Non-Financial Performance Measurement for Shariah Banks: A Survey to Masyarakat Ekonomi Syariah (MES) Surakarta

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Abstract

Measurement of non-financial performance in shariah banks is needed to enhance their market share and to maintain their long-term sustainability. The main aim of this research is to show the position of shariah banks in Surakarta in respect with their non-financial aspects (i.e. product, service, human resource and image) based on opinions given by members of Shariah Economic Society (MES) of Surakarta. Extent analysis for Fuzzy Analytic Hierarchy Process is employed to measure the non-financial performance of the banks. The result indicates that the first two banks with best non-financial performance are BMI and BSM.

Keywords: Shariah bank, extent analysis, fuzzy analytic hierarchy process, service performance

1. Introduction

The number of Shariah Banks in Indonesia increased significantly in a couple of decades. In the end of 2007, there were three Islamic Commercial Banks with 401 offices. It increased to 11 Islamic Commercial Banks with 1,215 offices by December 2010 (Bank Indonesia, 2010). At the same time, there were 23 Islamic Business Units and 150 Islamic Rural Banks with 548 offices (Bank Indonesia, 2010). Depositor funds of shariah banks boosted to about 9.72 percent from the end of 2009 to April 2010 (Bank Indonesia, 2010). It seems that those promising figures indicate an increasing attention of Indonesian society to Shariah Banks. Despite a small correlation between number of bank offices and bank profitability (Hirtle, 2007), the increasing number of Islamic bank offices is one of indicators of rivalry among Islamic banks. For their business sustainability, hence, measuring non financial performance Islamic banks in addition to financial performance is inevitable.

Financial ratio is the most common criteria for measuring performance of banks (Naser and Montinho, 1997; Shih *et al.*, 2007; Rosly and Bakar, 2009). The financial ratio of capital, asset quality, management, earning, and liquidity (CAMEL) are some of the most important financial ratio in assessing bank performance. Infobank (2007), on the other hand, applies profitability, instead of management and earning.

Apart from that, non-financial criteria for measuring banks performance have also been applied in addition to financial criteria. Those non-financial criteria are service quality of bank (e.g. Jabnoun and Al-Tamimi, 2003; Zhou, 2004; Arasli *et al.*, 2005; Jabnoun and Khalifa, 2005; Mukherjee and Nath, 2005; Petridou *et al.*, 2007) and branch network size (Hirtle, 2007). They were applied due to the fact that it influences income of bank which in turn will affect long term profitability of the bank (Seçme *et al.*, 2009). With the above reasons, measuring banks performance in terms of their non-financial aspects is a necessity. In this paper, non-financial performance of Islamic commercial banks in Surakarta will be assessed. To deal with the fact that non-financial criteria are intangible, a fuzzy analytic hierarchy process (fuzzy-AHP) is utilized. Collected data were obtained from members of Masyarakat Ekonomi Syariah (MES) of Surakarta due to their expertise in Shariah Banking.

2. Shariah Banks in Surakarta

Bank Syariah Mandiri (BSM), the first Islamic Commercial Bank in Surakarta, firstly operated in Surakarta by the end of 2000. In 8 September 2003, Bank Muamalat Indonesia (BMI) opened branch offices. In the same year, Danamon Syariah, the Islamic Business Unit of Bank Danamon, firstly operated in Surakarta. From the early of 2004 to 2007, three Islamic Business Units (BRI Syariah, BNI Syariah and BTN Syariah) started to run their business in Surakarta. Bank Rakyat Indonesia (BRI) Syariah subsequently became Islamic Commercial Bank Since 2008. Two Shariah Banks (Bank Jateng and Bank Mega Syariah) have been operating since 2008. The summary of the development of Shariah Bank in Surakarta from 2000 to 2008 is depicted in Table 1.

Table 1. The development of numbers of Shariah Banks in Surakarta

Bank	Year								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
Islamic Business Units (UUS)	1	1	1	2	2	2	2	2	4
Islamic Commercial Bank (BUS)	0	0	0	1	2	4	4	4	4
Total	1	1	1	3	4	6	6	6	8

Source: Bank Indonesia (2010)

3. Criteria for Non-Financial Performance of Bank

Performance measurement of bank is important information for creditors, investors and stakeholders because it refers to the competitive assessment among banks (Seçme *et al.*, 2009). Financial aspect is the most common criteria for bank performance measurement. Recently, nonetheless, non-financial performance has been applied to bank assessment as well. It is due to the reason that non-financial performance has positive influence to long term performance of organisation (Seçme *et al.*, 2009). Moreover, Hussein and Hoque (2002) argued that non-financial performance serves as a better predictor for long term performance. In other words, non-financial performance leads to the success of bank (Hawari and Ward, 2006).

Non-financial performance can manifest in many different aspects of banks. Rod *et al.* (2003) categorise Information system, banking service product quality, internet banking service quality as non-financial sectors of bank. Seçme *et al.* (2009) use pricing, differentiation, marketing, delivery service, and

productivity as non-financial performance indicator of bank. However, the most commonly used non-financial performance of organisation including banking (Lepak, 1998; Petridou *et al*., 2007; Guo and Duff, 2008) is service quality dimensions.

Service quality dimensions have been applied in shariah banks (e.g. Tahir and Bakar, 2007; Astuti *et al*., 2009). However, shariah banks have different characteristics from those of conventional banks. That is, their operations have to comply with Islamic laws (shariah) such as profit and loss sharing approach. It is why some authors include shariah compliance dimensions, such as the shariah product that apply profit and loss sharing principles, into service quality dimensions for Shariah banks (Othman and Owen, 2002; Astuti, 2009).

4. Fuzzy Analytic Hierarchy Process Methodology

Analytic Hierarchy Process (AHP) has been developed by T. L. Saaty since 1970s and it is considered as an effective tool for decision making (Harker, 1987). Two of the benefits of AHP are its easiness to apply and its ability to deal with inconsistency of the argument (Harker, 1987). With those reasons, AHP has been used in many sectors such as banks performance measurement (Seçme *et al*., 2009), service quality assessment (Mikhailov and Tsvetinov, 2004; Chow and Luk, 2005), reward system for lecturer (Badri and Abdulla, 2004), social network analysis for knowledge management in an organisation (Liebowitz, 2005) and evaluation of advantage of information-sharing decision in supply chain (Perçin, 2008).

The first step of AHP is constructing the hierarchy of decision problem. Criteria and decision alternatives are structured into a hierarchy. The top of the hierarchy is the goal of decision, the middle is multiple criteria and the bottom of the hierarchy is the decision alternative. Once the hierarchy is defined, the next step is determining pairwise comparison matrix. Experts are involved in this step. Numerical value, namely Saaty scale is applied to determine pairwise comparison as presented in Table 2.

Table 2. Fundamental scale for AHP (Saaty, 1994)

Intensity of important	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
2	Weak	
3	Moderate importance	Experience and judgment slightly favor one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgment strongly favor one activity over another
6	Strong plus	
7	Very stmg or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
Reciprocals of above	If activity *i* has one of the above nonzero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*	A reasonable assumption
Rational	Ratios arising from the scale	If consistency were to be forced by obtaining *n* numerical values to span the matrix

Source: Saaty (1994) and modification

Prioritisation of criteria and alternatives are calculated sequentially. Let $C = \{C_j | j = 1, 2, ..., n\}$ be the set of criteria. The pairwise comparison of n criteria is then summarised in a $(n \times n)$ matrix M:

$$M = \begin{vmatrix} m_{11} & m_{12} & \cdots & m_{1n} \\ m_{21} & m_{22} & \cdots & m_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ m_{n1} & m_{n2} & \cdots & m_{nn} \end{vmatrix}, \quad m_{ii} = 1, m_{ji} = 1/m_{ij}, \quad m_{ij} \neq 0 \tag{1}$$

where $i, j = 1, 2, ..., n$.

However, vagueness of people judgement in pairwise comparison is one of problems of AHP. Integrating fuzzy theory (fuzzification) into AHP is a solution for that problem. The most common fuzzy number is triangular fuzzy number (TFN) (Seçme *et al*., 2009). The triangular membership function,
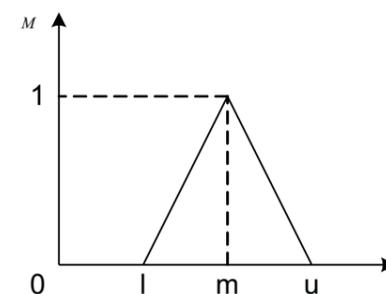

Figure 1. Triangular fuzzy number of *M*

Table 3. Fuzzy measurement of pairwise comparison

Lingusitic term	Saaty scale	TFN	Resiprocal TFN
Equal importance	1	(1/2, 1, 3/2)	(3/2, 1, 2)
Weak	2 (right)	(1, 3/2, 2)	
	2 (left)		(1/2, 2/3, 1)
Moderate importance	3 (right)	(3/2, 2, 5/2)	
	3 (left)		(2/5, 1/2, 2/3)
Moderate plus	4 (right)	(2, 5/2, 3)	
	4 (left)		(1/3, 2/5, 1/2)
Strong importance	5 (right)	(5/2, 3, 7/2)	
	5 (left)		(2/7, 1/3, 2/5)
Strong plus	6 (right)	(3, 7/2, 4)	
	6 (left)		(1/4, 2/7, 1/4)
Very strong	7 (right)	(7/2, 4, 9/2)	
	7 (left)		(2/9, 1/4, 2/7)
Very, very strong	8 (right)	(4, 9/2, 5)	
	8 (left)		(1/5, 2/9, 1/4)
Extreme importance	9 (right)	(9/2, 5, 11/2)	
	9 (left)		(2/11, 1/5, 2/9)

In this article, extent analysis will be applied to fuzzy approach. According to Kahraman *et al*. (2003) and Perçin (2008), the fuzzy synthetic extent is formulated as

$$S_i = \sum_{j=1}^{m} M_{gi}^j \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^j \right]^{-1} \tag{2}$$

where

$$\sum_{i=1}^{m} M_{gi}^{j} = \left(\sum_{i=1}^{m} l_{ij}, \sum_{i=1}^{m} m_{ij}, \sum_{i=1}^{m} u_{ij}, \right) \qquad (3)$$

$$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} = \left(\sum_{i=1}^{n} l_{ij}, \sum_{i=1}^{n} m_{ij}, \sum_{i=1}^{n} u_{ij}, \right) \qquad (4)$$

and l_i, m_i and u_i is represented by $l_i = \sum_{j=1}^{m} l_{ij}$, $m_i = \sum_{j=1}^{m} m_{ij}$ and $u_i = \sum_{j=1}^{m} u_{ij}$, respectively. The inverse of $\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j}$ is

$$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} \right]^{-1} = \left(\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i} \right) \qquad (5)$$

S_i in equation 2 is equal to:

$$S_i = \left(\sum_{j=1}^{m} l_{ij} \times \frac{1}{\sum_{i=1}^{n} m_i}, \sum_{j=1}^{m} u_{ij} \times \frac{1}{\sum_{i=1}^{n} l_i} \right) \qquad (6)$$

The degree possibility of $M_2 = (l_2, m_2, u_2)$ $M_1 = (l_1, m_1, u_1)$ is defined as:

$$V(M_2 \geq M_1) = hgt(M_1 \cap M_2) = \mu_{M_2}(d) = \begin{cases} 1 & if\ m_2 \geq m_1 \\ 0 & if\ l_1 \geq l_2 \\ \frac{(l_1 - u_2)}{(m_2 - u_2) - (m_1 - l_1)} & otherwise \end{cases} \qquad (7)$$

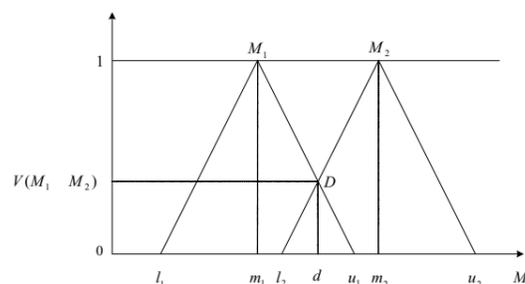Where d is the ordinate of the highest intersection point D between

Figure 2. Intersection between M_1 and M_2

The degree possibility for convex fuzzy number to greater than k convex fuzzy numbers $M_i (i = 1, 2, ..., k)$ is defined by:

$$V(M \quad M_1, M_2, ..., M_k) = V[(M \quad M_1)\ and\ (M \quad M_2)\ and\ ...\ and\ (M \quad M_k)] = min\ V(M \quad M_i), \qquad (8)$$

where, $i = 1, 2, ..., k$ and $k = 1, 2, .., n$; $k \quad i$, then the weight vector is:

$$W = (d'(S_1), d'(S_2), ..., d'(S_k))^{\top} \qquad (9)$$

Assume $d'(S_1) = min\ V(S_i \quad S_k)$

After fuzzification, the last step of AHP is a calculation of relative weight (M_w) of each matrix. Relative weight is the right eigenvector (w) of matrix multiplied by largest eigenvalue ($_{max}$):

$$M_w = \lambda_{max} w \qquad (10)$$

$$\bar{M}_{geometric} = \sqrt[n]{\prod_{i=1}^{n} M_i} \qquad (11)$$

5. Result

Thirty respondents were gathered randomly. They are members of Masyarakat Ekonomi Syariah (MES) Surakarta 2009. According to the survey, 23 respondents are academics and 7 respondents are shariah banking practitioners. Meanwhile, 16 respondents are undergraduates; nine respondents have Master degrees and five respondents hold doctoral degree.
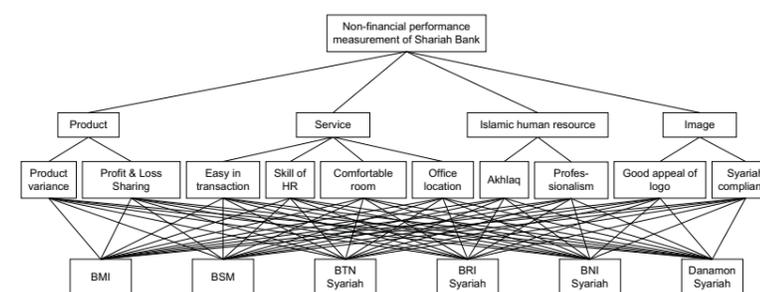

Figure 2. Hierarchy of the decision

Criteria and sub criteria are generated from the interview with respondents. Those criteria, sub criteria and alternatives are shown in Figure 3. Four criteria: product, service, Islamic human resource and image, are gathered from initial survey to MES members. Product is measured by product variance and profit loss sharing (PLS). Service is assessed through the easiness of banking transactions, the skill of employees, comfortable room for customer's services and good location for bank office. Human resource is evaluated from employee's *akhlaq* and their professionalism. Finally, image is considered by the appeal of logo for customers and the compliance of Islamic banks operation to Islamic laws (shariah).

Using those abovementioned criteria and sub-criteria, six Shariah Banks in Surakarta are compared: Bank Muamalat Indonesia (BMI), Bank Syariah Mandiri (BSM), Bank Tabungan Negara (BTN) Syariah, Bank Rakyat Indonesia (BRI) Syariah, Bank Negara Indonesia (BNI) Syariah and Bank Danamon Syariah. Those six Shariah Banks selected have run the business for more than two years and we predict that it is a sufficient period for introducing a bank to society such that people know that the bank has operated in Surakarta.

From this point onwards, the illustration of analysing the fuzzy AHP will be presented. The synthesis of fuzzyfication of the goal through geometric mean approach (see Equation 11) is shown in Table 4. Extent analysis of the synthesis of the goal is summarised in Table 5. Equation 4, 5 and 6 are applied to come to the result presented in that table. The result of Table 5 is analysed by using Equation 7 and Equation 8 to get the weight of each criteria (i.e. those provided in Table 6).

Table 4. The syntesis of fuzzyfication of the goal

	Product			Service			Islamic Human Resource (IHR)			Image		
Product	1,00	1,00	1,00	0,57	0,94	1,31	0,56	0,82	1,11	0,75	1,13	1,53
Service	0,76	1,07	1,74	1,00	1,00	1,00	0,52	0,91	1,30	0,98	1,40	1,84
IHR	0,90	1,22	1,77	0,77	1,10	1,93	1,00	1,00	1,00	0,89	1,37	1,84
Image	0,65	0,88	1,34	0,54	1,40	1,02	0,54	0,73	1,13	1,00	1,00	1,00

Table 5. Extent analysis of the goal

	l	M	u		S_i	
Product	2,89	3,89	4,95	0,132	0,229	0,397
Service	3,26	4,38	5,88	0,149	0,258	0,473
IHR	3,56	4,69	6,55	0,163	0,276	0,526
Image	2,74	4,01	4,48	0,125	0,236	0,360
$\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j}$	12,45	16,97	21,86			
$\left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^{j} \right]^{-1}$	0,046	0,059	0,080			

Table 6. Local weight of the goal

M_2 vs M_1	$V(M_2 \geq M_1)$	$V(M = M_1, M_2, ..., M_k)$	Normalisation
Product vs Service	0,90	0,83	0,23
Product vs IHR	0,83		
Product vs Image	0,97		
Service vs Product	1,00	0,95	0,26
Service vs IHR	0,95		
Service vs Image	1,00		
IHR vs Product	1,00	1,00	0,28
IHR vs Service	1,00		
IHR vs Image	1,00		
Image vs Product	1,00	0,83	0,23
Image vs Service	0,91		
Image vs IHR	0,83		
	Total	3,61	1,00

All sub-criteria and alternatives are measured through already mentioned process to obtain local weights. The local weight of each criteria, sub-criteria and alternatives are summarised in Table 7. Global weights of criteria, sub-criteria and alternatives are determined by summing up the multiplication of local weights. Summary of global weights of those criteria and alternatives are presented in Table 8.

Table 7. The summary of local weight of each criteria, sub-criteria and alternatives

Product (0,23)		Service (0,26)		Islamic Human Resource (0,28)		Image (0,23)	
Product variance (0,30)	BMI (0.24) BSM (0.22) BTN Sy (0.12) BNI Sy (0.14) BRI Sy (0.16) DNM Sy (0.13)	Easy in transaction (0,30)	BMI (0.20) BSM (0.20) BTN Sy (0.15) BNI Sy (0.17) BRI Sy (0.13) DNM Sy (0.14)	Akhlaq (0,51)	BMI (0.17) BSM (0.17) BTN Sy (0.17) BNI Sy (0.17) BRI Sy (0.15) DNM Sy (0.16)	Good appeal of logo (0,06)	BMI (0.19) BSM (0.19) BTN Sy (0.16) BNI Sy (0.16) BRI Sy (0.15) DNM Sy (0.15)
Profit and loss sharing (0,70)	BMI (0.22) BSM (0.20) BTN Sy (0.13) BNI Sy (0.15) BRI Sy (0.17) DNM Sy (0.14)	Skill of human resource (0,26)	BMI (0.20) BSM (0.19) BTN Sy (0.17) BNI Sy (0.17) BRI Sy (0.13) DNM Sy (0.15)	Professionalism (0,49)	BMI (0.17) BSM (0.18) BTN Sy (0.17) BNI Sy (0.17) BRI Sy (0.15) DNM Sy (0.16)	Shariah compliance (0,96)	BMI (0.21) BSM (0.17) BTN Sy (0.15) BNI Sy (0.16) BRI Sy (0.15) DNM Sy (0.16)
Comfortable room (0,22)	BMI (0.19) BSM (0.18) BTN (0.17) BNI (0.17) BRI (0.15) DNM (0.15)						
Office location (0,22)	BMI (0.17) BSM (0.19) BTN (0.16) BNI (0.16) BRI (0.17) DNM (0.14)						

Regarding the final weight in Table 8, the Shariah Banks should pay attention on Islamic human resource and service due to the high value of their weight, i.e. 27.7% and 26.2%, respectively. It means that the experts in MES view that those criteria are important to be maintained and should be improved. On the other hand, global weight of shariah compliance (one of sub-criteria of image) is higher than all sub-criteria in service and IHR. Similarly, global weight of PLS higher than other sub criteria but shariah compliance. Meanwhile, the weight of sub-criteria *akhlaq* and professionalism of human resource are high, i.e 14% and 13.6%, respectively. The high weights of those sub-criteria are caused by the high values of their local weight. By seeing Table 7, local weights of shariah compliance, PLS, *akhlaq* and professionalism are 96%, 70%, 51% and 49%, respectively. Local weights of shariah compliance and PLS are much higher than other sub criteria, whilst local weights of *akhlaq* and professionalism are double of local weights of sub-criteria that are classified as service criteria.

Table 8. The final (global) weight of criteria and alternatives

Criteria	Weight	Sub-criteria	Weight	Alternatives	Weight
Product	0,231	Product variety	0,070	BMI	0,197
		PLS	0,161	BSM	0,162
Service	0,262	Easy in transaction	0,078	BTN Sy	0,153
		Skill of HR	0,069	BNI Sy	0,139
		Comfortable room	0,056	BRI Sy	0,154
		Office location	0,058	Danamon Sy	0,150
IHR	0,277	*Akhlaq*	0,140		
		Professionalism	0,136		
Image	0,231	Good appeal of logo	0,013		
		Shariah compliance	0,217		

It could also be seen on Table 7 that, with respect to almost all sub-criteria, the two highest weights of alternatives are BMI and BSM. Product variance and the PLS of BMI is assessed as the best among other shariah Banks in Surakarta. In contrast, BTN Syariah is assessed as having the least product variance and the worst PLS. In serviceability's sub-criteria, BMI dominate the high weight except in office location. Before 2008, the office of BSM was not located on the main road of the city of Surakarta, therefore it is most likely that the experts view that the location of BMI is not better than that of BSM. On the contrary, Danamon Syariah is assessed to be the worst shariah Bank in term of office location.

However, the easy of transaction and personal's skill of Danamon Syariah is better than BRI Syariah. Professionalism of personal in BSM, meanwhile, is better than others. It can also be seen that BMI, BTN Syariah and BNI Syariah have similar local weight. Equally, those banks including BSM have equal local weight in term of *akhlaq* of their personnel. Finally, local weights of BMI with regards to both of sub-criteria of image are still high. On the other hand, local weights of BRI Syariah with regards to the same sub-criteria are still low. All of those local weights in Table 7, subsequently, are used to determine global weight in Table 8.

From Table 8, it can be seen that the weight of BMI is the highest (19.7%) followed by BSM (16.2%). The weights of BRI Syariah and BTN Syariah are slightly the same, ie. 15.4% and 15.3%, respectively. The least weight is BNI Syariah. It can therefore be concluded that, according to the MES members, the two best non-financial performance of Shariah Banks in Surakarta in order of appearance are BMI and BSM. In contrast, MES members view that non-financial performance of BNI is the worst.

6. Conclusion

Most of MES members view that human resource able to fulfil shariah requirement is more important than service, product and image. Surprisingly, the two most important sub criteria are shariah compliance and profit and loss sharing which are not parts of Islamic human resource criteria. Consequently, these two sub-criteria are important to be improved by the Shariah Banks. In addition, because experts see that Islamic human resource is also important, Shariah Banks has to maintain their human resource performance to meet Islamic law's requirement and the service. Finally, according to the result of this research, it can be concluded that based on four criterias: product, service, Islamic human resource and image of Shariah banks, BMI is the best Shariah Banks.

References

Arasli, H., Smadi, S. M., dan Katircioglu, S. T. (2005), "Customer service quality in the Greek Cypriot banking industry", *Managing Service Quality*, Vol. 15 No. 1, pp. 41-56.

Astuti, S. P., Wilasari, W., and Utami, D. E. (2009), "Meningkatkan Kualitas Pelayanan di Bank Syariah Penelitian dengan Fuzzy SERVQUAL dan dimensi CARTER", *INTEGRITAS Jurnal Manajemen Bisnis*, Vol 2, No 1, pp. 47-58.

Badri, M. A., and Abdulla, M. H. (2004), "Awards of excellence in institutions of higher education: an AHP approach", *International Journal of Educational Management*, Vol. 18 No. 4, pp. 224-242.

Bank Indonesia (2010), *Statistik Perbankan Syariah Desember 2010*, Bank Indonesia, Jakarta.

Chow, C. C., dan Luk, P. (2005), "A strategic service quality approach using analytic hierarchy process", *Managing Service Quality*, Vol. 15 No. 3, pp. 278-289.

Dağdeviren, M., Yavuz, S., and Kılınç, N. (2009), "Weapon selection using the AHP and TOPSIS methods under fuzzy environment", *Expert Systems with Applications*, Vol. 36, pp. 8143-8151.

Guo, X., Duff, A., and Hair, M. (2008), "Service quality measurement in the Chinese corporate banking market", *International Journal of Bank Marketing*, Vol. 26 No. 5, pp. 305-327.

Harker, P. T. (1987), "Incomplete pairwise comparison in the analytic hierarchy process", *Mathematical Modelling*, Vol 9 No. 11, pp. 837-848.

Hawari, M., and Ward, T. (2006), ""The effect of automated service quality on Australian banks' financial performance and the mediating role of customer satisfaction", *Marketing Intelligence & Planning*, Vol. 24 No. 2, pp. 127-147.

Hirtle, B. (2007), "The impact of network size on bank branch performance", *Journal Banking & Finance*, Vol. 31, pp. 3782-3805.

Hussein, M. M., and Hoque, Z. (2002), "Understanding non-financial performance measurement practices in Japanese banks", *Accounting, Auditing & Accountability Journal*, Vol. 15 No. 2, pp. 162-183.

InfoBank (2007), "Cara menyusun rating 130 bank", *Infobank*, Vol. XXIX, No. 339, pp. 18-20.

Jabnoun, N., dan Al-Tamimi, H. A. H. (2003), "Measuring perceived service quality at UAE commercial banks", *International Journal of Quality & Reliability Management*, Vol. 20 No. 4, pp. 458-472.

Jabnoun, N., dan Khalifa, A. (2005), "A customized measure of service quality in the UAE", *Managing Service Quality*, Vol. 15 no. 4, pp. 374-388.

Kahrahman, C., Cebeci, U and Ulukan Z. (2004), "Multi-attribute comparison of catering service companies using fuzzy AHP: The case of Turkey", *International Journal of Production Economics*, No. 87, pp. 171 – 184.

Lepak, G. M. (1998), "Bayesian approach for analyzing the services of banking institutions", *The Journal of consumer Affairs*, Vol. 31 No. 1, pp. 121-144.

Liebowitz, J. (2005), "Linking social network analysis with the analytic hierarchy process for knowledge mapping in organizations", *Journal of Knowledge Management*, Vol. 9 No. 1, pp. 76-86.

Mikhailov, L., and Tsvetinov, P. (2004), "Evaluation of service a fuzzy analytic hierarchy process", *Applied Soft Computing*, Vol. 5, pp. 23-33.

Mukherjee. A., and Nath, P. (2005), "An empirical assessment of comparative approach to service quality measurement", *Journal of Service Marketing*, Vol. 19 No. 3, pp. 174-184.

Naser, K., and Montinho, L. (1997), "Strategic marketing management: the case of Islamic banks", *International Journal of Bank Marketing*, Vol. 15 No. 6, pp. 187-203.

Othman, A. Q., and Owen, Lynn (2002), "Adopting and measuring customer service quality (SQ) in Islamic Banking: A case study in Kuwait finance house", International Journal of Islamic Financial Services, Vol. 3 No. 1.

Perçin, S. (2008), "The use of fuzzy AHP for evaluating the benefits of information-sharing decisions in a supply chain", *Journal of Enterprise Information Management*, Vol. 21 No. 3, pp. 263-284.

Petridou, E., Spathis, C., Glaveli, N., and Liassides, C. (2007), "Bank service quality: Empirical evidence from Greek and Bulgarian retail customers", *International Journal of Quality and Reliability Management*, Vol. 24 No. 6, pp. 568-585.

Rod, M., Ashill, N. J., Shao, J., and Carruthers, J. (2009), "An examination of the relationship between service quality dimensions, overall internet banking service quality and customer satisfaction: A New Zealand study", *Marketing Intelligence & Planning*, Vol 27 No. 1, pp. 103-126.

Rosly, S. A., dan Bakar, M. A. A. (2003), "Performance of Islamic and mainstream banks in Malaysia", *International Journal of Social Economics*, Vol. 30 No. 12, pp. 1249-1265.

Saaty, T. L. (1994), *Fundamental of Decision Making and Priority Theory with The Analytic Hierarchy Process*, RWS Publications, Pittsburgh.

Seçme, N. Y., Bayrakdağolu, A., and Kahraman, C. (2009), "Fuzzy performance evaluation in Turkish Banking Sector using Analytic Hierarchy Process and TOPSIS", *Expert Systems with Applications*, Vol. 36, No. 11699–11709.

Shih, V., Zhang, Q., dan Liu, M. (2007), "Comparing the performance of Chinese Banks: A principal Componen approach", *China Economic Review*, Vol. 18, pp. 15-34.

Tahir, I. M., and Bakar, N. M. A. (2007), "Service quality gap and customers' satisfactions of commercial banks in Malaysia", *International Review of Business Research Papers*, Vol. 3 No. 4, pp. 327-336.

Zhou, L. (2004), "A dimension-specific analysis of performance only measurement of service quality and satisfaction in China's retail banking", *Journal of Services Marketing*, Vol. 18 No. 7, pp. 534-546.