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Efficiency of Waqf Organizations in Pakistan: Data Envelopment Analysis

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ABSTRACT

The philanthropic sector of Pakistan is guided and rooted by the Islamic system of charity. Waqf is an important instrument of Islamic charity that has played a significant role in Islamic history by provided various public services to communities. Many public and private waqf institutions in Pakistan are deeply committed to serving society through a wide range of philanthropic activities. The objective of this research is to measure the efficiency of public and private (hybrid) waqf organizations in Pakistan. This research uses the Data Envelopment Analysis (DEA) a non-parametric approach, with output orientation and variable return to scale (VRS) assumption. A data sample of 100 hybrid waqf organizations was gathered during the period of 2021-2022. The result shows that waqf organizations in Pakistan, on average, remains technical efficient with an efficiency level of 74%. The pure technical efficiency score of large, medium and small size organizations were 75%, 85% and 88% respectively. The highest efficiency level of small size organizations could be due to their low operation costs and fewer employees. The overall scale efficiency level of waqf institutions is 89%. Pakistani waqf organizations can enhance efficiency by investing in technology, improving staff skills, and optimizing resource allocation. Strategic partnerships and government support can further boost their impact.

KEYWORDS	Data Envelopment Analysis (DEA), Efficiency, Pakistan, Waqf Organizations

Introduction

To achieve sustainable development and reduce poverty, the global economy needs massive infrastructure investment. This will require mobilizing all resources, public, private, and philanthropic. Waqf is a significant and powerful institution in the Islamic philanthropic sector. Waqf is an Arabic word that literally means "to stop, to hold, limitation, or prohibition." It is derived from the hadith, as it is not mentioned in the Quran. When Hazrat Umar told Prophet Muhammad (peace be upon him) that he had a very precious piece of land, the Prophet told him to make it "habs" and use its profits for charity. Waqf is a synonym of habs, which means "locking up." Technically, it refers to holding a certain property and preserving it for the restricted benefit of certain benevolent purposes, prohibiting any use outside its specific objective (Kahf, 2003). The historical achievements of waqf (plural:awqaf) in enhancing societal well-being are noteworthy. Awqaf can be used to strengthen the capabilities of deprived populations by providing them with essential services such as healthcare, clean drinking water, education, shelter, and other public goods (Khan, 2004).

Waqfs existed in Pakistan before the colonial era, but under the Mughal regime, land areas under waqf were administered by the state. During the British era, Islamic religious law was amended to ban family waqfs. Muhammad Ali Jinnah then strived to

restore the rights of private ownership of Islamic waqfs. His struggle was successful in 1913 when the Muslim Waqf Validating Act was passed, which returned the private property of waqf to its owners (Malik, 1990). In 1979, waqf became a provincial matter, and separate waqf properties acts were approved by government of Pakistan and implemented in the four provinces of Baluchistan, Khyber Pakhtunkhuwa, Punjab, and Sindh. According to this act, Awqaf departments operate in each province with budgets in the millions. However, their involvement in providing social services is very limited. They are primarily responsible for the administration of mosques, shrines, and other religious places. They have also taken over the management of private waqfs whose founders have died (Usman and Rahman, 2020). On the other hand, privately administered awqaf contribute to society's well-being by providing education, healthcare, and clean drinking water. They do this in their individual capacity, focusing on these specific areas. Private waqf used English form of organizations like trusts, foundations, and societies because of state regulation. These hybrid models of waqf provided a wide range of social services for the development of the people of Pakistan (Abbasi, 2019).

The waqf organizations would have a significant impact on society's development if they are managed effectively and efficiently. Three E's are used to measure the performance of public sector organizations: efficiency, economy, and effectiveness. Efficiency is defined as the rational use of inputs in order to maximize the output or profits. In case of non for profit organizations, efficiency should not be measured by profit maximization, but by the fulfillment of social goals through the provision of social services to the maximum number of beneficiaries (Rodriguez *et al*, 2016). In other E's, economy reflects the relationship between the allocation of resources for any project and gain from it. Effectiveness represents the impact of management activities on output (Wahab and Rahman, 2013). Awqaf is a public sector institution, so it is a public concern to examine its efficiency. Data Envelopment Analysis, a non-parametric approach of efficiency analysis is used in this study to measure the efficiency of waqf organizations. Data on selected inputs and outputs were obtained from published annual reports of large and medium-sized organizations, and unpublished data from officials of small-sized organizations. This paper measures the efficiency of 100 public and private waqf institutions in Pakistan, filling a gap in the literature, as there is no previous study in Pakistan evaluating the performance of waqf institutions.

Literature Review

Over the past two decades, Islamic finance has grown by more than 10% per annum, making it one of the fastest-growing financial sectors in the world. Zakat and waqf are two of the most important components of Islamic social finance, playing a vital role in promoting social justice and economic development. Pakistan has both public and private awqaf, but they are undergoing a revival. Public awqaf are strictly controlled by the government and are used to manage mosques, shrines, and graveyards, which reflects their historical role. There is inflexible and hard rule and legislation for private awqaf in Pakistan, so most philanthropic activities are conducted through English legal structures such as trusts and foundations (Abbasi, 2019).

Public sector organizations are understudied in terms of their efficiency, despite studies by Ahmad et al. (2015), Shah (2022), Akmal (2008), and Hayat (2011) measuring the efficiency of commercial banks in Pakistan using Data Envelopment analysis. Ahmad (2011) measured the efficiency of microfinance institutions in Pakistan using Data Envelopment Analysis. He found that the MFIs under study had an average financial efficiency of 80% and an average social efficiency of 81%.In a 2020 study by M. Khan, the

performance of government and NGOs in delivering social services to rural people was compared. The survey results showed that people were more satisfied with NGOs for providing health, drinking water, and agricultural supplies.

Abbasi (2019) investigated the role of Islamic banks in waqf development in Pakistan. He conducted a case study of Ihsan Trust, a successful cash waqf project of Meezan Bank Limited established in 2010. As of 2018, Ihsan Trust had facilitated the higher education of over 20,000 students at around 110 educational institutions. The main donors to this waqf fund include Meezan Bank Limited, other Islamic banks operating in Pakistan. In 2017, Ihsan Trust received the Global Islamic Economy Award in the waqf and endowment category in recognition of its efforts to provide interest-free loans for educational purposes. Similarly, Usman (2020) studied the role of waqf in funding higher education in Pakistan by examining three institutions: Hamdard Laboratories Pakistan, Begum Aisha Bawany Welfare Waqf, and Darul Tasnif Limited. He found that all three institutions generated sufficient funds to support their higher education activities.

Rusydiana et al. (2022) assessed the effectiveness of nine Indonesian charitable waqf institutions using Data Envelopment Analysis and a production strategy. The results revealed that the highest average Technical Efficiency (TE) and Pure Technical Efficiency (PTE) scores for waqf funds managed by waqf institutions in Indonesia were in 2016, namely TE (0.485) and PTE (0.722), while the lowest TE average score was in 2013 (0.115) and the lowest PTE was in 2018 (0.368). The study also found that the Covid-19 epidemic had no significant impact on the effectiveness of waqf institutions. In addition, Juliana et al, (2022) examined the efficiency of private waqf in Indonesia using DEA approach. Ozbek (2015) used Data Envelopment Analysis (DEA) to assess the effectiveness of five Turkish non-governmental organizations (NGOs). The Turkish Diyanet Foundation (TDF) was the most efficient non-governmental organization (NGO) in 2014. Misbharudin (2015) investigated the efficiency of Malaysian waqf organizations using DEA with an output orientation and a variable return to scale assumption. The results revealed that average technical efficiency is dependent on both pure technical and scale efficiency. Year 2012 showed a high technical efficiency of 73.9%, indicating that most of the institutions were operating at their optimal level. Rehman and Usman (2015) used the data envelopment analysis (DEA) method to evaluate the zakat efficiency of a panel of 14 State Islamic Religious Councils (SIRCs) in Malaysia. Their results suggest that scale efficiency outweighs technical efficiency, and that almost half of the institutions were scale inefficient in term VRS and DRS.

Material and Methods

Data envelopment Analysis; The Model

Data envelopment analysis (DEA) was developed by Charnes, Cooper, and Rhodes in 1978 to measure the efficiency of a set of units called decision-making units (DMUs). Their proposed model, the CCR model, uses a linear programming approach to measure the efficiency of DMUs in using their inputs and outputs. The BCC model (Banker, Charnes, and Cooper) is another widely used version of DEA for measuring efficiency. It differs from the CCR model in one aspect: returns to scale. The CCR model assumes constant returns to scale (CRS), while the BCC model is more flexible and allows for variable returns to scale (VRS). The VRS assumption estimates both pure technical efficiency and sale efficiency. If the estimates of pure technical efficiency and technical efficiency differ, this reflects scale inefficiencies. Coelli *et al*. (1996) noted that the BCC DEA model, has been used most commonly to measure scale efficiency since the

beginning of the 1990s. This is because the BCC model is more flexible than other DEA models and can accommodate a wider range of production technologies.

In the CCR model, the efficiency of each decision-making unit (DMU) is calculated by dividing the sum of weighted outputs by the sum of weighted inputs. The efficiency value for each DMU is equal to or smaller than 1, and the weights for inputs and outputs are positive.

The CCR model with output orientation and VRS assumption can be represented by the following linear programming problem:

$$Max\ w_k = \sum_{r=1}^{s} u_{rk}\ y_{rk} \tag{1}$$

$$\sum_{r=1}^{s} u_{rk} y_{rk} - \sum_{i=1}^{h} v_{ik}\ x_{rk} \le 0; \quad j=1, 2,\ldots, \tag{2}$$

Subject to

$$\sum_{i=1}^{m} v_{ik}\ x_{ik} = 1; \quad j=1, 2,\ldots, n \tag{i}$$

$$u_{rk} \ge 1; \qquad r=1\ ,\ldots, s \tag{ii}$$

$$v_{ik} \ge 1; \qquad i=1\ ,\ldots, m \tag{iii}$$

The DMU is denoted as w_k, while u_{rk} is the weight of the output r, v_{ik} is the weight of input i; y_{rk} and x_{ik} are output and input values of the kth DMU, respectively (Cooper et al., 2011).

Data and inputs-outputs

For this study, the efficiency of 100 Pakistani waqf organizations was examined for the 2021-2022 period. These 100 organizations were further classified into large, medium, and small size waqf institutions. Pakistan has a range of large and medium-sized non-profit organizations. Large organizations operate throughout Pakistan with more than 50 full-time employees, while medium organizations operate in 2-3 provinces with more than 20 full-time employees. Small organizations provide their services to a city or town (Rais, 1997). The selection of input and output variables depends on the availability of data and the previously reviewed literature. In this study, we used three inputs and three outputs for large and medium-sized organizations, and three inputs and two outputs for small-sized organizations. Data on return on investment (ROI) were not available for small-sized organizations. The data were collected from annual reports of organizations and unpublished data from organization's offices. The following table lists the input and output variables employed in the analysis.

Table 1
Inputs and Outputs Variable to the Efficiency Analysis

Inputs	Measurement of variables
Donations	Donation from national and international donors in form cash waqf, sadaqah and zakat
No of Employees	Total no of fulltime and part-time employees
Operative Expenses	Administration and managements Operative expenses
Outputs	
Expenses on Goals	Total expenses on projects executed
No of Beneficiaries	Total number of people assist from social projects
Return of Investment	Return from long term and short-term investment

Source: Rodríguez et al (2016) and own elaboration.

Following table depicts the descriptive statistics of inputs and outputs of this study.

Table 2
Descriptive statistics of inputs and outputs

Description	Panel A Large size Organizations	Panel B Medium size organizations	Panel C Small size Organizations
Output 1			
Expenses on Goals			
Mean	2.22×10^9	2.34×10^8	12057772
Median	7.9×10^8	78431774	8013400
SD	5.04×10^8	45180263	3976263
Output 2			
No of Beneficiaries			
Mean	2191868	51246.82	4278.79
Median	942605	25000	4500
SD	506795.7	18570.69	304.75
Output 3			
Return of Investment			
Mean	3.83×10^8	30999415	NA
Median	1.65×10^8	8643197	NA
SD	79726409	9218366	NA
Input 1			
Donations			
Mean	2.04×10^9	2.52×10^8	9356038
Median	8.91×10^8	98154622	8431128
SD	5.54×10^8	45981579	1063585
Input 2			
No of Employees			
Mean	2076.09	98.5	18.64
Median	2175	75.5	15
SD	270.98	14.78	2.18
Input 3			
Operative Expenses			
Mean	1.98×10^8	16202587	920181.1
Median	85914509	11282330	985435
SD	45546742	2999774	69833.01

Results and Discussion

The study employed Data Envelopment Analysis to evaluate the efficiency of waqf organizations. First, this section presents the results of the efficiency of large medium and small waqf organization by employing DEA output orientation separately. The output orientation was a logical rationale because the major objective of charitable organizations is to reach the maximum number of beneficiaries (Cook et al., 2014). In last we present the summary results of technical efficiency (TE) and its decomposition into pure technical efficiency (PTE) and scale efficiency (SE).

The efficiency of large-size, medium-size, and small-size organizations are calculated separately using the DEA output orientation approach. Table 3 depicts the large size organization efficiency results.

Table3
Efficiency Results of Large Size *Waqf* Organizations

DMUS	CRS Efficiency	VRS Efficiency	Scale Efficiency

1	1	1	0.623
2	0.927	0.927	1
3	1	1	1
4	0.442	0.497	0.889
5	1	1	1
6	0.315	0.439	0.718
7	1	1	1
8	0.676	1	0.676
9	0.509	0.712	0.714
10	0.268	0.279	0.961
11	0.438	0.45	0.974
12	0.242	0.242	0.997
13	1	1	1
14	1	1	1
15	0.279	0.305	0.914
16	0.601	0.637	0.944
17	0.794	1	0.794
18	0.358	0.398	0.899
19	1	1	1
20	0.498	0.533	0.934
21	0.317	0.483	0.657
22	0.245	0.319	0.768
23	0.218	0.484	0.451
24	1	1	1
25	0.247	0.298	0.828
26	1	1	1
27	1	1	1
28	0.604	0.972	0.622
29	1	1	1
30	1	1	1
31	0.8	0.843	0.949
32	0.755	1	0.755
33	0.564	0.89	0.634

DMUS: Decision Making Units (*Waqf* Organizations)
CRS Efficiency: Efficiency Under Constant Return to Scale
VRS Efficiency: Efficiency Under Variable Return to Scale

Table 3 employs an output orientation to compare the technical efficiency of all large sized Waqf organizations using both the CRS and VRS models. The CRS models reveal that 36% of the DMUs are efficient, with efficiency scores 1. The VRS models show that 45% of DMUs are overall technically efficient. 36% of firms are scale-efficient. An organization that has been pronounced inefficient under CRS may be considered efficient under VRS since the VRS border is "tucked inside" the CRS frontier. This is because the VRS model evaluates the potential benefits of operating at a specific size.

The results also show that 48% of Waqf organizations have a technical efficiency score of 0.7 or higher under the CRS model, whereas 60% have a score of 0.7 or higher when the VRS model is utilized. Similarly, 82% of Waqf organizations have a 0.7 or higher scale efficiency score. When a nonprofit organization receives a high scale efficiency score in a Data Envelopment Analysis (DEA), it indicates that it is operating at its most productive scale in terms of converting resources (inputs) into charitable effects (outputs). High scale efficiency may suggest a long-term sustainable operation that maximizes effect within the present framework.

Table 4
Efficiency Results of Medium Size *Waqf* Organizations

DMUS	CRS Efficiency	VRS Efficiency	Scale Efficiency
1	1	1	1
2	0.597	0.604	0.988
3	0.69	0.743	0.929
4	0.841	0.845	0.995
5	0.789	0.789	0.999
6	0.908	0.919	0.988
7	1	1	1
8	1	1	1
9	0.524	0.525	1
10	0.59	0.599	0.985
11	0.136	0.159	0.855
12	0.549	0.56	0.979
13	1	1	1
14	0.594	0.639	0.929
15	0.878	0.888	0.989
16	0.855	0.858	0.996
17	1	1	1
18	0.658	0.665	0.989
19	0.977	0.986	0.991
20	0.848	0.853	0.994
21	1	1	1
22	1	1	1
23	0.898	1	0.898
24	1	1	1
25	1	1	1
26	0.957	0.993	0.964
27	0.767	0.769	0.998
28	0.675	0.69	0.978
29	0.798	0.856	0.932
30	0.789	1	0.789
31	1	1	1
32	0.915	1	0.915
33	1	1	1
34	0.991	1	0.991

Table 4 shows the efficiency results of medium sized waqf organization. According to the CRS model results, 32% of medium-sized Waqf organizations are technically efficient, earning an efficiency score of 1. According to the VRS assumption results, 44% of organizations are technically efficient. Of the thirty-four Waqf organizations, thirteen are scale-efficient. The findings show that 74% of Waqf organizations have a technical efficiency score of 0.7 or higher under the CRS assumption, while 76% of organizations have a technical efficiency score of 0.7 or higher when the VRS model is applied. Similarly, all Waqf organizations have 0.7 and above scale efficiency score.

Table 5 shows the results of small-sized Waqf organizations, 15% are technically efficient, with an efficiency score of 1 under the CRS model. VRS assumes that 33% of organizations are technically efficient. Five out of 33 Waqf groups are scale-efficient. The results show that 58% of Waqf organizations have a technical efficiency score of 0.7 or higher under the CRS assumption, whereas 94% have a score of 0.7 or higher when the VRS model is applied. Similarly, 79% of Waqf organizations have a 0.7 or higher scale efficiency score.

Small-sized organizations outperform larger ones in terms of technical efficiency due to factors such as simplified operations, reduced bureaucracy, improved coordination, and quicker decision-making. Managers in smaller organizations can more easily identify and address inefficiencies, and employees may feel a stronger connection

to the Waqf's beneficiaries, leading to increased motivation and better performance. Additionally, smaller organizations are more agile, able to adapt to changing conditions and opportunities, and can avoid unnecessary overhead costs associated with complex organizational structures.

Table 5
Efficiency Results of Small Size *Waqf* Organizations

DMUS	CRS Efficiency	VRS Efficiency	Scale Efficiency
1	0.502	0.798	0.629
2	1	1	1
3	0.734	1	0.734
4	0.943	1	0.943
5	1	1	1
6	0.605	0.974	0.621
7	0.454	1	0.454
8	0.566	1	0.566
9	0.46	0.781	0.59
10	0.741	0.795	0.931
11	1	1	1
12	0.676	0.958	0.706
13	0.572	0.738	0.775
14	0.774	0.8	0.967
15	0.813	1	0.813
16	0.536	0.794	0.675
17	0.669	0.686	0.975
18	0.816	0.886	0.921
19	0.96	0.976	0.984
20	0.82	0.942	0.87
21	1	1	1
22	0.554	0.674	0.822
23	0.777	0.863	0.901
24	1	1	1
25	0.58	0.98	0.592
26	0.826	0.856	0.966
27	0.652	0.71	0.919
28	0.591	0.836	0.707
29	0.705	0.773	0.912
30	0.707	0.737	0.959
31	0.775	0.779	0.994
32	0.657	0.741	0.887
33	0.872	1	0.872

Table 6 depicts the summary results of all Waqf organizations in this study. Panel A consists of 33 large-size DMUs; Panel B consists of 34 medium-size DMUs; Panel C includes 33 small-size DMUs and Panel E includes total 100 DMUs.

Table 6
Summary of Statistics on Efficiency Score (TE, PTE and SE)

Type of Efficiency	Mean	Min	Max	SD
Panel A				
TE	0.658	0.218	1.000	0.300
PTE	0.749	0.242	1.000	0.290
SE	0.870	0.451	1.000	0.155
Panel B				
TE	0.830	0.136	1.000	0.199
PTE	0.851	0.159	1.000	0.198
SE	0.973	0.789	1.000	0.040
Panel C				
TE	0.737	0.454	1.000	0.169
PTE	0.881	0.674	1.000	0.115
SE	0.839	0.459	1.000	0.158

Panel D (Total)

TE	0.741	0.136	1.000	0.086
PTE	0.827	0.159	1.000	0.069
SE	0.894	0.451	1.000	0.070

TE: Total Efficiency
PTE: Pure Technical Efficiency
SE: Scale Efficiency

Table 6 shows that the technical efficiency scores of large DMUs range from 0.213 to 1, with an average score of 0.658. Medium DMUs have a wider range of scores, from 0.136 to 1, but a higher average score of 0.830. Small DMUs also have a wide range of scores, from 0.456 to 1, but their average score is slightly lower than that of medium DMUs, at 0.737. Similarly, small DMUs have a higher average pure technical efficiency (PTE) score (0.881) than large (0.749) and medium (0.851) DMUs. While medium size organizations have a higher scale efficiency (SE) score (0.973) than large (0.870) and small (0.839) size organizations. The results show that there is little difference in efficiency between different size classifications. Smaller organizations exhibit the highest pure technical efficiency, which is likely due to their lower staffing levels and operating costs. The results, however, show a significant difference in the minimum and maximum efficiency scores of waqf organizations, which warrants attention. A more interesting finding is that the average scale efficiency score is higher than the average pure technical efficiency score. This means that, on average, the organizations in the sample are operating at a scale that is closer to their optimal size than they are to their optimal level of technical efficiency.

Table 7
Returns to scale in waqf organizations in Pakistan

	Large size organizations		*Medium size organizations*		*Small size organizations*	
	No of DMUs	**% Share**	**No of DMUs**	**% Share**	**No of DMUs**	**% Share**
CRS	12	36%	13	38%	5	15%
DRS	12	36%	5	15%	24	73%
IRS	9	28%	16	47%	4	12%
TOTAL	33	100	34	100	33	100

The table 7 shows a trend in which medium-sized Waqf organizations have the largest economies of scale (growing return to scale), with 47% compared to large size Waqf organizations (28%), and small Waqf organizations (12%). This is further confirmed by the fact that 38% of medium-sized firms operate at optimal scale (constant returns to scale). In contrast, 73% of small firms encounter diseconomies of scale (a decrease in return to size), compared to 15% for medium and 36% for large organizations.

Small Waqf organizations may experience decreasing returns to scale due to several factors. Limited fixed assets may constrain growth as additional resources are added. Difficulty in finding qualified workers can hinder productivity gains. Focusing on larger beneficiary populations, even if inefficient, may be a necessity for smaller Waqfs, leading to diminishing returns. Insufficient infrastructure or training can limit the impact of additional employees. Finally, poorly planned program implementation can disrupt existing services and reduce overall efficiency. The scale inefficiencies could be tackled if waqf organization made improvements like investing in technology and increase their coordination and communication.

Conclusion

This research evaluates the efficacy of waqf organizations in Pakistan from 2021 to 2022. The non-parametric Data Envelopment Analysis (DEA) approach was used with output orientation and variable return to scale assumption. This approach provides three types of efficiency: technical, pure technical, and scale efficiency. The results show that waqf organizations exhibit a mean technical efficiency of 74%, mean pure technical efficiency of 83%, and mean scale efficiency of 89%. This suggests that scale efficiency dominates technical efficiency, so more attention should be paid to technical advancement to improve the overall efficiency of waqf organizations. Further the result of return to scale shows that most waqf organizations were not operating at constant return to scale (CRS). Only 30% were operating at CRS, while 41% were operating at decreasing return to scale (DRS) and 29% were operating at increasing return to scale (IRS). Comparing the results of large, medium, and small organizations, we find that small organizations have the highest pure technical efficiency, while medium organizations lead in both technical and scale efficiency. Waqf organizations could overcome these inefficiencies by investing in new technologies and equipment, launching new social service projects, and increasing their reach.

In conclusion, this study indicates that Pakistani Waqf institutions exhibit significant levels of efficiency, primarily driven by scale and technological advancements. However, a notable concern arises from suboptimal resource allocation, suggesting potential inefficiencies in resource utilization. This may be attributed to market imperfections specific to the Waqf sector.

Recommendations

Pakistani waqf organizations, while relatively efficient, may improve their performance by investing in technology, developing staff skills, and allocating resources more effectively. Economies of scale can be achieved through strategic partnerships, mergers, and specialization. Additionally, waqf organizations should prioritize data-driven decision-making, risk management, and sustainability. The government may help by reducing laws, offering tax breaks, and funding capacity-building projects. By addressing these areas, waqf organizations can maximize their social impact and better serve their communities.

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