan Islamic Bank UK's overall efficiency level has experienced a pretty good efficiency trend, reaching 100.00% in 2015, 100.00% in 2016, 100.00% in 2017, reaching 80.76% in 2018 due to inefficiency of fixed assets, staff expenses, total deposits, and loans. In 2019, the value reached 94.52% due to inefficiencies in fixed assets, staff expenses, total deposit, and loan variables. The average Amount (US Dollar) of efficiency is 95.05%. Improvements in the efficiency of the British Al-Rayan Islamic bank 2019 shows in Figure 5.

Al Rayan Bank PLC (formerly known as Islamic Bank of United Kingdom) is a commercial bank in the UK that offer sharia-compliant financial service products to customers of any religion. This bank is the first British Bank to claim to operate, as a whole, following Islamic principles. Based on the DEA calculation showing a figure of 94.52 percent and included in the Amber category, Islamic banks are approaching the point of efficiency. However, it may also be at risk if the inefficiency problem not handles, and attention is needed here.

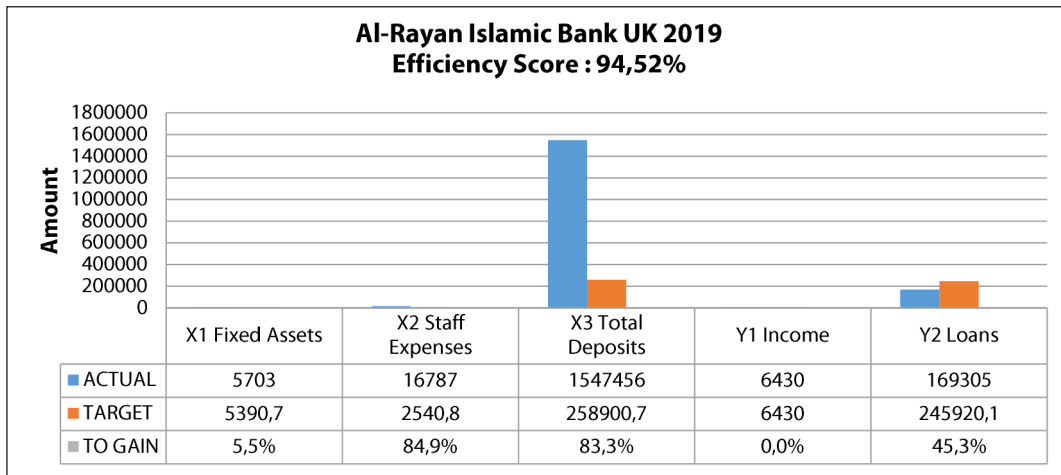
Table 7. Efficiency Levels of Al-Rayan Islamic Bank UK 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	261	261	0.0%	100%
	X2 Staff Expenses	5579	5579	0.0%	100%
	X3 Total Deposits	509803	509803	0.0%	100%
	Y1 Income	1215	1215	0.0%	100%
	Y2 Loans	82719	82719	0.0%	100%
2016: 100%	X1 Fixed Assets	5990	5990	0.0%	100%
	X2 Staff Expenses	7242	7242	0.0%	100%
	X3 Total Deposits	730713	730713	0.0%	100%
	Y1 Income	10272	10272	0.0%	100%
	Y2 Loans	139454	139454	0.0%	100%
2017: 100%	X1 Fixed Assets	6431	6431	0.0%	100%
	X2 Staff Expenses	9308	9308	0.0%	100%
	X3 Total Deposits	1222853	1222853	0.0%	100%
	Y1 Income	9501	9501	0.0%	100%
	Y2 Loans	216058	216058	0.0%	100%
2018: 80,76%	X1 Fixed Assets	6112	4935,8	19.2%	80.8%
	X2 Staff Expenses	13025	2834,9	78.2%	21.8%
	X3 Total Deposits	1596656	271934,9	83.0%	17.0%
	Y1 Income	8620	8620	0.0%	100%
	Y2 Loans	227594	278132,8	22.2%	81.8%
2019: 94.52%	X1 Fixed Assets	5703	5390.7	5.5%	94.5%
	X2 Staff Expenses	16787	2540.8	84.9%	15.1%
	X3 Total Deposits	1547456	258900.7	83.3%	16.7%
	Y1 Income	6430	6430	0.0%	100.0%
	Y2 Loans	169305	245920.1	45.3%	68.8%

Source: Data processed by Warwick Win DEA

A detailed calculation shows that the Al-Rayan Islamic bank of England in 2019 experienced inefficient waste in fixed assets, staff expenses, and total deposits. Spending on fixed assets must be reduced by 5.5 percent, while staff expenses must reduce to 84.9 percent, and total deposits must reduce to 83.3 percent. Through the same weighting of Al-Jazira Saudi Arabia Syariah Bank 2019 in terms of income, it is by the actual Amount (US Dollar) and target, while in terms of Loans, it must be increased again by 45.3 percent. According to Öndeş et al. (2019) also said Al-Rayan Islamic bank UK is almost efficient. The other factor that could make Al-Raryan Islamic bank almost efficient is because Al-Rayan Islamic bank is the most prominent Islamic Bank in the United Kingdom.

Figure 5. Improvements in the Efficiency of Al Rayan Islamic Bank of UK 2019

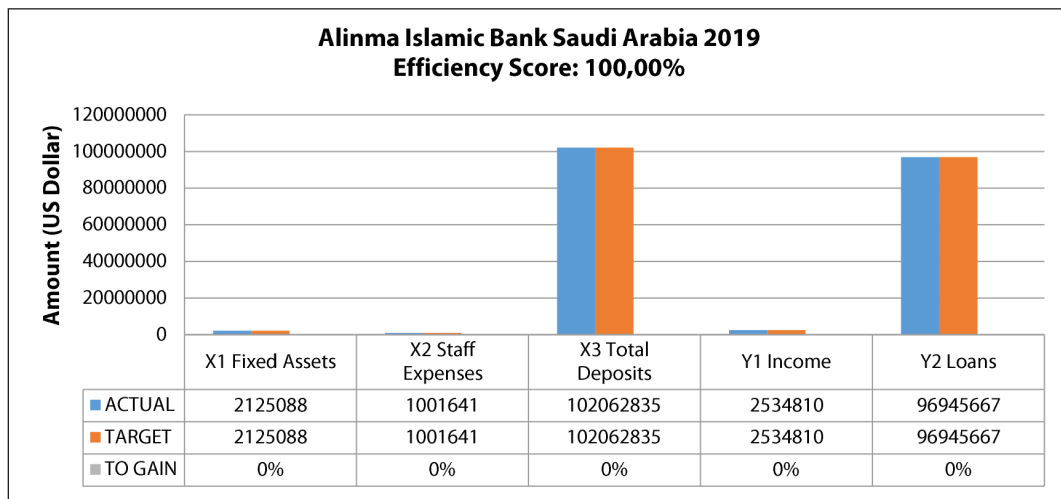


Source: Data processed by Warwick Win DEA

6. Alinma Islamic Bank Saudi Arabia

Based on Table 8, during five years from 2015-2019, the overall efficiency level of Alinma Islamic bank has been outstanding, reaching 100.00% from 2015-2019, the average Amount (US Dollar) of efficiency is 100.00%. The future suggestion is that Alinma Islamic Bank Saudi Arabia must maintain this condition in the following year. The efficiency score of the Alinma Saudi Arabian Islamic bank 2019 shows in Figure 6.

Figure 6. Alinma Islamic Bank Saudi Arabia Efficiency Score 2019



Source: Data processed by Warwick Win DEA

Alinma Bank is a Saudi joint-stock company formed on March 28, 2006. Alinma provides a comprehensive range of retail and corporate banking following Shariah and investment services. The efficiency value obtained by Alinma Syariah Bank of Saudi Arabia in 2019 based on DEA calculation shows 100.00 percent and include in the Green category,

which means that Islamic banks are in an efficient condition in terms of fixed assets, staff expenses, and total deposits, income and loans are in accordance between the actual number and the target. These results are consistent with research conducted by Hassan et al. (2018) that try to measure Islamic banks' performance in Saudi Arabia. The result said that overall, Alinma Bank Saudi Arabia has good efficiency.

Table 8. Alinma Islamic Bank Saudi Arabia Efficiency Score 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015 : 100%	X1 Fixed Assets	1326070	1326070	0.0%	100%
	X2 Staff Expenses	669975	669975	0.0%	100%
	X3 Total Deposits	65694524	65694524	0.0%	100%
	Y1 Income	1469976	1469976	0.0%	100%
	Y2 Loans	74097662	74097662	0.0%	100%
2016 : 100%	X1 Fixed Assets	1456919	1456919	0.0%	100%
	X2 Staff Expenses	755347	755347	0.0%	100%
	X3 Total Deposits	80612226	80612226	0.0%	100%
	Y1 Income	1502271	1502271	0.0%	100%
	Y2 Loans	87953728	87953728	0.0%	100%
2017 : 100%	X1 Fixed Assets	1607644	1607644	0.0%	100%
	X2 Staff Expenses	876009	876009	0.0%	100%
	X3 Total Deposits	89064751	89064751	0.0%	100%
	Y1 Income	2011357	2011357	0.0%	100%
	Y2 Loans	88851454	88851454	0.0%	100%
2018 : 100%	X1 Fixed Assets	1635884	1635884	0.0%	100%
	X2 Staff Expenses	939583	939583	0.0%	100%
	X3 Total Deposits	90128138	90128138	0.0%	100%
	Y1 Income	2856951	2856951	0.0%	100%
	Y2 Loans	92182356	92182356	0.0%	100%
2019 : 100%	X1 Fixed Assets	2125088	2125088	0.0%	100%
	X2 Staff Expenses	1001641	1001641	0.0%	100%
	X3 Total Deposits	102062835	102062835	0.0%	100%
	Y1 Income	2534810	2534810	0.0%	100%
	Y2 Loans	96945667	96945667	0.0%	100%

Source: Data processed by Warwick Win DEA

7. Al-Rajhi Islamic Bank Saudi Arabia

Based on Table 9, the efficiency level of Al-Rajhi Islamic Bank as a whole experienced a good efficiency trend, which reached 100.00% in 2015, 100.00% in 2016, 100.00% in 2017, decreased to 87.47% in 2018 due to inefficiency in fixed assets, staff expenses, and total deposits, and 100.00% in 2019. The average Amount (US Dollar) of efficiency is 97.49%. The efficiency score of Al-Rajhi Saudi Arabian Islamic Bank 2019 shows in Figure 7.

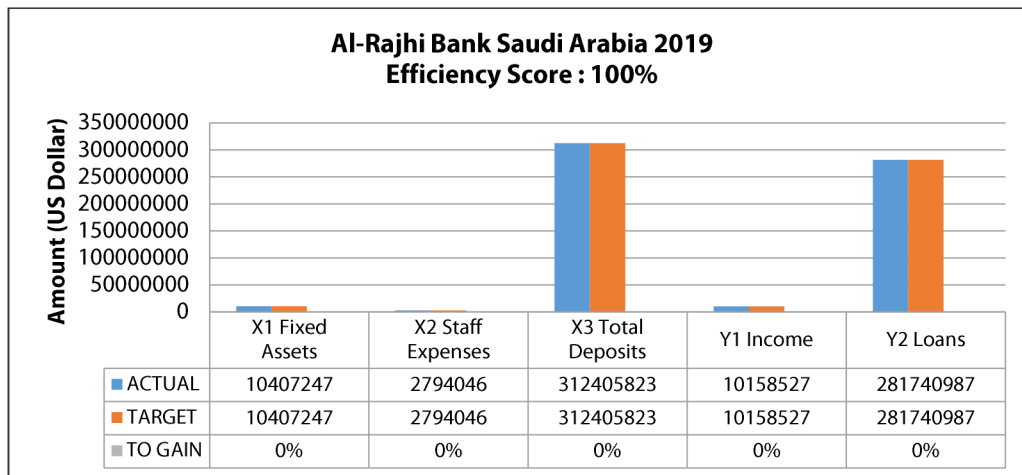
Table 9. Efficiency Score of Al-Rajhi Islamic Bank Saudi Arabia 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	5578931	5578931	0.0%	100%
	X2 Staff Expenses	2661043	2661043	0.0%	100%
	X3 Total Deposits	257821641	257821641	0.0%	100%
	Y1 Income	7130075	7130075	0.0%	100%
	Y2 Loans	237128924	237128924	0.0%	100%
2016: 100%	X1 Fixed Assets	6485162	6485162	0.0%	100%
	X2 Staff Expenses	2949886	2949886	0.0%	100%
	X3 Total Deposits	272593136	272593136	0.0%	100%
	Y1 Income	8125960	8125960	0.0%	100%
	Y2 Loans	251572649	251572649	0.0%	100%
2017: 100%	X1 Fixed Assets	7858127	7858127	0.0%	100%
	X2 Staff Expenses	2813918	2813918	0.0%	100%
	X3 Total Deposits	273056445	273056445	0.0%	100%
	Y1 Income	9120726	9120726	0.0%	100%
	Y2 Loans	244245368	244245368	0.0%	100%
2018: 87,47%	X1 Fixed Assets	8649435	6698594.7	22.6%	77.4%
	X2 Staff Expenses	2809449	2457394.1	12.5%	87.5%
	X3 Total Deposits	293909125	133392166	54.6%	45.4%
	Y1 Income	3767953	3767953	0.0%	100%
	Y2 Loans	264145966	264145966	0.0%	100%
2019: 100%	X1 Fixed Assets	10407247	10407247	0.0%	100%
	X2 Staff Expenses	2794046	2794046	0.0%	100%
	X3 Total Deposits	312405823	312405823	0.0%	100%
	Y1 Income	10158527	10158527	0.0%	100%
	Y2 Loans	281740987	281740987	0.0%	100%

Source: Data processed by Warwick Win DEA

Al Rajhi Bank, founded in 1957, is a bank originating from Saudi Arabia and is the largest Islamic bank in the world by capital. The efficiency value obtained by Al-Rajhi Islamic Bank of Saudi Arabia in 2019 based on DEA calculation shows 100.00 percent and include in the Green category. This result means that Islamic banks are efficient in terms of fixed assets, staff expenses, and total deposits, income, and loans. This fact shows no difference between the actual data (blue graph) and the target data or its ideal form (orange graph). According to the actual number and the target, the condition must maintain in the following year. The result is not surprising since many studies like from Hassan et al. (2018) have found that overall results summarize that Al-Rajhi is most efficient in Saudi Shari'ah compliant banking industry as commemorating a mean efficiency score followed by Al-Jazira and Al-Inma Bank, and AlRajhi also one of the most prominent Islamic Bank in Saudi Arabia.

Figure 7. Efficiency Score of Al-Rajhi Islamic Bank Saudi Arabia 2019

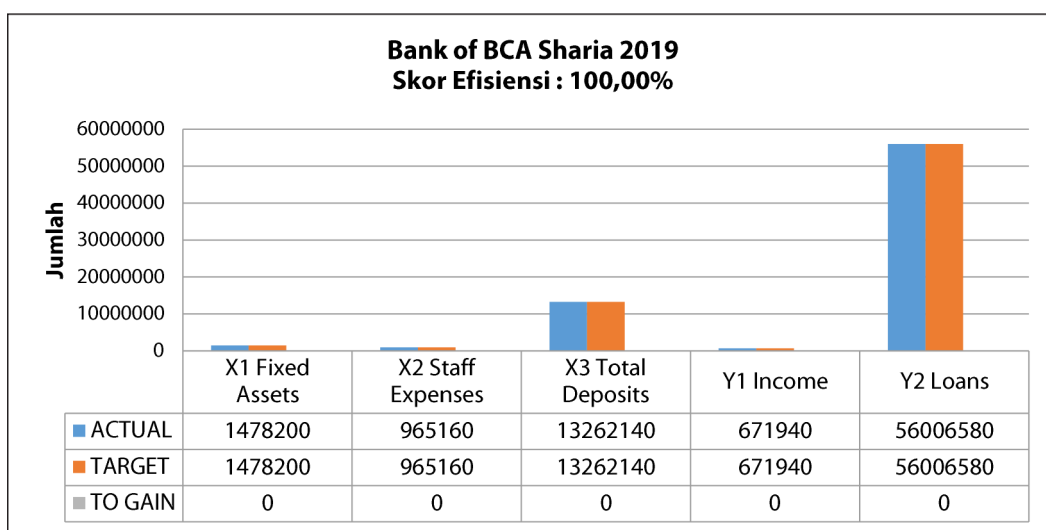


Source: Data processed by Warwick Win DEA

8. Bank of BCA Sharia, Indonesia

Based on Table 10, over the five years from 2015-2019, Bank of BCA Sharia's overall efficiency level has been outstanding, reaching 100.00% from 2015-2019. The average efficiency is 100.00%. Bank of BCA Sharia Indonesia 2019 efficiency score can be seen in Figure 7. The establishment of BCA Syariah Bank is inseparable from the development of Islamic banking in Indonesia. Initially, PT Bank BCA acquired PT Bank Utama Internasional on June 12, 2009. Subsequently, on March 2, 2010, based on a decision by the Governor of BI, there was a change in a conventional bank's activities to a sharia bank and change its name to PT Bank of BCA Sharia.

Figure 7. Bank of BCA Sharia Efficiency Score 2019



Source: Data processed by Warwick Win DEA

Suhail. How Efficient are Islamic Banks in Indonesia, Saudi Arabia, and the United Kingdom?

The efficiency value obtained by Bank of BCA Sharia Indonesia 2019 based on DEA calculation shows 100.00 percent and include in the Green category. This result means that Islamic banks are efficient in terms of fixed assets, staff expenses, and total deposits, income, and loans. This study's results contradict previous research by Bayuny & Haron (2017), that find the overall value of BCA Syariah Bank has not had a good enough efficiency in recent years.

Table 10. Bank of BCA Sharia Efficiency Score 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015 : 100%	X1 Fixed Assets	400008	400008	0.0%	100%
	X2 Staff Expenses	650561	650561	0.0%	100%
	X3 Total Deposits	3517485	3517485	0.0%	100%
	Y1 Income	234368	234368	0.0%	100%
	Y2 Loans	32470958	32470958	0.0%	100%
2016 : 100%	X1 Fixed Assets	507247	507247	0.0%	100%
	X2 Staff Expenses	807026	807026	0.0%	100%
	X3 Total Deposits	3652647	3652647	0.0%	100%
	Y1 Income	368163	368163	0.0%	100%
	Y2 Loans	37486973	37486973	0.0%	100%
2017 : 100%	X1 Fixed Assets	813538	813538	0.0%	100%
	X2 Staff Expenses	882677	882677	0.0%	100%
	X3 Total Deposits	6601959	6601959	0.0%	100%
	Y1 Income	478602	478602	0.0%	100%
	Y2 Loans	37388419	37388419	0.0%	100%
2018 : 100%	X1 Fixed Assets	1262807	1262807	0.0%	100%
	X2 Staff Expenses	921488	921488	0.0%	100%
	X3 Total Deposits	6697386	6697386	0.0%	100%
	Y1 Income	583670	583670	0.0%	100%
	Y2 Loans	53889752	53889752	0.0%	100%
2019 : 100%	X1 Fixed Assets	1478200	1478200	0.0%	100%
	X2 Staff Expenses	965160	965160	0.0%	100%
	X3 Total Deposits	13262140	13262140	0.0%	100%
	Y1 Income	671940	671940	0.0%	100%
	Y2 Loans	56006580	56006580	0.0%	100%

Source: Data processed by Warwick Win DEA

9. Bank of BNI Sharia, Indonesia

Based on Table 11, over the five years from 2015-2019, the overall efficiency level of Bank BNI Syariah Indonesia has an excellent trend of efficiency, reaches 100.00% from 2015-2019. The average efficiency is 100.00%. Bank BNI Syariah Indonesia 2019 efficiency score can be seen in Figure 8. Finally, after ten years passed, on June 19, 2010, following the BI Governor's decree, BNI Syariah was separated from conventional banks.

The efficiency value obtained by Bank BNI Syariah Indonesia 2019 shows 100.00 percent and include in the Green category. This result means that Islamic banks are in an efficient condition in terms of fixed assets, staff expenses, total deposits, income, and loans following the Amount (US Dollar) actual and target. This condition shows no difference between the actual data and the target data or its ideal form. These conditions must maintain in the following year.

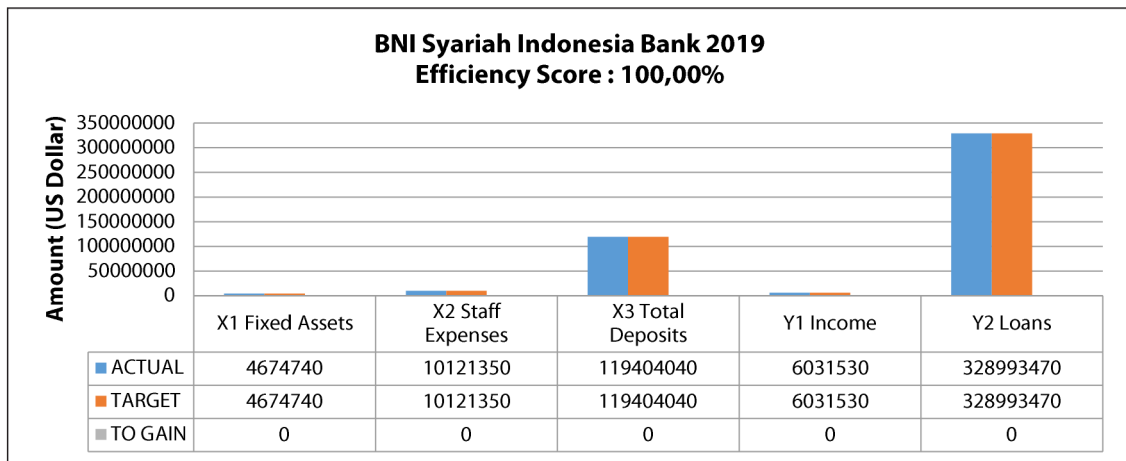
Table 11. BNI Syariah Indonesia Bank Efficiency Score and improvement 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	1597590	1597590	0.0%	100%
	X2 Staff Expenses	6695850	6695850	0.0%	100%
	X3 Total Deposits	27807360	27807360	0.0%	100%
	Y1 Income	2285250	2285250	0.0%	100%
	Y2 Loans	174737310	174737310	0.0%	100%
2016: 100%	X1 Fixed Assets	2145850	2145850	0.0%	100%
	X2 Staff Expenses	7509100	7509100	0.0%	100%
	X3 Total Deposits	40790840	40790840	0.0%	100%
	Y1 Income	2773750	2773750	0.0%	100%
	Y2 Loans	201562030	201562030	0.0%	100%
2017: 100%	X1 Fixed Assets	2307590	2307590	0.0%	100%
	X2 Staff Expenses	7076900	7076900	0.0%	100%
	X3 Total Deposits	59707870	59707870	0.0%	100%
	Y1 Income	3066860	3066860	0.0%	100%
	Y2 Loans	233815890	233815890	0.0%	100%
2018: 100%	X1 Fixed Assets	3475050	3475050	0.0%	100%
	X2 Staff Expenses	9377940	9377940	0.0%	100%
	X3 Total Deposits	88354450	88354450	0.0%	100%
	Y1 Income	4160800	4160800	0.0%	100%
	Y2 Loans	279062160	279062160	0.0%	100%
2019: 100%	X1 Fixed Assets	4674740	4674740	0.0%	100%
	X2 Staff Expenses	10121350	10121350	0.0%	100%
	X3 Total Deposits	119404040	119404040	0.0%	100%
	Y1 Income	6031530	6031530	0.0%	100%
	Y2 Loans	328993470	328993470	0.0%	100%

Source: Data processed by Warwick Win DEA

These results are consistent with research conducted by Sufian & Kamarudin (2015) that find Bank of BNI Sharia in overall has good efficiency if compare with other Islamic banks in in Southeast Asia, namely Malaysia, Indonesia, and Brunei comparing with Foreign Islamic Banks from the Middle East. This finding also supports by Havidz & Setiawan (2015) that find that BNI Sharia has good efficiency due to the assets in Indonesia.

Figure 8. BNI Syariah Indonesia Bank Efficiency Score 2019

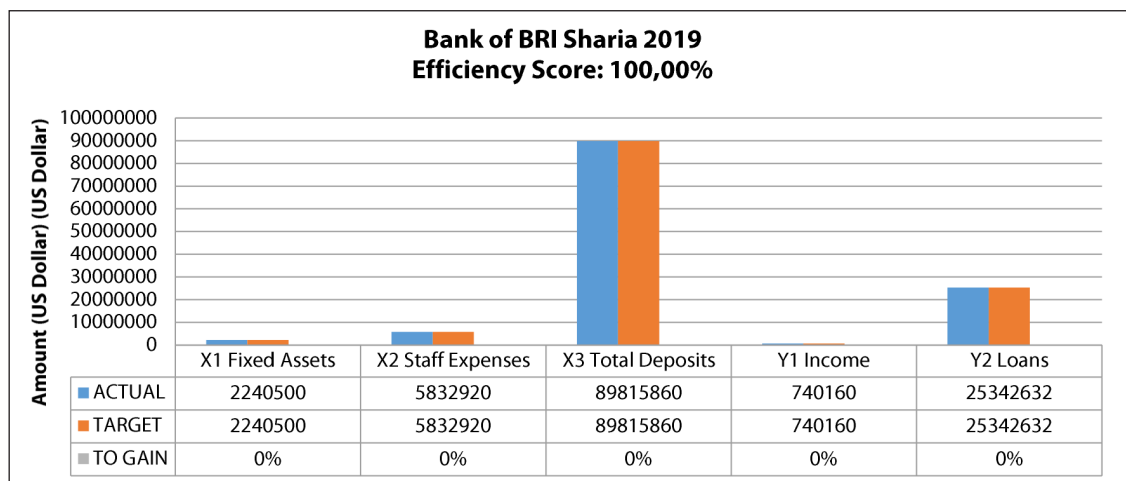


Source: Data processed by Warwick Win DEA

10. Bank of BRI Sharia, Indonesia

Based on Table 12, the efficiency levels of BRI Sharia Indonesia Bank as a whole has a good trend, reaching 100.00% in 2015, 100.00% in 2016, decreasing to 99.56% in 2017 due to inefficiencies in fixed assets, staff expenses, total deposit, and income. The value reached 100.00% in 2018 and 2019. The average efficiency is 99.91%. Bank of BRI Sharia Indonesia 2019 efficiency score can be seen in Figure 9.

Figure 9. Bank of BRI Sharia Indonesia Efficiency Scores 2019



Source: Data processed by Warwick Win DEA

Table 12. Bank of BRI Sharia Efficiency Scores and Improvement 2015-2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015 : 100%	X1 Fixed Assets	1561880	1561880	0.0%	100%
	X2 Staff Expenses	5090980	5090980	0.0%	100%
	X3 Total Deposits	46547600	46547600	0.0%	100%
	Y1 Income	1226370	1226370	0.0%	100%
	Y2 Loans	164207140	164207140	0.0%	100%
2016 : 100%	X1 Fixed Assets	1408160	1408160	0.0%	100%
	X2 Staff Expenses	5382270	5382270	0.0%	100%
	X3 Total Deposits	53063210	53063210	0.0%	100%
	Y1 Income	1702090	1702090	0.0%	100%
	Y2 Loans	179963590	179963590	0.0%	100%
2017 : 99,56%	X1 Fixed Assets	1779350	1771506	0.4%	99.6%
	X2 Staff Expenses	5220670	5197655	0.4%	99.6%
	X3 Total Deposits	65189960	48590488	25.5%	74.5%
	Y1 Income	1010910	2347121	56.9%	43.1%
	Y2 Loans	175202200	175202200	0.0%	100%
2018 : 100%	X1 Fixed Assets	2214440	2214440	0.0%	100%
	X2 Staff Expenses	5108280	5108280	0.0%	100%
	X3 Total Deposits	78810470	78810470	0.0%	100%
	Y1 Income	1066000	1066000	0.0%	100%
	Y2 Loans	198268090	198268090	0.0%	100%
2019 : 100%	X1 Fixed Assets	2240500	2240500	0.0%	100%
	X2 Staff Expenses	5832920	5832920	0.0%	100%
	X3 Total Deposits	89815860	89815860	0.0%	100%
	Y1 Income	740160	740160	0.0%	100%
	Y2 Loans	25342632	25342632	0.0%	100%

Source: Data processed by Warwick Win DEA

The establishment of Bank of BRI Sharia began with the acquisition process of PT Bank Jasa Arta by PT Bank BRI in 2007. Furthermore, following the Decree of the Governor of BI on November 17, 2008, Bank of BRI Sharia officially carried out its activities according to Islamic principles. The efficiency value obtained by Bank Syariah Syariah Indonesia 2019 based on DEA calculation shows 100.00 percent and include in the Green category. This condition means that Islamic banks are in an efficient condition in terms of fixed assets, staff expenses, total deposits, income, and Loans are by the Amount (US Dollar) actual and target. This fact shows no difference between the actual

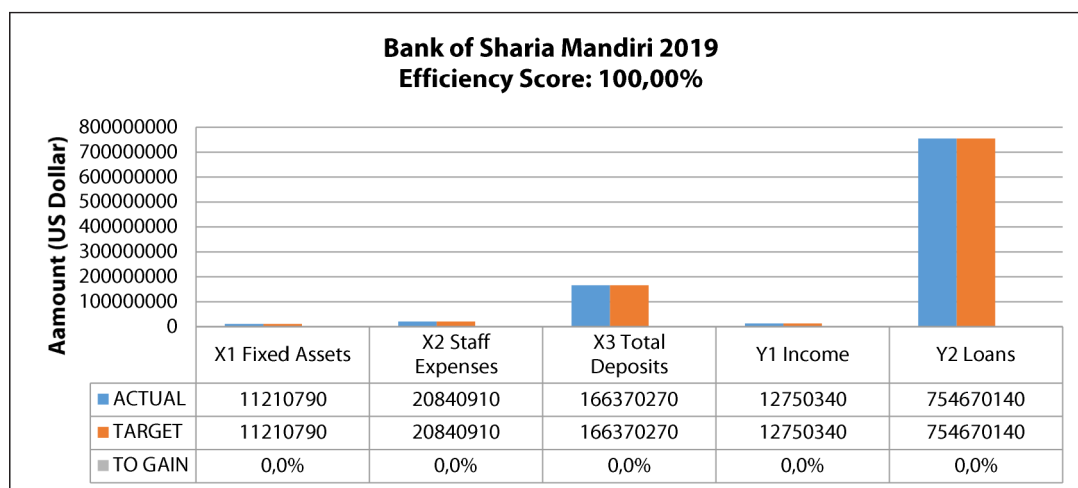
data (blue graph) and the target data or its ideal form (orange graph). These conditions must maintain in the following year.

These results are consistent with Sufian & Kamarudin (2015), showing that the Bank of BRI Sharia has a good efficiency. Because BRI Sharia is one of the banks with the most considerable assets and has human resources inclusive to the regions, these results are also relevant to previous research conducted by Zuhroh et al. (2015). who researched the cost efficiency of Islamic banks in Indonesia said that Bank of BRI Sharia Bank has good inclusiveness and good value trend efficiency.

11. Bank of Sharia Mandiri

Table 13 shows that the efficiency levels of Bank Bank of Sharia Mandiri as a whole the efficiency trend has fluctuated. The value reaching 68.88% in 2015, 76.69% in 2016, 100.00% in 2017, 100.00% in 2018, and 100.00% in 2019. The average total efficiency was 89.11%. Bank of Sharia Mandiri bank efficiency scores 2019 shows in Figure 10.

Figure 10. Bank of Sharia Mandiri Efficiency Scores 2019



Source: Data processed by Warwick Win DEA

The efficiency value obtained by Bank of Sharia Mandiri 2019 based on DEA calculation shows 100.00 percent and include in the Green category. According to the Amount (US Dollar) actual and target, this value means that Islamic banks are in an efficient condition in terms of fixed assets, staff expenses, total deposits, Income, and Loans according to the Amount (US Dollar) actual and target. This condition shows no difference between the actual data and the target data or its ideal form. These conditions must maintain in the following year. This result is not surprising because it agrees with previous research conducted by Widiarti et al. (2015) and Hidayati et al. (2017). The research finds that Bank of Sharia Mandiri is experiencing a relatively good trend of efficiency. One of the factors is because it has quality resources.

Table 13. Bank of Sharia Mandiri Efficiency Scores and Improvement 2015-2019

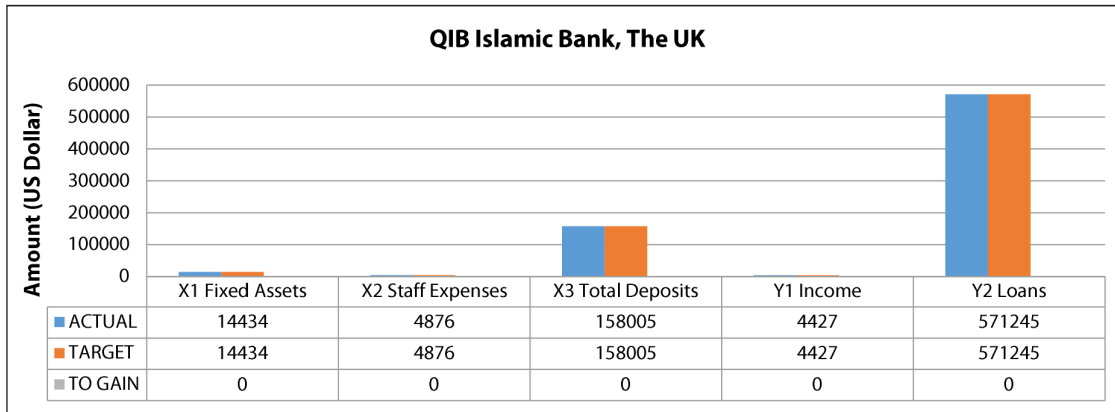
Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 68,88%	X1 Fixed Assets	11241363	7742582	31.1%	68.9%
	X2 Staff Expenses	13702146	9437467	31.1%	68.9%
	X3 Total Deposits	80579490	55499795	31.1%	68.9%
	Y1 Income	2895757	3681075	27.1%	78.7%
	Y2 Loans	490174614	490174614	0.0%	100%
2016: 76,69%	X1 Fixed Assets	9732730	7464490	23.3%	76.7%
	X2 Staff Expenses	14851750	11390508	23.3%	76.7%
	X3 Total Deposits	94542880	72509400	23.3%	76.7%
	Y1 Income	3254140	5499562	69.0%	59.2%
	Y2 Loans	543884260	543884260	0.0%	100.0%
2017: 100%	X1 Fixed Assets	8815040	8815040	0.0%	100.0%
	X2 Staff Expenses	15992620	15992620	0.0%	100.0%
	X3 Total Deposits	116293340	116293340	0.0%	100.0%
	Y1 Income	3651660	3651660	0.0%	100.0%
	Y2 Loans	586787860	586787860	0.0%	100.0%
2018: 100%	X1 Fixed Assets	9846300	9846300	0.0%	100.0%
	X2 Staff Expenses	18059750	18059750	0.0%	100.0%
	X3 Total Deposits	124557640	124557640	0.0%	100.0%
	Y1 Income	6052130	6052130	0.0%	100.0%
	Y2 Loans	663531620	663531620	0.0%	100.0%
2019: 100%	X1 Fixed Assets	11210790	11210790	0.0%	100.0%
	X2 Staff Expenses	20840910	20840910	0.0%	100.0%
	X3 Total Deposits	166370270	166370270	0.0%	100.0%
	Y1 Income	12750340	12750340	0.0%	100.0%
	Y2 Loans	754670140	754670140	0.0%	100.0%

Source: Data processed by Warwick Win DEA

12. Qatar Islamic Bank (QIB), the UK

Based on Table 14, during five years from 2015-2019, the Bank of England QIB Islamic Bank's overall efficiency level was excellent, reaching 100.00% from 2015-2019. The average efficiency is 100.00%. The Bank of England QIB 2019 efficiency score can be seen in Figure 10. The efficiency value obtained by Bank QIB 2019 shows 100.00 percent. This value means that Islamic banks are efficient in terms of fixed assets, staff expenses, total deposits, income, and loans by the actual Amount (US Dollar). These conditions must be maintained the following year. This result contradicts with Öndeş et al. (2019) that find QIB Bank efficiency is fluctuating.

Figure 10. QIB Islamic Bank UK Efficiency Scores 2019



Source: Data processed by Warwick Win DEA

Table 14. QIB Islamic Bank UK Efficiency Scores and Improvement 2015- 2019

Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	16249	16249	0.0%	100%
	X2 Staff Expenses	3715	3715	0.0%	100%
	X3 Total Deposits	7726	7726	0.0%	100%
	Y1 Income	2548	2548	0.0%	100%
	Y2 Loans	299627	299627	0.0%	100%
2016: 100%	X1 Fixed Assets	15827	15827	0.0%	100%
	X2 Staff Expenses	3977	3977	0.0%	100%
	X3 Total Deposits	132498	132498	0.0%	100%
	Y1 Income	131	131	0.0%	100%
	Y2 Loans	397313	397313	0.0%	100%
2017: 100%	X1 Fixed Assets	15354	15354	0.0%	100%
	X2 Staff Expenses	4569	4569	0.0%	100%
	X3 Total Deposits	148083	148083	0.0%	100%
	Y1 Income	1760	1760	0.0%	100%
	Y2 Loans	428522	428522	0.0%	100%
2018: 100%	X1 Fixed Assets	14837	14837	0.0%	100%
	X2 Staff Expenses	4631	4631	0.0%	100%
	X3 Total Deposits	157790	157790	0.0%	100%
	Y1 Income	3713	3713	0.0%	100%
	Y2 Loans	518870	518870	0.0%	100%
2019: 100%	X1 Fixed Assets	14434	14434	0.0%	100%
	X2 Staff Expenses	4876	4876	0.0%	100%
	X3 Total Deposits	158005	158005	0.0%	100%
	Y1 Income	4427	4427	0.0%	100%
	Y2 Loans	571245	571245	0.0%	100%

Source: Data processed by Warwick Win DEA

13. Rasmala Islamic Bank, The UK

During five years from 2015-2019, the Rasmala Islamic Bank UK's overall efficiency level was outstanding. The value is reaching 100.00% from 2015-2019. The average amount of efficiency is 100.00%. Recommendations in the efficiency of the Rasmala Islamic Bank UK 2019 shows in Figure 11.

Table 15. Rasmala Islamic Bank, The UK Efficiency Scores 2015-2019

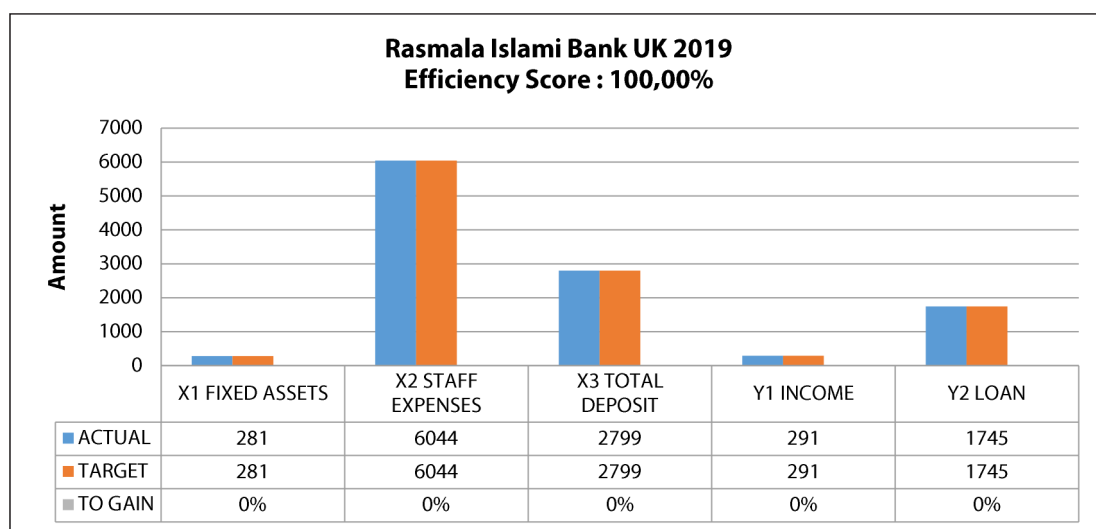
Efficiency Score	Variable	Actual	Target	To Gain	Achieved
2015: 100%	X1 Fixed Assets	174	174	0.0%	100%
	X2 Staff Expenses	5378	5378	0.0%	100%
	X3 Total Deposits	6630	6630	0.0%	100%
	Y1 Income	600	600	0.0%	100%
	Y2 Loans	40244	40244	0.0%	100%
2016: 100%	X1 Fixed Assets	344	344	0.0%	100%
	X2 Staff Expenses	6199	6199	0.0%	100%
	X3 Total Deposits	4180	4180	0.0%	100%
	Y1 Income	249	249	0.0%	100%
	Y2 Loans	34056	34056	0.0%	100%
2017: 100%	X1 Fixed Assets	309	309	0.0%	100%
	X2 Staff Expenses	6957	6957	0.0%	100%
	X3 Total Deposits	6847	6847	0.0%	100%
	Y1 Income	135	135	0.0%	100%
	Y2 Loans	20565	20565	0.0%	100%
2018: 100%	X1 Fixed Assets	273	273	0.0%	100%
	X2 Staff Expenses	8065	8065	0.0%	100%
	X3 Total Deposits	6359	6359	0.0%	100%
	Y1 Income	236	236	0.0%	100%
	Y2 Loans	4931	4931	0.0%	100%
2019: 100%	X1 Fixed Assets	281	281	0.0%	100%
	X2 Staff Expenses	6044	6044	0.0%	100%
	X3 Total Deposits	2799	2799	0.0%	100%
	Y1 Income	291	291	0.0%	100%
	Y2 Loans	1745	1745	0.0%	100%

Source: Data processed by Warwick Win DEA

The efficiency value obtained by Rasmala Bank UK 2019 based on DEA calculation shows 100.00 percent. The value means that Islamic banks are in an efficient condition in terms of fixed assets, staff expenses, and total deposits, Income, and Loans according to the

actual Amount (US Dollar). This condition from the fact that there is no difference between the actual data and the target data or its ideal form. Rasmala Bank can have efficient results, but these results are not relevant to previous research from Öndeş et al. (2019) that Islamic banks in the UK experienced inefficiency and Turkish Islamic banks experienced efficiency, including Rasmala Bank, one of the factors was because Rasmala Bank UK's assets were still small. However, These results also prove that the assets' size does not necessarily affect the efficiency value.

Figure 11. Rasmala Islamic Bank UK Efficiency Scores 2019



Source: Data processed by Warwick Win DEA

Conclusion

This research calculates the efficiency of 13 Islamic banks in Indonesia, Saudi Arabia, and the United Kingdom for the 2015-2019 period. The result shows that in 2015 there were ten efficient Islamic banks and three Islamic banks experiencing inefficiency. In 2016 there were nine Islamic banks that efficient and four Islamic banks that experience inefficiency. There were ten Islamic banks that efficient and three Islamic banks that inefficient in 2017. In 2018 there were seven Islamic banks that efficient and six sharia banks that were inefficient. Finally, in 2019, there are eight efficient Islamic banks and five inefficient Islamic banks. During the 2015-2019 period, each Islamic Bank in Indonesia, the UK, and Saudi Arabia had different efficiency levels.

Some variables are inefficient, like from total assets, staff expenses, and total deposit variables. The 100% efficient rate shows that Islamic banks have been right in allocating production factors compared with other Islamic banks. Specific results obtained through managerial simulations indicate that Islamic banks can be improved to be efficient in the future. The efficiency level of an inefficient Islamic bank base on its variables. If labor expenditure is inefficient, then the number of workers handling Islamic banks is too much. To overcome inefficiencies in the workers can be done by adding production aids. Inefficiencies in total assets and total deposits state that the Islamic banks are relatively wasteful in allocating them.

Inefficiencies in income and loans indicate that the Islamic Bank produces relatively less income and loans than other Islamic banks, where efficient Islamic banks can produce more with the same input and output ratio. The inefficiency of staff expenses indicates that Islamic banks' inefficient workers are relatively less productive than Islamic banks whose workers are efficient.

Based on the results of the study's conclusions and limitations, suggestions that can be submitted to improve efficiency are: First, reducing the workers of inefficient Islamic banks. Second, reallocating wastage of total variables assets and total deposits. Third, implementing policies that can result in increased income and loans. Fourth, this research should be preceded by local-level research to obtain an average picture of input and output allocations so that data accuracy is better than before. Fifth, Islamic banks can use this research to reduce wasteful variables like the number of workers and staff cost efficiency and optimize those that are still less than optimal, like income and loan to achieve efficiency.

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