

## **Inputs and Outputs in Islamic Banking System**

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### **Abstract**

Evaluation of performance and productivity is among the fundamental concepts in management. In order to achieve their goals, organizations must evaluate their performance. One of the important stages of performance appraisal is evaluation of organization's efficiency. Banks, financial and credit institutions are among the most important organizations of every economic system, because every activity which entails asset acquisition and financial resources undoubtedly requires mediation of banks and financial organizations. One of the most vital issues in banks' efficiency evaluation is identification of input and output variables. Identification of these variables helps to create an appropriate model in order to evaluate the efficiency. The purpose of this paper is clarifying of the importance of the input and output in Islamic banking with the use of the content analysis method. In this paper various approaches that were selected by researchers are reviewed and classified. Then the input and output variables in the Islamic banking is analyzed. The result show that the intermediation approach is the acceptable approach among scholars furthermore, labors and deposits are best inputs while, loans and investment are best outputs.

### **Key words**

Islamic bank, Efficiency, Inputs and Outputs, Data envelopment analysis

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## Introduction

Previous studies about efficiency in banking industry widely used DEA model (Ferrier & Lovell, 1990; Charnes *et al*, 1990; Furukawa, 1995; Zaim, 1995; Miller & Noulas, 1996; Resti, 1997; Molyneux, 2000; Beccalli *et al*, 2006; Drake & Post, 2001; Ana Canhoto & Dermine, 2003; Mostafa, 2011; Sufian, 2011; Fethi & Pasiouras, 2010). Although some studies have utilized another model such as financial ratio, stochastic frontier analysis etc (Jondrow *et al*, 1982; Kraft & Tirtiroglu, 1998; Weill, 2003; Rossi *et al*, 2005; Kasman & Yildirim, 2006; Staikouras *et al*, 2008). DEA is a precious model for estimation of bank's efficiency. Data envelopment analysis (DEA), as a helpful and popular nonparametric modeling approach, is applied to estimate efficiency. The DEA technique has been implemented to appraise efficiency of company across a variety of organizations, including industrial, commercial, educational, and financial services (Chanes *et al*, 1978). Since 1978, when Charnes, Cooper and Rhodes (CCR) offered a mathematical programming formulation for the empirical evaluation of relative efficiency of the observed quantities from inputs and output for a group of similar referent DMUs until now, DEA has kept improving. Primary input-oriented DEA efficiency scores have estimated the relative reduction in inputs while the level of output is maintained. This model is based on some inputs and outputs.

A review of studies on the efficiency of banks, shows a wide literature in this field. It is very controversial among researchers that what inputs and outputs are in bank industry. We need to investigate banking efficiency literature if we want to find an answer to this question. This paper tries to find an answer to the following questions:

1. What are the approaches to choose input and output in Islamic banking?

2. Which approach is more acceptable in Islamic banking studies?
3. What are the status of input and output variables?

This paper is organized as follows. Literature review contains different approaches of selected input and output that is organized in section 2. The section 3 is methodology include the research methods and statistics. Findings are provided in section 4 and section 5 includes Summary and Conclusions.

### **Literature review**

While searching the words DEA and bank efficiency on web of science, more than 100 articles are found. It is clear that in the large area of literature there is no consensus on how the inputs and outputs are selected. Despite the disagreements, three approaches are detected in this literature: production approach, intermediation approach, operating approach or profit/ revenue approach. The production and intermediation approaches came from the traditional microeconomic theory. Operating approach or profit/ revenue approach results from sharing between classical theory and some special activities of banking which are illustrated separately in the following paragraphs.

### **Intermediation approach**

In the intermediation approach, bank is assumed as a financial institution that plays a role of intermediation between customers who deposit money in the bank and customers who need to take money or loan from the bank. In other word, in this approach total deposits are inputs and total loans are outputs, while the personnel costs and physical assets are input too (Sufian, 2011; Sealey & Lindley, 1977). In practice, the intermediation approach is the most widely used technique to measure efficiency (Kwan, 2002). Some researchers

believe that the intermediation approach is better than other approaches to estimating the bank's efficiency because interest costs (the part of income given to depositors) is calculated by this approach (Mokhtar *et al*, 2008; Humphrey, 1997).

### **Production approach**

Another approach of the literature in the field is production approach or value added approach. In this approach, bank is defined as a financial institution that produces some services for its customers such as depositors and account holders (Benston & Smit, 1976). This approach registered by Benston (1965), has emphasized on transactions of the deposit accounts and processing the documents. Therefore, based on this approach, the best factor for measuring efficiency is the amounts of accounts or its related transactions for input. On the other hand, physical assets and number of employees are considered as output. It seems the production approach is very valuable for estimating bank branches efficiency because the bank branches generally are not only responsible for handling customer document but also have no concerns about investment decisions. Because, this kind of decision makings are basically out of the bank branch authority (Berger & Humphrey, 1997).

### **Value added approach**

The third approach is called operating approach in which the bank is assumed as a business unit that its main target is generating revenue from the total cost for running the business (Lighter & Lovell, 1998). According to this view, total revenue (interest and non-interest income) and total expenses (interest and non-interest expenses) are specified as input and output.

Table1. efficiency in Islamic banking input and output.

	Author or Authors	title	country	year	input		output		approach
1	Hamims.ahmadmokhtaret al	Efficiency and competition of Islamic banking in Malaysia	Malaysia	2008	Total deposit, total overhead expenses	2	Total earning ,assets	2	intermediation
2	Norma Md. Saadet al	A comparative analysis of the performance of conventional and Islamic unit trust companies in Malaysia	Malaysia	2010	portfolio turnover ratio, management expenses ratio	2	returns	1	operating
3	Fadzlan sufian		malaysia	2011	Total deposits, capital, labor	3	Total loans, investments, non interest income	3	intermediation
4	Fadzlan sufian & Mohamad A.N mohamadnoor	The determinants of Islamic banks' efficiency changes Empirical evidence from the MENA and Asian banking sectors	In 16 Islamic countries	2009	Total deposits, capital,	2	Total loans, income, investments	3	intermediation
5	Mohamed M. Mostafa	Modeling the efficiency of top Arab banks: A DEA-neural network approach	85 banks in arab countries	2009	Assets, equity	2	Net profit, rate on assets, rate on equity	3	operating
6	Mohamed M. Mostafa	Modeling Islamic banks' efficiency: a non-parametric frontier approach	100 banks in Islamic countries	2011	Assets, equity	2	Net income, rate on assets, rate on equity	3	operating
7	NakhunThoraneenitayan&Necmi K. Avkiran	Measuring the impact of restructuring and country-specific factors on the efficiency of post-crisis East Asian banking systems: Integrating DEA with SFA	5 countries in east Asia	2009	Deposits, labor ,capital, physical capital	4	Loans, investment and other earning assets, income, off-balance sheet items	4	Intermediation
8	Khalid shahooth .K &ahmedH.batt all	Using data envelopment analysis to measure cost efficiency with an application on Islamic banks	24 Islamic banks	2006	Capital, reserves, deposits	3	Investment, assets	2	Intermediation

9	FadzlanSufian	The efficiency of Islamic banking industry in Malaysia Foreign vs domestic banks	Malaysia	2007	Total deposits, labor, fixed assets	3	Total loans, income	2	Intermediation
10	Ramakrishnan Ramanathan	Performance of banks in countries of the Gulf Cooperation Council	55 banks the Gulf Cooperation Council	2007	Fixed assets, deposits, short term funding, equity, personnel expenses	5	Loans, other earning assets	2	Intermediation
11	Mohammad Hanif Akhtar	Are Saudi banks productive and efficient?	Saudi Arabia	2010	Interest, non-interest expenses	2	net interest income, non-interest income	2	operating
12	FadzlanSufian	Banks total factor productivity change in a developing economy: Does ownership and origins matter?	Malaysia	2010	Total deposits, Capital, Labor	3	Total loans, Investments, interest income	3	intermediation
13	FadzlanSufian	Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia	Malaysia	2008	Deposits, labor, capital	3	Loans, investments	2	intermediation
					Labor, Capital, interest expenses	3	deposits, loans, investments	3	value added
					interest expenses, labor, Non-interest expense	3	interest income, non-interest income	2	operating
14	Taufiq Hassan et al	Efficiency of conventional versus Islamic banks: evidence from the Middle East	Middle East	2009	Labor, Fixed assets, Total funds (Total deposits plus total borrowed funds)	3	Total loans, Other earning assets, Off-balance sheet items	3	intermediation
15	Hirofumi Fukuyama, Roman Matousek	Efficiency of Turkish banking: Two-stage network system. Variable returns to scale model	Turkey	2010	Labor, capital, deposit	3	Loan, securities	2	intermediation
total	15					48		42	

As mentioned, there are different approaches based on them each different inputs and outputs are selected. A lot of studies have been done in banking efficiency area that appraised efficiency level in the bank with various variables. Although we know choosing various variables significantly affects the results, The problem is compounded by the fact that variable selection is often constrained by the paucity of data on relevant variables. This paper focuses on Islamic study about bank efficiency.

### Methodology

The method used in this paper is derived from documentary and theoretical studies that apply content analysis method based on the chosen criteria. The statistical population of this study includes 15 articles, published between 2007 and 2011, in the field of Islamic banking performance. The papers that were used have been mentioned in Figure 1. This paper utilizes descriptive statistics in order to describe the variables.

### Findings

Using content analysis shows there are 3 approaches such as intermediation, operating and production that have been classified in table 2. The most frequent approach used on Islamic bank efficiency is intermediation approach, 64.7%, as shown in figure 1.

**Table 2. Input and output pick-up approaches in the banking system**

row	approach	frequency
1	<i>intermediation</i>	11
2	<i>operating</i>	5
3	<i>production OR Value-added</i>	1
total	3	17*

\*there are 15 article but one of them uses three approach.

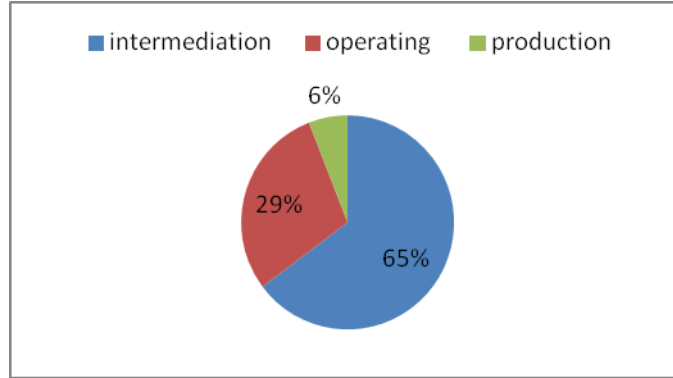


Figure 1. Three main approaches and Islamic banking efficiency.

Table 3. Describes the approach and scope of performance studies of Islamic banking

	intermediation	operating	production	
between banks in one country	6	1	3	8
between banks in several country	5	0	2	7
total	11	1	5	17

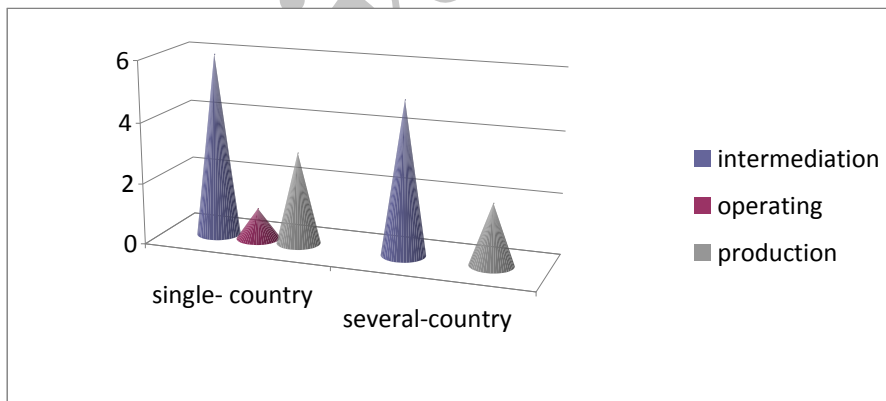


Figure 2. Area of study and approaches

As shown in table 3, in this paper statistical population encompasses two categories: 1) single- country category that applies the approaches



to study efficiency of banks in a single country and 2) several-country category, that applies the approaches the study efficiency of banks in several countries.

Analyzing the approaches applied in evaluating the Islamic banks' efficiency, complies that the intermediation approach stands the highest one in the two categories and the operating approach is not used in several-country category as shown in figure 2.

In the explored studies, inputs totals as 48 including 18 categories and outputs totals 42 including 16 categories as shown in table 4 and 5.

**Table 4. Efficiency in Islamic banking input and output.**

No	Input	Frequency	Percentage
1	Assets	2	4.166667
2	capital	8	16.666667
3	equity	3	6.25
4	fixed assets	3	6.25
5	Interest	1	2.083333
6	interest expenses	2	4.166667
7	Labor/ personnel expenses	10	20.833333
8	management expenses ratio	1	2.083333
9	non-interest expenses	2	4.166667
10	physical capital	1	2.083333
11	portfolio turnover ratio	1	2.083333
12	reserves	1	2.083333
13	short term funding	1	2.083333
14	Total deposits	10	20.833333
15	Total funds	1	2.083333
16	total overhead expenses	1	2.083333
Total	16	48	100

**Table 5. Efficiency in Islamic banking input and output.**

No	Output	Frequency	Percentage
1	assets	2	4.761905
2	deposits	1	2.380952
3	income	3	7.142857
4	interest income	2	4.761905
5	investment and other earning assets	1	2.380952
6	investments	6	14.28571
7	lone	10	23.80952
8	Net income	1	2.380952
9	net interest income	1	2.380952
10	Net profit	1	2.380952
11	non-interest income	3	7.142857
12	off-balance sheet items	2	4.761905
13	Other earning	2	4.761905
14	rate on assets,	2	4.761905
15	rate on equity	2	4.761905
16	returns	1	2.380952
17	securities	1	2.380952
18	Total earning	1	2.380952
total	18	42	100

Figure 3 presents a picturesque analysis of categories of inputs in which categories of Labor/Personnel and total deposits shows the highest frequency of 10 indicating the largest portion of 40%. The Capital category follows the two highest ones in the order of frequency with a minor difference of 2 equaling slightly above 16%. The frequency drops drastically to 3 in the Equity and Fixed assets category. Following the two categories and preceding the rest of the categories, like Assets, Interest and Non-interest expenses are considered with a difference of 1.

As for the outputs' categories, figure 4 illustrates that the one category stands highest showing a frequency of 10 and portion of about 24% which is followed by the Investments category as it drops to 6 making a portion of 14%. Except the two categories of Interest income and Non-interest income that show frequency of 3 comprising about 14% of the categories, the other 8 ones have the frequency of 2 or 1.

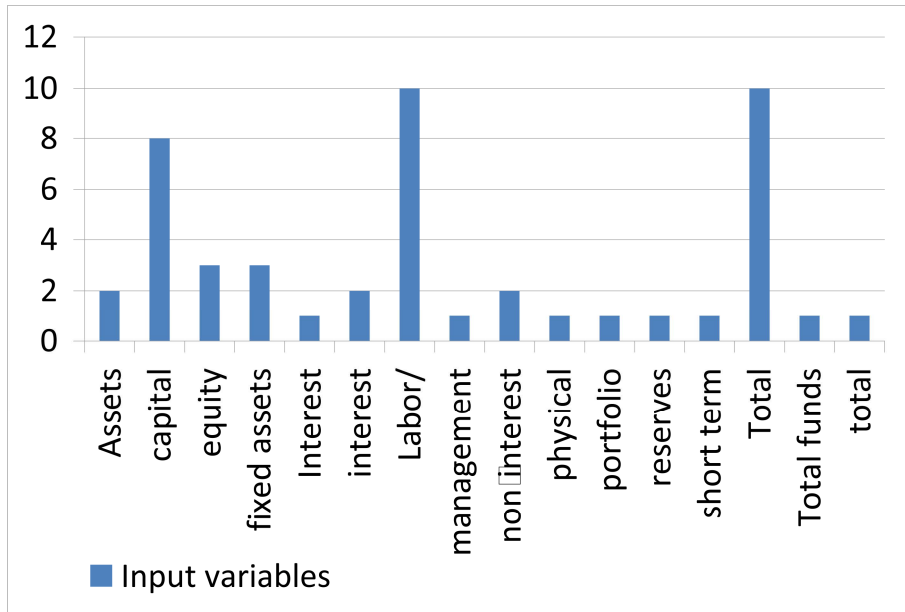


Figure 3. Analysis of Inputs' Categories

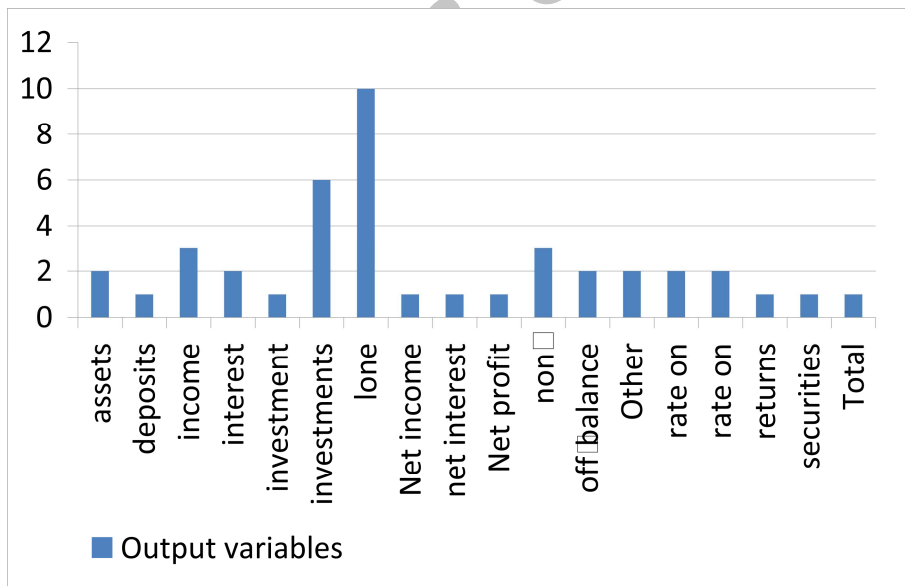


Figure 4. Analysis of Outputs' Categories

By comparing the descriptive analyses of input and output variables in table 4 and 5, it is inferred that there is no consensus among the researchers on selecting the input and output variables not only in three approaches but also even in one approach.

### **Conclusion**

According to the analyses, it can be concluded that studies about the Islamic banks' efficiency is highly inclined in application of the intermediation approach in estimating efficiency both in single-country category and several-country category. It is also clear that there is no agreement among the input and output variables and disagreement is considered to have generally three reasons: The first one is the selected approach by the researcher. The second one is the considered objectives by researchers and the last one is the limitation the data since some of them are not available in the banks sector.

Results of researches indicatives that even though there is substantial amount of literature in the field of banks' efficiency, it is needed to develop and expand the studies in the field of Islamic banking both in the several-country category and single-country category.

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