

Waqf Efficiency: CRS, VRS and Malmquist Total Factor Productivity Index via Data Envelopment Analysis (DEA)

Hazriah Hasan^{a*}, Nur Farahiah Azmi^b, Nik Noorhazila Nik Mud^c, Ismail Ahmad^d, ^aPhD. Senior Lecturer of Faculty of Entrepreneurship and Business, Universiti Malaysia Kelantan (UMK), ^bTutor, Faculty of Entrepreneurship and Business, Universiti Malaysia Kelantan, ^cLecturer, Faculty of Entrepreneurship and Business, Universiti Malaysia Kelantan, ^dProfessor, PhD. Faculty of Business Management, Universiti Teknologi MARA Shah Alam, Email: ^{a*}hazriah.h@umk.edu.my

Waqf or Islamic endowment is established from the notion of religious and economic duty of a Muslim brother towards his worldly affairs and life hereafter. A stronger Waqf system would not only complete the equation for a comprehensive Islamic financial system that supports a more equitable distribution of wealth to ensure justice, but would also become the user of the Islamic financial services particularly in the management and investment of the Waqf funds. This study aimed to measure efficiency scores on two states of Kelantan and Penang that managed Waqf funds by its State Islamic Religion Councils (SIRCs). Efficiency can best be measured by Data Envelopment Analysis (DEA). In measuring the technical efficiency score of each state, we need to have information on the input and output of their operation by which we can compute a dynamic analysis according to the consecutive years begin at 2008 to 2010. From the results, we also compare between both scales of analysis in its constant return to scale (CRS) and variable return to scale (VRS) in order to evaluate its impact on the size of the firm towards its efficiency scores. In VRS DEA analysis, we can see whether the scale operation increases return to scale, decreases return to scale or remains stagnant. Malmquist index in DEA analysis was used to compare between the two states precisely. The result that we run using Data Envelopment Analysis (DEA) has shown only one state, namely Penang state, that operated at the full score (the benchmark) of efficiency, whereas Kelantan is far from fully efficient.

Key words: *Waqf, Efficiency, Malmquist TFP, DEA.*

Introduction

Islam is not just a religion of worship. It is a comprehensive discipline that includes all aspects of the sciences including economics. It provides many institutions that have to function in parallel in order to maintain a just and a welfare society for all. As a faith-based organization, Waqf stayed firm with its definition, context and motivation. According to Murat Cizakca in his writing of “Waqf in history and its implication for modern Islamic economies” (Monzer Kahf & Siti Mashitoh Mahamood, 2011), all over the vast Islamic world, from the Atlantic to the Pacific, magnificent works of architecture as well as myriad of services vitally important for the society have been financed and maintained for centuries through the Waqf system. Despite overwhelming achievements, the history of Waqf is a turbulent one and the fate of its institutions was closely linked to the fates of the states under which they functioned and operated. As a consequence, the Waqf system experienced dramatic ups and downs.

Moreover, Waqf is a form of charity with special features that have permanence and continuity. The property is perpetual and its benefit are continuous and without a timeframe. The beneficiaries can benefit from the waqf property for years, generations or even centuries. The ownership of waqf is withdrawn from the owner and returned to Allah for the benefit of His subjects to whom their property has been bequeathed. Waqf is a form of worship to Allah and has a significant contribution to economic development, playing an important role as a wealth redistribution mechanism (Asmak Abdul Rahman, 2009). Therefore, Waqf property must be seen as a valuable asset for investment, capital and development processes. The successful Waqf institutions will benefit not only fellow Muslims, but also the economy of the Ummah.

Waqf is derived from the Arabic word which means to make endowment of the land and give it to the needy. It is a religious endowment that is recognized by Shariah as a religious, pious or charitable donation. Waqf also means: make endowment of houses and keep its gains in the way of God.

By this we can understand that Waqf is wealth that was kept from the consummation of the original owner and benefits the poor and needy. That wealth must remain in the same condition without being consummated by the first owner. The four eminent Islamic scholars of al-Hanafī, al-Maliki, al-Syafi’I and Hanbali, have given different definitions of Waqf or endowment. However, all four scholars agree that Waqf has to keep the origin wealth and use its profit for charity in order to help the poor and needy. Baharuddin Sayin, Asmak Hj. Ali, and S. Salahudin Suyurno (2006) explained that State Religion and Islamic Councils became the sole trustee for all Waqf properties in the states. Legally, every SIRC plays a role managing and administering every single waqf property in cash, shares, building, land and so forth. One single institution responsible for every state’s waqf property and funds is hoped to ensure development, a good monitoring system, and integrity, as well as create a custom practice among all states in Malaysia. As in the history before the legislation of waqf law in Malaysia, property was



managed individually by the family members, ketua kampung, penghulu or the mosque committee itself.

The department plays a role as a planning coordinator and observes the waqf matter, as well as the Zakat administration system and the implementation of regulations of pilgrimage (hajj) administration. Jabatan Wakaf, Haji dan Zakat (JAWHAR) was formed in the Ministry of The Prime Minister's Department, which aimed at coordinating national Waqf matters and channelling the government's budgetary aids for every state of waqf development. Yayasan Wakaf Malaysia (YWM) was then established as the subsidiary body of JAWHAR in managing national cash waqf funds and its development. YWM introduced Saham Wakaf Malaysia to inculcate the spirit of helping other Muslim brothers by giving cash waqf donation.

Endowments are one of the institutions of Islam that began in the days of Prophet and that serve as a catalyst for the economic growth and development of Muslims. This institution is the cornerstone of the social security system of Islam, as well as other mechanisms such as zakat, alms and other. Therefore, it is an urgent need today to ensure that the system can run well and in line with current developments. This role is not only applied in worship to Allah SWT, but also as an economic institution that can impact the overall good of the Muslims, in particular Malays. Therefore, the sustainable nature of the existing system's endowment should systematically be planned and implemented by the State Islamic Council as Sole Trustee so that it can be a catalyst for a social security system for Muslims today.

Literature Review

The financial crisis and global debt problems are driving the world towards a challenging economic situation. New formulas for economic growth should be sought. Over the years, Malaysia's economy relies heavily on the active roles that have been played by the public and private sectors. Financial pressure and debt problems are hurting both sectors and call for a new transformation in the socio-economic growth model. Participation from the community in moving socio-economic activities need to be developed well. In order to realise this purpose, the third sector has needs to be developed, empowered, and, vitally, given more attention.

In the third sector, that is, the voluntary sector, the primary objective is not for profit but rather to defend and safeguard the welfare of the society. This third sector is unique, and its effectiveness is closely related to the level of volunteers. The higher the public involvement in volunteer activities, the greater the role of the third sector in building a country's socio-economic status. This sector usually involves voluntary activities such as the provision of social services, environmental protection and conservation, education and various other activities that are seldom overlooked by the public and private sectors.

Third sector is a voluntarily or non-profit sector of an economy. Etzioni (1973) mentioned in his writing that this third sector of the economy will be the most important alternative in the following decades, but not by replacing the public and private sectors. The third sector will match and balance the essential role of the public and private sectors. The writer described the third sector bodies in the United States as consisting of health insurance, student loans, NASA, postal service, railroads, universities, hospitals and other community service organizations.

In Moulaert and Ailenei (2005), the authors discussed social economy, the third sector, and solidarity relations from the perspective of history in terms of the present practices. In the article, historical facts showed the co-operative economy needs a new institutional impetus that is financially and administratively strong and concrete.

The other renowned institution of world higher learning is Al Azhar University in Egypt. Al-Azhar University of Egypt was established in the year 975M, which makes it the oldest university in the world, also got full financial support from Waqf, which thereby provided free education to people from all over the world from elementary school to University. In the year 1986, there is a provision about E 147,324,300 for this University to pay for education and building activities which comprise 55 faculties with 6154 academic staff including 849 professors, 819 associate professors, 1517 lecturers, 1456 tutors, and 1510 readers. Al-Azhar University was not only well known by its contribution to Islamic knowledge but also its contribution as the propagator of belief activities all over the world. This was similar to the declaration of George Makdisi who stated that education in Islamic world was based on Waqf.

Brown (2011) stated in his book that the 1961 law in Al Azhar was the most ambitious attempt by Egypt's post-1952 rulers to bring al-Azhar under their control, but there were two other aspects of al-Azhar governance that more subtly undermined the institution's position. First, religious endowments were more fully brought under the control of the Ministry of Religious Affairs (a process that began in the nineteenth century but that the Nasserist regime picked up with vigour). This step had the effect of undermining the fiscal independence of al-Azhar because it no longer had control over funds that had been specifically designated to support its activities. Second, in a series of moves, the office of shaykh of al-Azhar was attached to the prime minister's office rather than the presidents. This not only introduced an element of cabinet oversight; it was also considered by those mindful of the institution's prestige as an affront to its dignity. The shaykh of al-Azhar should properly be considered second in relation to Egypt's president. And he scoffed at the idea that the vicissitudes of election returns should influence the direction of al-Azhar, as if a liberal prime minister or minister of religious affairs should have some control over the institution's scholarship.

Efficiency was first defined by Debreu (1951) who proposed a measurement towards efficiency as "*A numerical evaluation of the 'dead loss' associated with a non optimal situation (in the*

Pareto sense) of an economic system.” There was then the work of M. J. Farrel (Farrell, 1957) in his paper in the Journal of the Royal Statistical Society in 1957 which was entitled: The Measurement of Productive Efficiency. He used the work of Koopmans (1951) and Debreu (1951). Farrel demonstrated how distance functions can be used in a practical way. To illustrate this in a practical way he uses an empirical example of efficiency in the agricultural sector.

In his paper, Farrell (1957) introduced a satisfactory measure of productive efficiency and offered a practical solution to it. He used the concept of efficiency postulated by Koopmans (1951) and the radial type of efficiency measure considered by Debreu (1951) to introduce the foundation for efficiency analysis. He differentiated between technical and allocative efficiencies. A firm is technically efficient if it uses the minimal possible combination of inputs for producing a certain output (input orientation). Allocative efficiency, or as Farrell called it price efficiency, refers to the ability of a firm to choose the optimal combination of inputs given input prices. If a firm has realized both technical and allocative efficiency, it is then cost efficient (overall efficient).

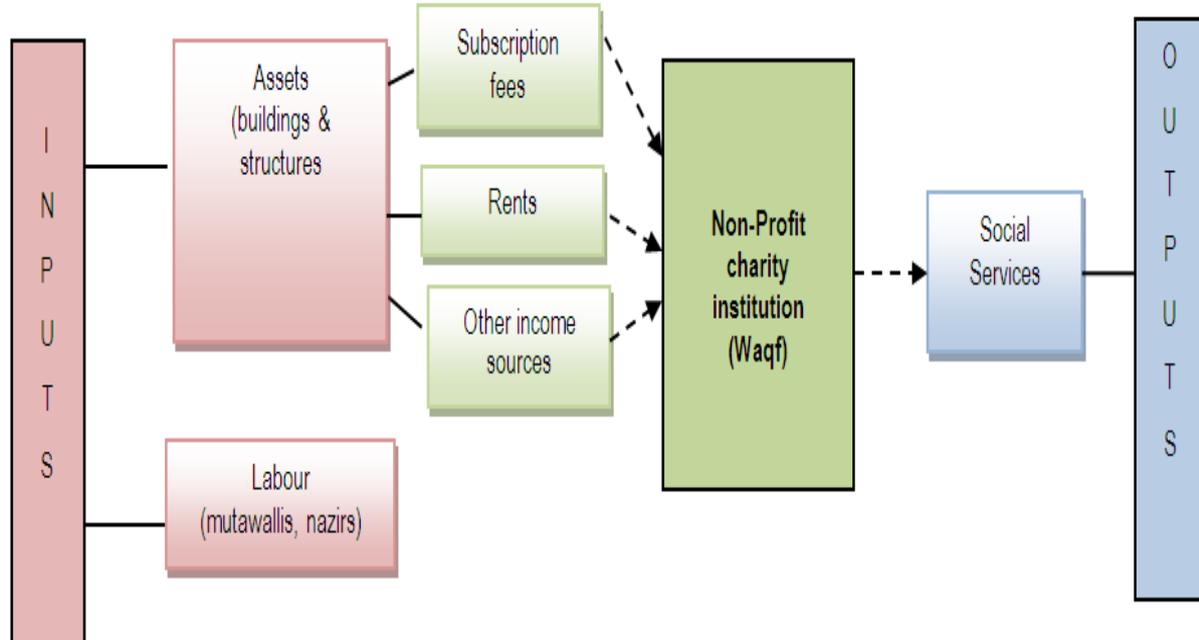
In economic literature, the ‘efficiency’ terminology is usually centred on the physical, allocative and economic aspects of enterprising, not being conveniently adaptable to Waqf operations. In contrast, concepts of financial and operational efficiency seem to be more in line with the nature of Waqf operation. Hossein Pirasteh in **“Efficiency criteria in the public and private Waqf management: the Iranian experience”** describes about three general definitions of efficiency: technical, allocative and economic efficiency (Monzer Kahf & Siti Mashitoh Mahamood, 2011). Even though the definition of efficiency seems to be applicable to all private, public, profit and non-profit seeking enterprises, it is expected that the definition, measurement and interpretation of the social institutions to be rather different. There are differences in objectives, as well as in the nature of performance of Waqf organizations, specifically in terms of its insourcing and outsourcing flows.

Waqf efficiency is discussed in the articles by Ahmad and Hasan (2018); Hasan (2017). The authors managed to measure Waqf efficiency for Malaysian public Waqf institutions as in State Religious Islamic Councils (SIRCs). The DEA method focuses on the technical efficiency of input savings, which can be further detailed into its pure technical and scale efficiency components. The results of this study enrich knowledge on the factors that influence the performance of Waqf institutions in Malaysia.

In Figure 1, the author provides the operational framework of non-profit charity institutions that are waqf institutions. The input information comprises of all resources for the operation such as labour, asset, office building and other income sources. The output information therefore prescribes all the products or benefits that reach the people. In the waqf situation, the output constitutes the projects that are finished for the benefit of the society, as well as the

amount of funds allocated for welfare and development. Critically, waqf funds, property and asset must be kept perpetually in its original value. This is different to zakat funds, which are allocated to be fully spent for the benefit of the beneficiaries.

Figure 1. Operational framework of non-profit charity institutions (Waqf) (Hossein Pirasteh in Monzer Kahf and Siti Mashitoh Mahamood (2011)



Methodology

Data envelopment analysis (DEA) is categorized under a non-parametric mathematical programming approach to frontier estimation. The attention to DEA began with the paper wrote by Charnes, Cooper and Rhodes in 1978 in which they coined the term data envelopment analysis. Ever since then a large number of researches applied and upgraded the methodology. Charnes A, Cooper WW, and Rhodes E. (1978) proposed a model which had an input orientation and assumed the constant return to scale (CRS). This model is known as CCR model in DEA. Later, Banker, Charnes, and Cooper (1984) introduced a variable return to scale (VRS) model of DEA and recognized the BCC model in DEA. DEA is convenient in assessing the multiple input and output variables of these entities by not requiring congruity and an apriori relationship makes it a very popular management tool in many application areas (Akçay, Ertek, & Büyüközkan, 2012). According to the authors, DEA is a widely used benchmarking tool to evaluate performances and efficiency.

The individual units or firms in this study that we are measuring for efficiency are all three SIRC's of Kelantan, Pahang and Penang. The firms are known as Decision Making Units

(DMUs). Each DMU has a number of inputs used to produce different outputs. In the standard model it is assumed that there are constant returns to scale (eg doubling all inputs will result in the doubling of all outputs).

We consider a problem with n DMUs indexed by j in $\{1, 2, \dots, n\}$. Each DMU has p inputs and q outputs. DMU j has inputs $a_{1j}, a_{2j}, \dots, a_{pj}$ and outputs $c_{1j}, c_{2j}, \dots, c_{qj}$. Here a_{ij} is the amount of input i used by DMU j for $i = 1, \dots, p$ and c_{tj} is the amount of output t produced by DMU j for $t = 1, \dots, q$.

$$\begin{aligned} \text{Max } h_0(u, v) &= \frac{\sum_{r=1}^s v_r c_{r0}}{\sum_{i=1}^m u_i a_{i0}} \\ \text{Subject to: } &\frac{\sum_{r=1}^s v_r c_{rj}}{\sum_{i=1}^m u_i a_{ij}} \leq 1 \text{ for } j = 0, 1, \dots, n \\ &u_i \geq 0 \text{ for } i = 1, 2, \dots, m \\ &v_r \geq 0 \text{ for } r = 1, 2, \dots, m \end{aligned}$$

where;

- a_{ij} = the amount of input i utilized by the j th DMU
- c_{rj} = the amount of output r produced by the j th DMU
- u_i = weight given to input i
- v_r = weight given to output r
- j = number of DMUs

Thanassoulis (2001) prescribed in his book that traditionally DEA is one of the methods which we can use to assess the comparative efficiency of homogeneous operating units such as schools, hospitals, utility companies or sales outlets. In less traditional contexts DEA can be used to choose from a set of competing multi-attribute alternatives such as selecting a most preferred site for locating some major facility or a sale outlet.

Several papers discussed the bank or financial institutions' efficiency (Berger, Leusner, & Mingo, 1997; Berger & Mester, 1997; Drake, Hall, & Simper, 2009; Halkos & Salamouris, 2004; Holod & Lewis, 2011) as a proxy for identifying the method of measuring efficiency in Waqf institutions. The reason for this is that there is no publication that discusses the use of DEA in measuring Waqf institutions' efficiency; the measurement of efficiency of the Islamic banks and Zakat department is thus referred.

In Sufian (2009), he found determinants of banking efficiency during Asian financial crisis in 1997 from a Malaysia perspective. The study was investigating Malaysia banking efficiency during the crisis by using DEA approach. It then examined the robustness of the estimated efficiency scores from three different approaches, namely the intermediation approach, the value-added approach, and the operating approach in Tobit regression. The findings in the study showed a significant inefficiency in local banking sectors during the crisis as the study

also inserted the dummy variables of bank ownership, economic conditions and bank characteristics in determining the real determinants of banking efficiency.

Sufian (2010) The present paper also provides important findings in regard to the best practice among banks. The findings from this study could be useful to bank management and policymakers in developing and transitioning economies in regard to attaining optimal utilization of capacities, improvement in managerial expertise, efficient allocation of scarce resources, and the most productive scale of operation in the banking sector. The inputs variable consists of deposits, fixed assets and overhead expenses in order to represent measures for the banks' labour, capital and operating costs. The output variable consists of loans, advances, and also the investments made by the banks as to represent measures for bank revenue and major bank activities. The findings concluded that banks operations reduced costs successfully, but at a non-optimal scale.

Nor Hayati Ahmad, Mohamad Akbar Noor Mohamad Noor, and Fadzlan Sufian (2010) provided an empirical study measuring Islamic bank efficiency from all Muslim countries that practiced Islamic banking during the period of 2003 to 2009. This vast research was dominated by macroeconomic findings that examined countries' banking characteristics and economic indicators of the studied countries which may have a relationship with the performance of the Islamic banking sector. It is commonly acknowledged that the choice of variables in efficiency studies significantly affect the findings. Islamic bank activities have differences with conventional banks in terms of its products, services and financial sources. Therefore, this study carefully identified its output and input variables so that the findings best represent the sector. Two approaches applied in this study was the production approach and intermediation approach. Both approaches categorize different input and output variables. In the production approach, Islamic banks are regarded as the services providers; the inputs are physical variables of labour and materials, including other associated costs. The outputs are all the services provided in term of transactions, documents processed and specialized services provided over a given time period. In the intermediation approach, Islamic banks are considered as the party that intermediates funds between savers and investors. Therefore, the inputs are labour, deposits and physical capitals while loans and investments traded are regarded as the outputs. The findings of the study concluded that Islamic banking sector is dominated by the high income Muslim countries that represent higher income people and prosperous nations.

In this study, we used DEAP Version 2.1 by Coelli T.J, a DEA application tool in computing efficiency and productivity. We apply two inputs and single output data due to limited sources of data. When we search for the information on the collection of Waqf funds and its benefit for the society, we were exhausted for having easy-to-get database. Normally for each SIRC they have different approaches for recording their financial data and necessarily need us to screen for the most suitable dataset. In DEA, the score ranges from zero (0) to one (1). Zero score

equals zero percent efficient (inefficient) score and one equalizes one hundred percent efficient score.

From Table 1, the data set was collected by its input and output information, which constituted Input 1 as the total collection in Ringgit Malaysia value of each Waqf department, and Input 2 as the number of staff hired by the department itself. The output solely becomes the benefit from the Waqf institution generally that counts the value in Ringgit Malaysia of the projects. The data caters three states only: Kelantan, Pahang and Penang states for the years of 2008 to 2010. Kelantan Waqf Department denotes Firm 1, Pahang Waqf Department as Firm 2 and Firm 3 is for the Penang Waqf Department. This study will dynamically examine the efficiency scores for each state and for each year. This test also measures the efficiency score for each Waqf state institutions in its variable return to scale (VRS) in order to see whether the firms operated at the increasing return to scale or decreasing return to scale. Increasing return to scale denotes that the firm is still a small-sized operation and needs to increase its scale of operation. If the firm scaled as DRS or decreasing return to scale, the firm needs to decrease its scale of operation because the operation scale is too big till lead to a loss.

Table 1: Descriptive analysis of the data (2008-2010)

	MEAN	MEDIAN	STDV
FIRM 1			
Input 1	122894.7	112417	19930.85
Input 2	3	3	0
Output 1	1550364	1562194	128542.4
FIRM 2			
Input 1	108546.9	111897.8	5897.574
Input 2	7	7	0
Output 1	154600	89800	144354.7
FIRM 3			
Input 1	56711	59908	37344.28
Input 2	9	9	0
Output 1	20000479	13612815	16778192

Analysis & Findings

Table 2 was produced by static analysis on CRS DEA of each firm for 2008 until 2010. From the table, Kelantan Waqf Department scores 0.531 for its technical efficiency (TE) score, a far different with Pahang Waqf Department that scores only 0.009 of its TE score. Penang Waqf Department has its full efficiency score that is equal to 1.000. From that, we examine a dynamic CRS DEA for a clearer observation of overall efficiency scores (Table 3). Dynamic DEA test gives more observation and detailed analysis for researcher because it runs for a single year only in a round, then from that we able to see trend and movement along the years analysed.

This dynamic DEA test, we can see that for Kelantan Waqf Department efficiency score varies from 0.531 (2008), 0.093 (2009) and 0.243 in 2010. Pahang Waqf Department efficiency scores also varies; 0.009 (2008), 0.001 (2009) and 0.021 in 2010. Penang denoted a full efficiency score for all three years, meaning that for 3 years consecutively, Penang Waqf Department operated at efficient score levels. The analysis continues to analyse variable return to scale DEA or VRS DEA in Table 4. The significant finding from VRS DEA is that it computes the scale resulted, either increasing return to scale (IRS), decreasing return to scale (DRS) or stagnant. Stagnant scale shows the firm operated at the best practice of its management and operation. IRS or DRS hinted to the firm either to make a shift backward or forward in satisfying the best practice scale. Therefore, in the table, both Kelantan Waqf Department and Pahang Waqf Department showed an IRS scale that conveys the need of both firms to make vast changes such as increasing the number of its staff, branches, size and so forth. Penang Waqf Department showed the best of its operation practices in running the operation of waqf.

Table 2: Technical efficiency (TE) scores for each firm 2008-2010

Static CRS 2008-2010		
Firm	TE	CRS/Input Oriented
1	0.531	
2	0.009	
3	1	
Mean	0.531	

Table 3: Dynamic technical efficiency (TE) scores for years accordingly

Dynamic CRS DEA			
	TE 2008	TE 2009	TE 2010
Firm 1	0.531	0.093	0.243
Firm 2	0.009	0.001	0.021
Firm 3	1	1	1
Mean	0.531	0.365	0.421

Table 4: VRS technical efficiency (TE) scores and its scales

DEA 2008-2010 VRS			
Firm	CSRTE	VRSTE	Scale
1	0.531	1	IRS
2	0.009	0.017	IRS
3	1	1	-
Mean	0.531	0.855	0.516



Conclusion

Measuring efficiency of a financial institutions is an easy job if the information is ready and available. Nevertheless, dealing with not-for-profit organisation or state-owned institutions, especially in the waqf field that constitutes its own definition of funds disbursement, gave us a tough challenge in materializing its data. From this point we can figure out a good proposal towards standardized financial reporting and documentation. It will provide a useful principle for further research in waqf development and performance in future.

Efficiency measurement provides a benchmark to the management part of the organisation so that the correction measure can be made. The efficient firm, Penang Waqf Department in this study, can be the benchmark for the other two firms in achieving the best practice of their operation.

REFERENCES

- Ahmad, I., & Hasan, H. (2018). Dynamic efficiency of Malaysian public waqf: a benchmarking analysis: Penerbit Universiti Malaysia Kelantan.
- Akçay, A. E., Ertek, G., & Büyüközkan, G. (2012). Analyzing the solutions of DEA through information visualization and data mining techniques: SmartDEA framework. *Expert Systems with Applications*, 39(9), 7763-7775. doi:10.1016/j.eswa.2012.01.059
- Asmak Abdul Rahman. (2009). Peranan wakaf dalam pembangunan ekonomi umat Islam dan aplikasinya di Malaysia. *Shariah Journal*, Vol. 17(No. 1), 113-152.
- Baharuddin Sayin, Asmak Hj. Ali, & S. Salahudin Suyurno. (2006). *Pengenalan pengurusan wakaf di Malaysia*. Shah Alam: Pusat Penerbitan Universiti (UPENA).
- Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management science*, 30(9), 1078-1092.
- Berger, A. N., Leusner, J. H., & Mingo, J. J. (1997). The efficiency of bank branches. *Journal of Monetary Economics*, 40(1), 141-162. doi:10.1016/s0304-3932(97)00035-4
- Berger, A. N., & Mester, L. J. (1997). Inside the black box: What explains differences in the efficiencies of financial institutions? *Journal of Banking & Finance*, 21(7), 895-947. doi:10.1016/s0378-4266(97)00010-1
- Brown, N. J. (2011). *Post-revolutionary Al-Azhar*. Washington: Carnegie Endowment for International Peace Publications Department.
- Charnes A, Cooper WW, & Rhodes E. (1978). Measuring the efficiency of decision making units. *Journal of Operational Research*, 2(6), 429-444.
- Debreu, G. (1951). The Coefficient of Resource Utilization. *Econometrica*, 19(3), 273-292.
- Drake, L., Hall, M. J. B., & Simper, R. (2009). Bank modelling methodologies: A comparative non-parametric analysis of efficiency in the Japanese banking sector. *Journal of International Financial Markets, Institutions and Money*, 19(1), 1-15. doi:10.1016/j.intfin.2007.05.002
- Etzioni, A. (1973). The third sector and domestic missions. *Public Administration Review*, 33(4), 314-323.
- Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society, Series A*(General 120 (3)), 253-290.



- Halkos, G. E., & Salamouris, D. S. (2004). Efficiency measurement of the Greek commercial banks with the use of financial ratios: a data envelopment analysis approach. *Management Accounting Research*, 15(2), 201-224. doi:10.1016/j.mar.2004.02.001
- Hasan, H. (2017). The economic of microfinance and Waqf: a dynamic role of Malaysian women in the developing financial catalyst *CONTEMPORARY MUSLIM WOMEN: ISSUES, CHALLENGES & BEST PRACTICES* (pp. 391-402): Persatuan Ulama' Malaysia (PUM).
- Holod, D., & Lewis, H. F. (2011). Resolving the deposit dilemma: A new DEA bank efficiency model. *Journal of Banking & Finance*, 35(11), 2801-2810. doi:10.1016/j.jbankfin.2011.03.007
- Monzer Kahf, & Siti Mashitoh Mahamood (Eds.). (2011). *Essential readings in contemporary waqf issues*. Kuala Lumpur: CERT Publications Sdn. Bhd.
- Moulaert, F., & Ailenei, O. (2005). Social economy, third sector and solidarity relations: a conceptual synthesis from history to present. *Urban Studies*, 42(11), 2037-2053.
- Nor Hayati Ahmad, Mohamad Akbar Noor Mohamad Noor, & Fadzlan Sufian. (2010). Measuring Islamic banks efficiency: the case of world Islamic banking sectors. *MPRA Paper*, No. 29497.
- Sufian, F. (2009). Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia. *Research in International Business and Finance*, 23(1), 54-77.
- Sufian, F. (2010). Modelling banking sector efficiency: a DEA and time series approach. *Ekonomika*, 89(2), 111-119.
- Thanassoulis, E. (2001). *Introduction to the theory and application of data envelopment analysis: a foundation text with integrated software*. Massachusetts, USA: Kluwer Academic Publishers.