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ANALYSIS OF EXPENSIVE MICROFINANCING IN CONVENTIONAL AND ISLAMIC MICROFINANCE INSTITUTIONS IN INDONESIA

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Abstract

Micro enterprises (MEs) in Indonesia comprise of 98.85% number of all enterprises, which absorb 90.98% of national employment, so that MEs and microfinance are strategic and critical to improve the wellbeing of society. Currently, microfinance (conventional as well as Islamic) has not been given sufficient attention, where micro-financing has been scarce and expensive while microfinance institutions (MFIs) operate inefficiently. This study aims to find the determinants of expensive micro-financing and the determinants of inefficiency in Conventional and Islamic microfinance institutions

The results of Data Envelopment Analysis (DEA) show that overall MFIs are technically inefficient, with conventional MFI shows better scale efficiency than that of Islamic MFI. Technical Efficiency of conventional Cooperative > conventional rural bank > conventional micro-banking unit, while efficiencies of Islamic BMT < Islamic rural bank < Islamic micro-banking unit. Most inefficient variables are 'Other Income' and 'Financing' for Cooperative-BMT, 'Financing' and 'Other Income' for Conventional-Islamic rural banks, and 'Other Income' and 'Labor' for Conventional-Islamic micro-banking units.

The results of Analytic Network Process (ANP) show that the main problems are 'Liquidity Maintenance' and 'low Efficiency' for Cooperative-BMT, 'Unfair Treatment' and 'High Deposit Margin' for conventional-Islamic rural banks, and 'Moral Hazard' and 'Expensive' for conventional-Islamic micro-banking units. Meanwhile the main solutions are 'Harmonization of Evaluation', 'Government Support' and 'Establishment of APEX institution for Cooperative-BMT, 'Government Support' and 'Fair Competition Act' for conventional-Islamic rural banks, and 'Government Support', 'Macro Stability' and 'Incentive for Low NPF'.

I. INTRODUCTION

1.1 Background

The role of MSMEs, especially after monetary crisis, considered as a safety valve in the process of national economic recovery both in enhancing economic growth and reducing unemployment rate. In the research held by Central Bank of Indonesia in 2001 titled "Credit Crunch in Indonesia After Crisis: The Fact, Causal Factor and Policy Implication" published by Department of Economy and Monetary Policy Bank Indonesia in 2001, there existed an acknowledgment from our industrial Banking that credit distributed to SMEs[1] had minimum risk and – compare to large enterprises – SMEs has sound and better business performance.

Several data show the significance of MSMEs' contribution towards Growth Domestic Product for about 58.17% in 2009 and 57.12% in 2010. It is more than that of the contribution of large enterprises towards GDP. MSMEs sectors could absorb for about 96.2 million labors (97.30%) in 2009 and 99.4 million labors (97.22%) in 2010.

Table 1. Statistics of Micro, Small and Medium Enterprises in 2010

	Number		GDP	Labor		Export
Micro	53.207.500	98.85%	33.81%	93.014.759	90.98%	1.50%
Small	573.601	1.07%	9.85%	3.627.164	3.55%	3.42%
Medium	42.631	0.08%	14.69%	2.759.852	2.70%	10.89%
Large	4.838	0.01%	13.46%	2.839.711	2.78%	84.19%
MSMEs	53.823.732	99.99%	57.12%	99.401.775	97.22%	15.81%

Source: Ministry of Cooperation and SMEs

Furthermore, the contribution of MSMEs to the national income through export activities reaches Rp162.25 trillion (17.02%) in 2009 and Rp175.89 trillion (15.81%) in 2010 from the total national export. With its specialties – especially with its low financial capital –, MSMEs could produce in the short-term process. Having simple management and huge unit volume scattered in the whole nation, brought about MSMEs to have better resistant toward the fluctuation of business cycle.

During 2005 – 2009, the MSMEs sectors have increased significantly in number (12.22%), in share of GDP (15.10%), in labor absorption (24.01%) as well as in share of export (47.05%), while on the contrary large enterprises have decreased in all segments. More interestingly, the biggest part of MSMEs is micro enterprises (MEs), which counted for 98.88% in number of enterprises, 32.68% share of GDP and 91.03% of labor force.

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[1] Micro enterprises sometimes are grouped together with Small enterprises, so that MSMEs sometime is termed as SMEs.

Furthermore, the biggest increases in number (15.36%) and in employment (28.65%) have been in MEs, while these figures in SMEs have been decreased.

Tambunan (2004) stated seven years after economic crisis, the most valuable lessons that should be taken into account are: (1) Indonesian economy cannot depend mostly on large enterprises, (2) SMEs has more resistant compare to the large one and (3) there is no clear industrial policy that enhances economic growth and creates vocation for poor and unemployed people.

Despite historical success of MSMEs, there exist unresolved issues that need to be further discussed whereby MSMEs, especially micro enterprises (MEs) have always been in difficulties to access loan or financing from the banking industry (conventional as well as Islamic financial institutions) for a number of reasons.
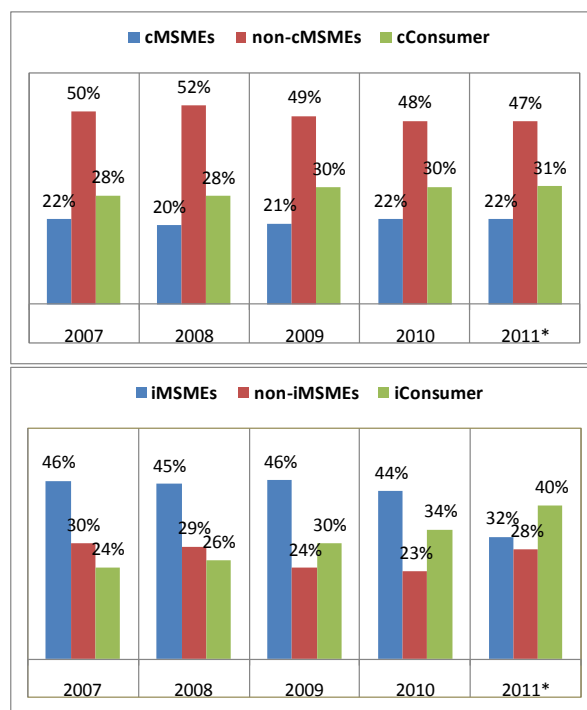

Figure 1. Conventional Loan and Islamic Financing to MSMEs

Figure 1 shows that conventional loan share to MSMEs has been stable at 22%, while Islamic financing share to MSMEs has been declining. At the end of September 2011, productive conventional loan to MSMEs reached 22% of conventional bank portfolio or Rp.459.7 trillion, while productive Islamic financing to MSMEs reached 32% or Rp.29.4 trillion. Most of these loan and financing have been extended to SMEs, since commercial banks (conventional as well as Islamic) mostly limit their loan/financing over Rp50 million.

Mohamad (2011) finds that 70 percent of 52.18 million MEs need loan below Rp5 million with low penetration, while 30 percent of MEs need loan up to Rp50 million. Moreover, Ascarya and Cahyono (2011) find that conventional and Islamic microfinance institutions (MFIs) have difficulties to get cheap funding. However, they could manage to extend competitive (cheaper) micro credits (MCs) or micro financings (MFs) to micro enterprises (MEs) than that of micro-banking unit of conventional/Islamic banks (see figure 2).
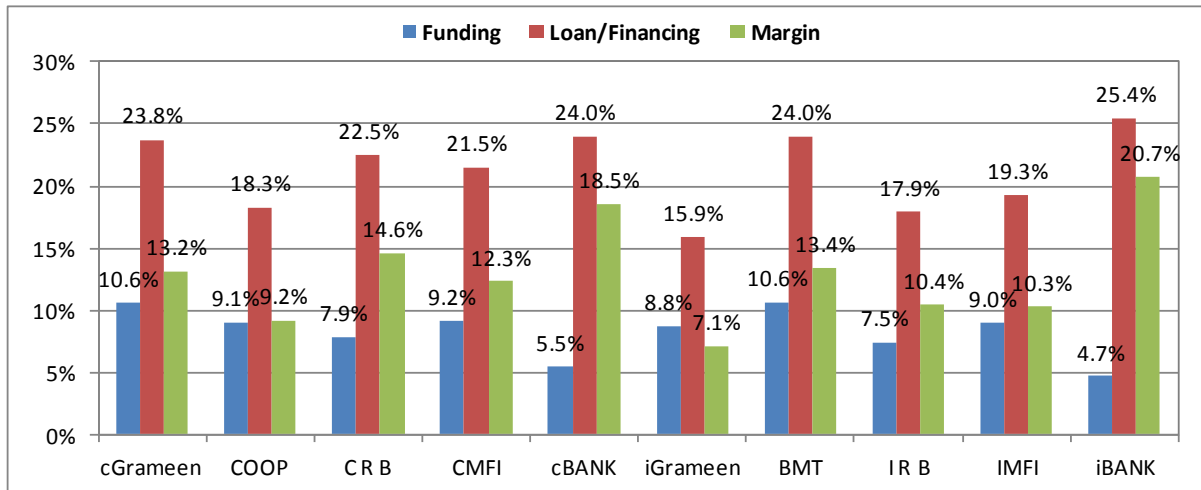

Figure 2. Conventional and Islamic MFIs Rate/Margin

Meanwhile, conventional and Islamic commercial banks can obtain much cheaper funding from demand deposits, savings deposits and time deposits, and subsequently, they can extend loan or financing to small, medium and large enterprises with much cheaper rate/margin (see figure 3).
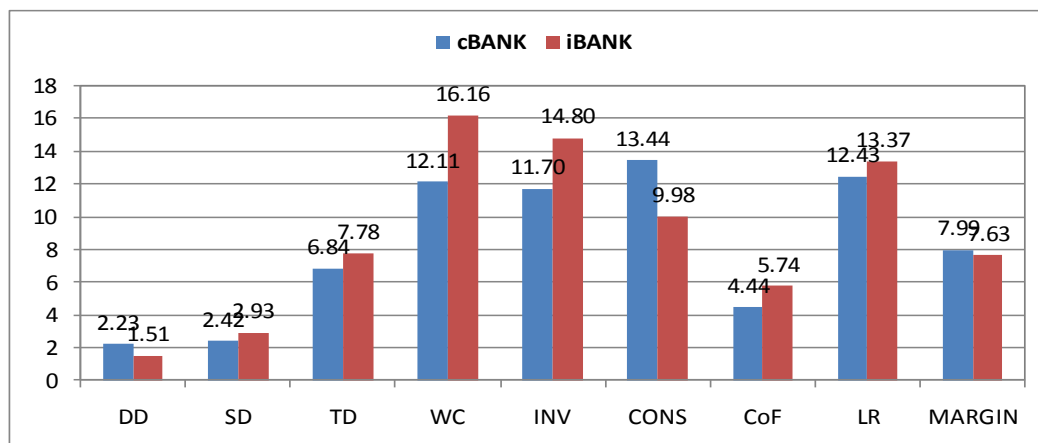

Figure 3. Conventional and Islamic Banks Rate/Margin

1.2   Problem Statement

Micro credits (MCs) or micro financings (MFs) are desperately needed by more than 53 million micro enterprises (MEs) in Indonesia, although the supply of MCs or MFs is scarce and expensive. Meanwhile, regular credits and financings for less than 50 thousands medium and large enterprises are abundance and much cheaper. These unfair conditions could make the gap between the poor and the rich become perpetually wider and wider. To improve just and distributive wellbeing for more than 93 million people working in MEs, MCs and MFs should be made fairly available with fair price/margin.

1.3   Objective

The objective of this study is two folds. Firstly, this study will determine and examine the main sources of expensive micro financing in Indonesia's conventional and Islamic microfinance institutions. Secondly, this study will propose some alternative solutions in order to provide fair treatment to MFIs, as well as to provide cheap and sustainable micro financing to micro enterprises.

1.4   Methodology

This study will apply several qualitative and quantitative methods simultaneously, namely, Descriptive analysis, Data Envelopment Analysis (DEA), and Analytic Network Process (ANP).

II.   LITERATURE REVIEW

2.1   Microfinance

In the modern era, microfinance could be conventional or Islamic which is targeted to fulfill certain goals, so that microfinance institution, whether conventional or Islamic, may be established as not-for-profit charity-based institution, social business institution or for-profit market-based institution.

2.1.1   Conventional Microfinance

There are many authors who define microfinance. Mukherjee (1998) states that CGAP (The Consultative Group to Assist the Poorest) defines microfinance as the provision of credit, savings, and financial services to very poor people, so that they could create, own, and accumulate assets and to smooth consumption. Later in 2010, CGAP improved the definition of microfinance as the provision of basic financial services (such as, loan, savings, money transfer services and micro-insurance) to poor people, so that they could run their businesses, build assets, smooth consumption, and manage risks.

Ledgerwood (1999) defines microfinance as the provision of financial services to low-income clients, including the self-employed. Basic financial services include savings and credit, which could be expanded to include insurance and payment services. In addition to financial intermediation, microfinance could also provide social intermediation services such as group formation, development of self-confidence, and training in financial literacy and management capabilities among members of a group. Thus the definition of microfinance often includes both financial intermediation and social intermediation. Microfinance is not simply banking, it is a development tool.

Therefore, microfinance can be defined as provision of financial products and/or services (such as, micro-credit, micro-savings, micro-equity, micro-transfers, micro-insurance, micro-pension plan) in sustained manner to the poor, marginalized people and/or low-income people whose low economic standing excludes them from formal financial systems. Moreover, microfinance also provides socio-development programs, such as skill training, knowledge building, management training, self-confidence, basic financial training, sanitation.

CGAP (2004) has come up with eleven key principles of Microfinance on decade-long consultations with its members and stakeholders, which has been endorsed by the Group of Eight leaders at G8 Summit on June 10, 2004. These are as follows:

1. Poor people need a variety of financial services, not just loans. In addition to credit, they want savings, insurance, and money transfer services.

2. Microfinance is a powerful tool to fight poverty. Poor households use financial services to raise income, build their assets, and cushion themselves against external shocks.

3. Microfinance means building financial systems that serve the poor. Microfinance will reach its full potential only if it is integrated into a country's mainstream financial system.

4. Microfinance can pay for itself, and must do so if it is to reach very large numbers of poor people. Unless microfinance providers charge enough to cover their costs, they will always be limited by the scarce and uncertain supply of subsidies from governments and donors.

5. Microfinance is about building permanent local financial institutions that can attract domestic deposits, recycle them into loans, and provide other financial services.

6. Microcredit is not always the answer. Other kinds of support may work better for people who are so destitute that they are without income or means of repayment.

7. Interest rate ceilings hurt poor people by making it harder for them to get credit. Making many small loans costs more than making a few large ones. Interest rate ceilings prevent microfinance institutions from covering their costs, and thereby choke off the supply of credit for poor people.

8. The job of government is to enable financial services, not to provide them directly. Governments can almost never do a good job of lending, but they can set a supporting policy environment.

9. Donor funds should complement private capital, not compete with it. Donor subsides should be temporary start-up support designed to get an institution to the point where it can tap private funding sources, such as deposits.

10. The key bottleneck is the shortage of strong institutions and managers. Donors should focus their support on building capacity.

11. Microfinance works best when it measures—and discloses—its performance. Reporting not only helps stakeholders judge costs and benefits, but it also improves performance. MFIs need to produce accurate and comparable reporting on financial performance (e.g., loan repayment and cost recovery) as well as social performance (e.g., number and poverty level of clients being served).

   This means that microfinance is considered as a tool for socio-economic development, and can be clearly distinguished from charity.

The main difference between microfinance and mainstream finance systems is its alternative approach to collateral that comes from the concept of Group Lending under Joint Responsibility (GLJR), since the poor do not have necessary asset for collateral, as well as personal approach with Pick-up Services or *banker meets customer.*

Microfinance mostly manifested in terms of small loans or micro-credit available to poor people (especially those traditionally excluded from financial services) through programs designed specifically to meet their particular needs and circumstances.

Good microfinance programs are characterized by small, usually short-term loans; streamlined, simplified borrower and investment appraisal; quick disbursement of repeat loans after timely repayment; and convenient location and timing of services.

2.1.2 Islamic Microfinance

Microfinance in Islamic perspective is one of Islamic approaches to alleviate and eradicate poverty, so that the main target is not only the poor, but more importantly is the poorest of the poor, which has always been left out by mainstream microfinance.

In Islam, poverty is in conflict with one of the primary objectives (*maqasid*) of Shariah, namely, "enrichment of self (*nafs*)". Moreover, Islamic jurists have unanimously held the view that it is the collective obligation (*fard kifayah*) of a Muslim society to take care of the basic needs of the poor. Obaidullah (2008) states that the principles of Islamic approach to poverty alleviation include: a) charity; b) economic empowerment; c) debt avoidance; d) cooperation and solidarity; e) family cohesiveness; f) Shari'ah compliance of contracts; and g) Islamic norms and microfinance best practices.

Not-for-profit charity-based microfinance is inherent in Islam in the institutions of zakah and sadaqa. Zakah is specifically dedicated for eight groups of the poorest of the poor to provide social safety net. Sadaqa in the form of awqaf can be dedicated for social development to provide capacity building, technical assistance, skill training and other aspects of human resource development. Furthermore, market-based microfinance can provide financial assistance intended for productive activities and wealth creation using Shari'ah compliant modes of financing.

Obaidullah (2008) states that the Islamic approach to poverty through microfinance puts overwhelming emphasis on microenterprise development through financial and non-financial assistance, as well as adherence to principles of transparency, empathy and cooperation. At the same time, various microfinance products and services must not violate various Shariah norms and prohibitions. Furthermore, the Islamic approach to poverty alleviation and eradication is more inclusive than the conventional

one. It provides for the basic conditions of sustainable and successful microfinance, blending wealth creation with empathy for the poorest of the poor. It also follows that the Islamic approach is a composite of mission-based and market-based interventions. It favors equity-based and cooperation-based models in contrast to mechanisms that create and perpetuate debt.

Therefore, Islamic microfinance can be viewed as a combination of microfinance and Islamic finance, so that it retains mainstream microfinance best practices and models, while modifying the conducts, products and services to make them comply with Shari'ah, which promote justice, fairness and equity. Islamic microfinance can range from not for-profit fully charity-based, a certain combination of charity-based and market-based, to fully for-profit market-based models.

2.1.3 Microfinance Institution

Microfinance products and services are usually provided by microfinance institutions (MFIs), including commercial bank, rural bank, village bank, cooperative or credit union, other non bank financial institution (NBFI), development organization, or non government organization (NGO).

As financial providers, MFIs could also act as financial planner, financial developer and financial manager of poor people. As development agents, MFIs could act as trainer, lecturer, assistant and motivator. MFIs could be not-for profit, social business, or for profit organizations.

In general, there are three types of MFI, namely not-for-profit charity-based MFI, social business MFI, and for-profit market-based MFI.

2.1.4 Comparison between Conventional and Islamic Microfinance

Microfinance in general, conventional or Islamic, can be grouped into not-for-profit charity-based, social business and for-profit market-based. Comparison between charity-based conventional microfinance and charity-based Islamic microfinance can be read in table 2.

Table 2. Comparison between Conventional and Islamic Not-For-Profit Charity-Based Microfinance

	Conventional Microfinance	Islamic Microfinance
Source of Funds	International donors	Local philanthropy (zakah, infaq, sadaqa, and waqf funds)
Usage of Funds	Profit earning	Socio-economic development
Type of Charges	Interest based	Interest free
Nature of Funds	Debt	Charity
Nature of Recovery	Forced recovery through peer group pressure	Community pressure
Type of Contributors	Non-voluntary	Voluntary
Type of Empowerment	Women	Family or individual
Type of Motivation	Commercial	Brotherhood
Level of Participation	Selected members of the society	Compulsory by every member of the society

Source: Kaleem and Ahmed (2010)

Meanwhile, the characteristic comparisons between conventional for-profit market-based microfinance and Islamic market-based microfinance can be read in table 3.

Table 3. Comparison between Conventional and Islamic For-Profit Market-Based Microfinance

	Conventional Microfinance	Islamic Microfinance
Source of Funds	International donors, Savings of clients	International donors, Savings of clients, Islamic charities
Mode of Lending/Financing	Interest based lending	Islamic modes of financing
Financing the Poorest	Not included	Can be included
Fund Transfer	Cash	Goods
Deduction (Fee)	Membership fee is deducted at inception	No deduction at inception
Target Group	Women	Family
Objective	Women empowerment	Ease and availability of financing
Liability of Loan/Financing	Recipient (women)	Recipient and spouse (family)
Worker Incentive	Monetary	Monetary and Religious
Treatment in case of Default	Group/Center pressure and threat	Group/Center/Spouse guarantee and Islamic ethics
Social Development program	Secular (non-Islamic): behavioral, ethics and social development	Religious (Islamic): behavioral, ethics and social development

Source: Mazher (2010)

2.2 Pricing in Microfinance

The price (interest rate or margin) of microfinance depends on many determinants, such as risks associated with micro-loan/financing, targeted customers (which could range from extreme poor, active poor, low micro-enterprise, medium micro-enterprise and high micro-enterprise), source of funding (charity, mixed, or commercial), and types of MFIs (which could be not-for profit, social business, or for-profit).

2.2.1 Risk in Microfinance

According to Gosh (2012), risk in microfinance or microbanking as well as commercial banking refers to the potential loss that may occur to a bank due to the happening of some events. Risk arises because of the uncertainty associated with events that have the potential to cause loss; an event may or may not occur, but if it occurs it causes loss. Risk is primarily embedded in financial transactions, although it can occur due to other operational events. It is measured in term of the likely change in the value of an asset or the price of a security/commodity with regard to its current value or price.

Microfinance Institutions (MFIs) and Banks usualy face two broad categories of risks namely business risks and control risks (Gosh, 2012). Business risks are inherent in the business and arise due to the occurrence of some expected or unexpected events in the economy or the financial markets, which can cause erosion in assets values and, consequently, reduction in the intrinsic value of the bank. The money lent to a customer may not be repaid due to the failure of the business. The risk that is inherent in the business of banks such as credit risk, market risk, and operational risk.

Control risk refers to the inadequacy or failure of control that is intended to check the intensity or volume of business risk or prevent the proliferation of operational risk. Inadequacy in control arises due to the lack of understanding of the entire business process, while failure in control arises due to complacency or laxity on the part of the control staff. MFIs as well as banks are susceptible to control risk because of the inadequacy of their control framework and the possibility of human failure in the application of control. Human failure often may occur due the lack of knowledge about the products and business process. Controls risk arises because of negligence in the application of control or because of complicity and compromise with the business principles and rules. Market risk may often occur in banks than in microbanks.

While credit risk is the risk of default by the counterparty and the potential loss that can occur from the default, operational risk is the risk of potential loss that may occur from adverse events associated with people, internal process and system, and external events. Operational risk is taken, not for an expected returns, it is implicit in the ordinary course of corporate activities. The degree of credit risk is not identical in all types of loans and advances. It varies in accordance with the nature of counterparty, and the customers, or for unproductive and speculative purposes and longer maturity periods carry a higher degree of credit risk.

2.2.2 Risk-based Loan Pricing

Ghosh (2012) states that the risk-based loan price reflects the return on a risk-free asset, plus a risk margin, which should be adequate to compensate the bank for the entire scope of risks assumed by it. Risk-based loan prices take into account different elements of risks, including default risk, rating migration risk, credit correlation risk, credit concentration risk, collateral risk, and recovery risk. The most dominant factors that influence the loan price are the probability of default and the loss rate given default that reflect the probable loss from credit risk. The key factor that determines the risk-based loan price is the quantum of potential loss that can arise from the exposures to counterparty. The default characteristics of loans and the varying scales of recovery when defaults occurs set the platform for discriminating between counterparties in fixing the lending rates.

Rating borrowers is the basis for varying the lending rates. The maximum interest rate band between the least risky and the most risky credit exposure should be alignment with banking industry practices and the regulatory prescriptions. The additional cost in procuring funds to support long-tenure loans should be included in the lending rate.

Based on Gosh (2012), the risk-based loan price should be granulated in accordance with the risk grade included in the rating scale. However, for operational convenience, lending rates can be linked to broad risk categories instead of each risk grade of the rating scale. Exceptions can be made in fixing the risk-based loan price due to market compulsion and longer maturity of the loans.

Risk-based loan pricing implies that the lending rates increase with the increase in credit risk, but risk grade alone is not the sole basis for deciding the final rate. Size of the bank, risk appetite, targeted return on assets, historical cost-income ratio, and the extent of credit portfolio diversification, will determine the final rate. Furthermore, collateral coverage and risk-mitigation opportunities also influence the lending rate.

2.3   Previous Studies

There are plenty of studies on conventional as well as Islamic microfinance. Most of microfinance studies focus on issues, such as:

- poverty alleviation (Hossain, 1988; Montgomery and Weiss, 2005; Ahmed, 2004; Obaidullah, 2007; Obaidullah, 2008; Achter, *et al.*, 2009; Abdulrahman, 2010; Ali and Alam, 2010; Laila, 2010),
- graduation (Matin, *et al.*, 2008),

- empowerment, especially woman (Mayoux, 2005; Dusuki, 2006; Muhtada, 2008; Rajouria, 2008),
- outreach (Malhotra, 1995; Kahlmann and Odeen (2005); Akhtar, 2007),
- socio-development programs (Wilson, 2007),
- provision of financial services (especially micro-credit) for the poor and microenterprises (Ahmed, 2002; Khan and Rehman, 2007; Dusuki, 2008; Khan and Usman, 2009),
- microfinance models (McDonnell, 1999; Harper, 2002; Masyita, *et al.*, 2005; Ahmed, 2007; Mannan, 2007; Bulut, 2008; Laila and Maqsood, 2009; Masyita, 2009; Kaleem and Ahmed, 2010; Ascarya and Cahyono, 2011),
- microfinance paradigm (Robinson 1995; Yunus, 1997; Yunus, 2008),
- impact studies (Khandker, 1996; Aguilar, 2006; Roodman and Morduch, 2009; Hossain, 2012)
- review (Robbani, 2007; Ashraf and Rattan, 2009; Islam, 2009),
- critic (Morduch, 1998; Morduch, 1999; Dichter, 2007; Bateman, 2010)
- challenge (Obaidullah and Khan, 2008)
- performance (Lapenu and Zeller 2001; Vinelli, 2002); Jiwani, 2007; Mazher, 2010),
- efficiency or effectiveness (Schreiner, 2001; Hadisumarto and Ismail, 2010),
- sustainability (Ravicz, 1998; GTZ, 2006; Badawi and Grais, 2007; Jiwani, 2007; Saefullah, 2011; Ascarya and Cahyono, 2011),
- comparison (Ravicz, 1998; Morduch, 1999; Lapenu and Zeller, 2001; Mannan, 2007; Khan and Usman, 2009; Ascarya and Cahyono, 2011),
- regulation and supervision (CGAP, 2003), and
- framework (Christen and Rosenberg, 2000; Dogarawa, 2009).

However, studies on microfinance loan/financing price are very limited. Some of these studies include Harper (1998), Ledgerwood (1999), Fernando (2006), Arvind (2009), Rosenberg *et al.* (2009), Mitra (2009), Ali and Alam (2010), as well as Hudon and Sanberg (2011) and Ghosh (2012). Other studies which touch on microfinance pricing include Morduch (1999), Porteous (2006), Cull, *et al.* (2008), Bateman (2010). Moreover, there is also one study which compares Islamic and conventional microfinance including their pricing by Mannan (2007).

Harper (1998) states that the demand for financial services among poor borrowers is highly inelastic—that is, a relatively large increase in interest rates tends to cause a relatively small reduction in quantity of loans demanded. The price inelastic characteristic of the market for micro loans has been well documented and explains one of the golden rules of microfinance: *access is more important to small borrowers than costs.*

Ledgerwood (1999) also mentions that microfinance clients are not interest-rate sensitive. That is, micro-entrepreneurs have not appeared to borrow more or less in reaction to an increase or decrease in interest rates. For the most part, an interest rate far above commercial bank rates is acceptable because the borrowers have such limited access to credit.

Fernando (2006) studies how to understand and deal with high interest rates on microcredit. Microcredit rates are so high due to four key factors to their sustainability, namely the cost of funds, the MFI's operating expenses, loan losses, and profits needed to expand their capital base and fund expected future growth. Permanent source of funds must be obtained at market rates which are also exposed to high inflation risk. Operating expenses include high personnel and administrative costs. Making and recovering small loans is costly on a per unit basis. Therefore, MFIs must find innovative ways to improve their productivity and efficiency, and reduce operating costs. Essential to this process is cost-reducing innovations. In summary, microcredit interest rates are high because microlending remains a high-cost operation. The key to reducing these rates in a sustainable manner is to reduce costs through improved market competition, innovation, and efficiency.

Arvind (2009) concludes that microcredit interest rates are lower than those of moneylenders, but higher than those of commercial banks to wealthier borrowers. Using simple economic framework of discontinues marginal revenue curves and U-shaped supply curve, he finds that these because of asymmetric information, transactions costs and complementary human capital.

Rosenberg *et al.* (2009) find that the key component to high price of microfinance is operational costs. Since the transaction of microfinance is small in size, transaction costs are proportionately high and the microfinance sector suffers from high interest rates of 15% to 50% (higher in some cases), with an average interest rate of about 28% per annum.

Mitra (2009) studies exploitative microfinance interest rates. He argues that MFIs often start with certain agenda to help the poor, but they face sustainability dilemma as they mature, so that MFIs gradually are shifted toward profitability. In so doing, the MFIs charge very high interest rates or impose several hidden charges to borrowers, such as margin money, compulsory savings, insurance premium and processing fee. The stated interest rates of 15% flat could effectively goes well over 100% per annum. To help the poor to understand the true cost of his/her loan MFIs should disclose effective interest rate

to the borrowers. Because, hiding effective interest rate to poor and illiterate borrowers by using "creative" accounting practices is highly unethical.

Ali and Alam (2010) also find that high interest rate on microcredit is one of the problems faced by microfinance in Pakistan, due to high administrative or transaction cost of small loans. However, poor people still take this high price microcredit, since they could not meet collateral requirement of commercial loans.

Hudon and Sanberg (2011) in their study titled Towards a Theory of Fair Interest Rates on Microcredit seeks to find a theoretical basis for a more balanced way of setting prices on microcredit; i.e. a theory of fairness in interest rates. They discuss four main theoretical approaches. Although further researches are still needed, in the end the authors favor a combination of consequentialism and liberal egalitarianism which seems able to adequately balance the needs of the institutions with the needs of the clients.

Moreover, the price (interest rate or margin) of microfinance depends on many determinants, such as risks associated with micro-loan/financing, targeted customers (which could range from extreme poor, active poor, low micro-enterprise, medium micro-enterprise and high micro-enterprise), source of funding (charity, mixed, or commercial), and types of MFIs (which could be not-for profit, social business, or for-profit). Risks in MFI (or bank): business risks and control risks. Business risks include credit risk, market risk and operational risk. Control risks refer to the inadequacy or failure of control that is intended to check the intensity or volume of business risk or prevent the proliferation of operational risk. Ghosh (2012) states that the risk-based loan price reflects the return on a risk-free asset plus a risk margin, which should be adequate to compensate the bank for the entire scope of risks assumed by it. Risk-based loan prices take into account different elements of risks, including default risk, rating migration risk, credit correlation risk, credit concentration risk, collateral risk, and recovery risk.

In the meantime, Morduch (1999) compares five conventional microfinance models from four different countries, namely, Grameen Bank Bangladesh, Banca-Sol Bolivia, BRI Unit Desa (Village Bank) Indonesia, Bank Kredit Desa (Village Bank), and FINCA (Village Bank) Latin America. Characteristics of these five microfinance model can be seen in table 4.

<p style="text-align:center">Table 4. Characteristics of Microfinance Models in Several Countries</p>

	Grameen Bank Bangladesh	Banco-Sol Bolivia	BRI Unit Desa Indonesia	BKD Village Bk. Indonesia	FINCA Village Bk. Latin America
Membership	2.4 million	81,503	2 m. borrower 16m. depositor	765,586	89,986
Avg. Loan Balance	$134	$909	$1007	$71	$191
Typical Loan Term	1 year	4-12 months	3-24 months	3 months	4 months
% Female Members	95%	61%	23%	-	95%
Rural/Urban	Rural	Urban	Mostly rural	Rural	Mostly rural
Group Lending	Yes	Yes	No	No	No
Collateral	No	No	Yes	No	No
Voluntary Saving	No	Yes	Yes	No	Yes
Progressive Lending	Yes	Yes	Yes	Yes	Yes
Reg. Repayment	Weekly	Flexible	Flexible	Flexible	Weekly
Target Client	Poor	Mostly non-poor	Non-poor	Poor	Poor
Fin. Sustainable	No	Yes	Yes	Yes	No
Interest Rate/Yr	20%	47.5-50.5%	32-43%	55%	36-48%
Inflation (1996)	2.7%	12.4%	8.0%	8.0%	-

Source: Morduch (1999)

Morduch concludes that microfinance may be an important aid for households that are not destitute but still remain considerably below poverty lines. The tension is that the scale of lending to this group is not likely to permit the scale economies available to programs focused on households just above poverty lines. Subsidizing may yield greater social benefits than costs. Moreover, price of microfinance tends to be lower for charity-based MFIs and higher for market-based MFIs. Morduch suggests applying group-lending and group repayments to reduce transactions costs.

Mannan (2007) compares conventional microfinance model (Grameen Bank or GB) with Islamic microfinance model (Social Islami Bank Ltd. or SIBL) in Bangladesh. He summarizes the comparisons in 'Nine Myths and Realities', as can be seen in table 5.

Table 5. Comparison between Grameen Bank and Social Islami Bank Limited Models

No	Grameen Bank Model	Social Islami Bank Ltd. Model
0	GB established through Ordinance in 1983: initial Government Share 60%, (now 25%).	SIBL established in 1995 under Banking Companies Act of Bangladesh. Three Sector integrated Islamic Banking Model in one: a) Corporate banking; b) Non-formal Baking with the poor; and c) Voluntary sector Banking. It is 100% Private Sector.
1	In the very model of GB, the poor borrower tends to move horizontally forwards limited self-employment with an individual loan limit of Tk. 10,000 (US $ 142), making marginal contribution to poverty alleviation.	In SIBL micro-credit model, there is a built-in mechanism for graduation process, where poor borrower can move beyond poverty from micro-credit to market through micro-enterprise after its successful graduation process starting from an individual loan limit of Taka 30,000 (i.e. US $ 428.00) up to Taka 10 lacs (i.e. US $14,285).
2	GB does <u>not</u> cover hardcore poor in the rural area, not to speak of the poor in the urban area. Main criterion for membership in GB disbursing loans is a ceiling on land holding of no more than half an acre and a floor on the level of income.	SIBL does cover the hardcore poor of both urban and rural areas: it imposes no condition on ceiling on land holding as well as a floor on the level of income.
3	GB imposes interest rate on its loan as high as <u>54%</u> per annum on its micro-credit operations, if the hidden cost of documentation and membership fees and obligatory provision for blocked amount are taken into consideration. Since <u>non-reducing method of accounting</u> is applied in case of repayment of loan installments; this may further raise the interest rate by 31% over the interest rate of <u>54%</u> making a total interest rate as high as <u>86%</u>. There is grant-in aid element in GB's transaction.	SIBL micro-credit operation is based on a flat expected profit rate of <u>8%-10%</u> only and calculation of installment payment is made in a reducing method. There is virtually <u>no</u> grant in aid element in SIB's transaction.
4	From lending process to recovery, GB's operation appears to be a new version of Feudal Economy like borrower-lender relation, exploitive interest rate, recovery system with profit on a daily or weekly basis and punishment for non-payment of loan, involving serious human rights violations and so on.	SIBL's operation is based on sharing on profit and loss. There is a provision for subsidy, out of its "Social Fund" in case of loss and cross subsidy from its corporate sector Banking.
5	GB's operation is based on implicit assumption of social class conflict and Neo-classical orthodox paradigm of western value free economics, it intends to empower women, as opposed to man (as over 95% of its client are women), de-links credit from culture. Its Micro-credit operation may eventually disintegrate a family.	SIBL intends to empower family by ensuring joint liability of husband and wife in case of lending to family or groups of families. It represents a paradigm shift in micro-credit operations, linking credit to culture in a predominant Muslim society and the family remains a bed-rock of a society.
6	GB micro-credit operation provide a forum for a flourishing international poverty business and a market for selling and buying aid, grants and loans by donor agencies and development partners.	SIBL tends to finance its micro-credit operation by generating its internal resources. It does not depend at all on foreign aid or grants.

7	Micro-credit operation of GB is not subject to audit by Central Bank or Statutory External audit.	SIBL's operations are subject to both Central Bank audit as well as external audit.
8	Micro-credit operation of GB is totally tax free.	SIBL's operation is not tax free.
9	Recovery of loans is around 97%: Peer pressures and coercive measures are adopted for recovery of loans.	Recovery of loans is around 97%: The recovering of loans are made through peer pressures with human face.

Source: Mannan (2007)

Mannan (2007) concludes that micro-credit as practiced by GB is not an answer to the reduction of poverty; it just helps poverty to continue. Meanwhile, family empowerment micro-credit program of SIBL represents a paradigm shift in microfinance, capable of reduction of poverty and growth with equitable distribution of income. Moreover, in terms of loan/financing pricing, GB charges very high interest rates 86%, while SIBL charges only 10% margin.

2.4   Conceptual Framework

The conceptual framework of this study can be seen in figure 4. The expensive price of microfinance (conventional and Islamic) will be viewed from conventional and Islamic perspectives. Conventional types of MFI could be: 1) not-for-profit charity-based; 2) social business; and 3) for-profit market-based. Islamic types of MFI could be: 1) ZISW-Based; 2) Mixed-Based; and 3) Market-Based. The main determinants of microfinance loan/financing pricing, include: 1) inherent microfinance risks; 2) un-bankable customers; 3) source of fund; and 4) types of MFI.

The expensive microfinance loan/financing price will be analyzed using qualitative method Analytic Network Process (ANP) and quantitative method Data Envelopment Analysis (DEA). Following these methods, the main determinants of microfinance loan/financing price will be divided into four groups, which include 1) input; 2) process; 3) output; and external. DEA method will use input and output only, while ANP will use all groups of determinants.

The results of quantitative and qualitative analyses will be used as foundation to devise policy recommendations to systematically reduce the loan/financing price of microfinance.
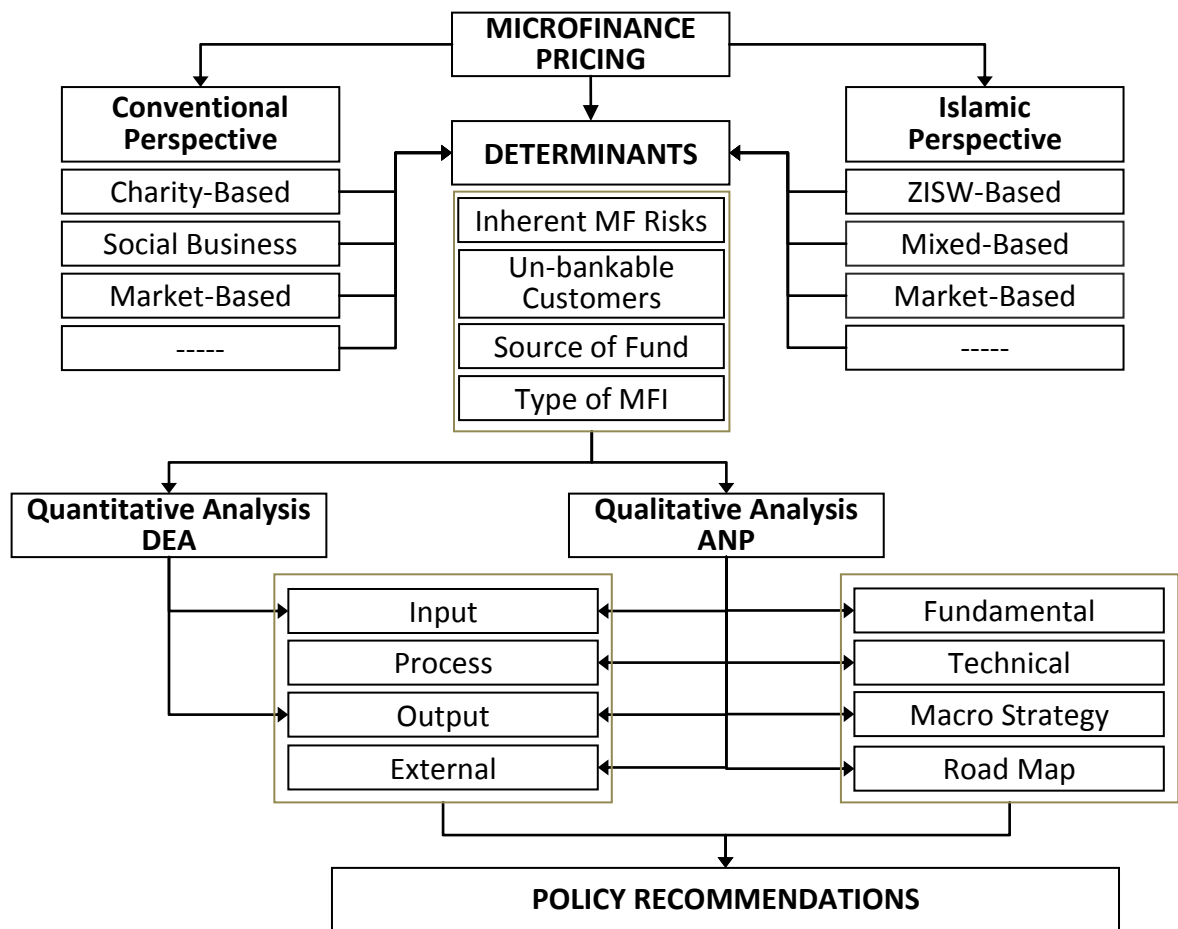
Figure 4. Conceptual Framework

III.   METHODOLOGY

3.1   Data

This study will apply qualitative and quantitative methods simultaneously, namely, Analytic Network Process (ANP) and Data Envelopment Analysis (DEA). Therefore, the data needed include qualitative and quantitative data. Qualitative data will be obtained from field survey to knowledgeable respondents (including experts and practitioners of conventional and Islamic microfinance), using un-probabilistic purposive sampling, since the prime requirements of ANP respondents is their expertise. Meanwhile, quantitative data will be obtained from conventional and Islamic MFIs (including balance sheets, income statement and other reports) in the form of annual time series data of 2007 to 2011.

3.2   Methodology

Two methods that will be used in this study, i.e. Analytic Network Process (ANP) and Data Envelopment Analysis (DEA), will be discussed in more detail. Moreover, the model of each method will also be presented in this section.

1.2.1   Analytic Network Process (ANP)
a.   Overview

ANP is a new approach in decision making process that provides general framework in treating decisions without making any assumption about independency of elements in higher level from elements in lower level and about independency of elements within the same level. Moreover, ANP uses network without having to determine level as in hierarchy used in Analytic Hierarchy Process (AHP), which is a starting point of ANP. The main concept of ANP is influence, while the main concept of AHP is preference. AHP with its dependency assumptions on clusters and elements are a special cases of ANP.

In AHP network, there are levels of goal, criteria, sub criteria, and alternative, where each level has its own elements. Meanwhile, in ANP network, level in AHP is called cluster that can consist of criteria and alternative which now is called node (see figure 5)
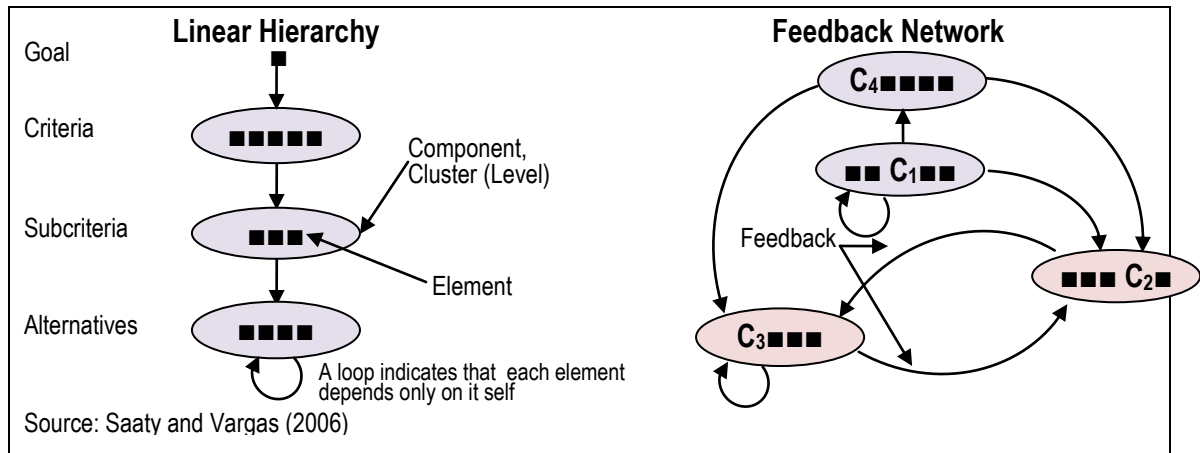
Figure 5. Comparisons of Hierarchy and Network

With the feedback, alternatives can depend on criteria, like in a hierarchy, but it can also depend on other criteria. Furthermore, those criteria themselves can depend on alternatives and other criteria (see figure 5). Meanwhile, feedback improves priority which derived from judgment and makes prediction more accurate. Therefore, the result of ANP is expected to be more stable. From feedback network in figure 5, it can be seen that the parent node or element and nodes to be compared can be in different clusters. For example, there is a direct link from parent node cluster C4 to the other clusters (C2 and C3), which called outer dependence. Meanwhile, there is parent node and nodes to be compared lie within the same cluster, so that this cluster will be connected with itself and create loop link. This is called inner dependence.

The intended output of ANP is to determine the overall influence from all elements. Therefore, all criteria must be configured and set their priority in a framework of control hierarchy or network. After that, do the comparison and synthesis to obtain the order of priority from these criteria. Then, we derive the influence from element in feedback system with respect to each criterion. Finally, the results of these influences are weighted according to the important level of the criteria, and summed them up to get overall influence from each element.

AHP and ANP utilize ratio scale, which makes basic arithmetic operation possible. It should be noted that ratio scales are also absolute scales. Both of them are derived from pairwise comparisons using judgments or derive from pairwise dominance ratios using actual measurements. When using judgments, in AHP one asks "which one is more preferred or more important?" while in ANP one asks "which one has greater influence?" The second question obviously requires factual observation and knowledge to produce valid answer. This makes the second question more objective than the first one.

b.   Axiom of ANP

Every theory is based on axioms. The simpler and the fewer the axioms, the more general and applicable the theory is. AHP has four (ANP has three) relatively simple axioms which carefully restrict the scope of a problem: 1) **Reciprocal**, which requires that if A is 4 times larger than B, then B is one forth as large as A; 2) **Homogeneity**, which states that the elements being compared should not differ by too much, else there will tend to be larger errors in judgment (the verbal scale of ANP ranges from one to nine, or about an order of magnitude); 3) **Hierarchy Structure** (not applicable to ANP), which requires the application of hierarchy structure; and 4) Individuals who have reasons for their beliefs should make sure that their ideas are adequately represented for the outcome to match these expectations.

c.   Basic Principles of ANP

There are three related basic principles of AHP/ANP, namely decomposition, comparative judgments, and hierarchic composition or synthesis of priorities (Saaty, 1999).

1. **Decomposition**. The principle of decomposition is applied to structure a complex problem into a hierarchy or network of clusters, sub clusters, sub-sub clusters, and so on. In other words, decomposition tries to model the problem into AHP/ANP framework.

2. **Comparative Judgments**. The principle of comparative judgments is applied to construct pairwise comparisons of all combinations of elements in a cluster with respect to the parent of the cluster. These pairwise comparisons are used to derive 'local' priorities of the elements in a cluster with respect to their parent.

3. **Hierarchic Composition or Synthesis**. The principle of hierarchic composition or synthesis is applied to multiply the local priorities of the elements in a cluster by the 'global' priority of the parent element, producing global priorities throughout the hierarchy or network and then adding the global priorities for the lowest level elements (usually the alternatives).

d.   Procedure to Obtain Ratio Scale[2]

Let A_1, A_2, A_3, ..., A_n be *n* elements in a matrix within a hierarchy. The pairwise comparisons on pairs of elements (A_i, A_j) that we have to make are represented by an *n-by-n* matrix **A** = (a_{ij}), where i,j = 1, 2, 3,....., n. Define a set of numerical weights w_1, w_2, w_3, ..., w_n that reflects the recorded comparisons, so that we can write:

$$A_1 \qquad A_2 \qquad\qquad A_n$$

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[2] Azis (2003), pp. 3-4.

$$A = \begin{array}{c} A_1 \\ A_2 \\ \cdot \\ \cdot \\ A_n \end{array} \begin{bmatrix} w_1/w_1 & w_1/w_2 & \ldots & \ldots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \ldots & \ldots & w_2/w_n \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ \ldots & \ldots & \ldots & \ldots & \ldots \\ w_n/w_1 & \ldots & \ldots & \ldots & w_n/w_n \end{bmatrix} \qquad (3.1)$$

Since every row is a constant multiple of the first row, A has a unit rank. By multiplying A with the vector of weights *w*,

$\quad$ Aw = *n*w $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (3.2)

To recover the scale from the matrix ratios, the following system ought to be solved:

$\quad$ (A-*n*I)w = 0 $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (3.3)

Clearly, a nontrivial solution can be obtained if and only if **det(A-*n*I)** vanishes, i.e., the characteristic equation of A. Hence, *n* is an *eigenvalue* and *w* is an *eigenvector*, of A. Given that A has a unit rank, all its eigenvalues except one are zero. Thus, the trace of A is equal to *n*.

If each entry in A is denoted by a_{ij}, then $a_{ij} = 1/a_{ji}$ (reciprocal property) holds, and so does $a_{jk} = a_{ik}/a_{ij}$ (consistency property). By definition, $a_{ii} = a_{jj} = 1$ (when comparing two same elements). Therefore, if we are to rank n number of elements, i.e., A is of the size *n*-by-*n*, the required number of inputs (from the paired comparison) is less than n^2; it is equal to only the number of entries of the sub-diagonal part of A (see Saaty, 1994). Hence, if there are three elements in a particular level of a hierarchy, only three pairwise comparisons are required.

In general, however, the precise value of w_i/w_j is hardly known simply because the pairwise comparisons we made is only an estimate, suggesting that there are some perturbations. While the reciprocal property still holds, the consistency property does not. By taking the largest eigenvalue denoted by λ_{max},

$\quad$ $A^P w^P = \lambda_{max} \cdot w^P$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ (3.4)

where A^P is the actual, or the given, matrix (perturbed from matrix A). Although (3.2) and (3.4) are not identical, if w^P is obtained by solving (3), the matrix whose entries are w_i/w_j is still a consistent matrix; it is a consistent estimate of A, although A^P itself does not need to be consistent. Note that A^P will be consistent if and only if $\lambda_{max} = n$. As long as the precise value of w_i/w_j cannot be given, which is common in a real case due to the bias in the comparisons, λ_{max} is always greater than or equal to *n* (hence, a measure of consistency can be derived based on the deviation of λ_{max} from *n*).

When more than two elements are compared, the notion of consistency can be associated with *transitivity* condition: if $A_1 \succ A_2$, and $A_2 \succ A_3$, then $A_1 \succ A_3$. It should be clear that in solving for **w**, the *transitivity* assumption is not strictly required; the inputted comparisons do not have to reflect a full consistency. Yet, as shown above, the resulting matrix and the corresponding vector remain consistent. It is this consistent vector w that reflects the priority ranking of the elements in each level. Hence, in a standard hierarchy with three levels (goals, criteria, and alternative policies), the elements in each level are pairwise compared with respect to elements in the level above it, and the resulting vector for the bottom level reflects the priority ranking of the alternative policies.

e.   Supermatrix in ANP[3]

While both AHP and ANP use the above procedure to derive the ratio scales, the presence of feedback influences in ANP requires a large matrix known as *supermatrix* containing a set of sub-matrices. This supermatrix should capture the influence of elements on other elements in the network.

Denoting a cluster by C_h, $h = 1, \ldots, N$, and assuming that it has n_h elements e_{h1}, e_{h2}, e_{h3}, $\ldots$, e_{hmh}, Equation 3.5 shows the supermatrix of the *hierarchy*.

$$(3.5)$$

When the bottom level affects the top level of the hierarchy, a form of network known as *holarchy* is formed, the supermatrix of which will look like the one displayed in Figure 3.3.

Notice that the entry in the last row and column of the supermatrix in equation 3.5 is the identity matrix I corresponding to a loop at the bottom level of the hierarchy. This is a necessary aspect of a hierarchy viewed within the context of the supermatrix. On the other hand, the entry in the first row and last column of a holarchy in equation 3.6 is nonzero, indicating that the top level depends on the bottom level.

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[3] Azis (2003), pp. 4-7.

$$W = \begin{array}{c} \\ C_1 \\ C_2 \\ \\ \\ C_N \end{array} \begin{bmatrix} 0 & 0 & \cdots & 0 & 0 & W_{1,n} \\ W_{21} & 0 & \cdots & 0 & 0 & 0 \\ 0 & W_{32} & \cdots & 0 & 0 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & \cdots & W_{n-1,n-2} & 0 & 0 \\ 0 & 0 & \cdots & 0 & W_{n,n-1} & 0 \end{bmatrix}$$

(3.6)

In general, when feedback influences are present as in Figure 3.1 (right), the supermatrix is formed by laying out all the clusters and all the elements in each cluster both vertically on the left and horizontally at the top as in equation 3.7.

$$W = \begin{array}{c} C_1 \\ C_2 \\ \\ C_N \end{array} \begin{bmatrix} W_{11} & W_{12} & \cdots & W_{1N} \\ W_{21} & W_{22} & \cdots & W_{2N} \\ \vdots & \vdots & \cdots & \vdots \\ W_{N1} & W_{N2} & & W_{NN} \end{bmatrix}$$

(3.7)

Typical entry of the above supermatrix is:

$$W_{ij} = \begin{bmatrix} W_{i1}^{(j_1)} & W_{i1}^{(j_2)} & \cdots & W_{i1}^{(jn_j)} \\ W_{i2}^{(j_1)} & W_{i2}^{(j_2)} & \cdots & W_{i2}^{(jn_j)} \\ \vdots & \vdots & \cdots & \vdots \\ W_{in_i}^{(j_1)} & W_{in_i}^{(j_2)} & \cdots & W_{in_i}^{(jn_j)} \end{bmatrix}$$

(3.8)

where i and j denote the affected and affecting cluster respectively, and n is the element of the respected cluster.

The entries of sub-matrices in W_{ij} are the ratio scales derived from paired comparisons performed on the elements within the clusters themselves according to their influence on each element in another cluster (outer dependence) or elements in their own

cluster (inner dependence)[4]. The resulting *unweighted supermatrix* is then transformed into a matrix each of whose columns sums to unity to generate a stochastic supermatrix. The derived weights are used to weight the elements of the corresponding column blocks (cluster) of the supermatrix, resulting in a *weighted supermatrix* which is also stochastic. The stochastic nature is required for the reasons described below.

It has been shown that such a limit exists given the stochastic nature of the weighted supermatrix (Saaty, 2001). There are 3 cases to consider in deriving W^k: (1) λ_{max} = 1 is a simple root and there are no other roots of unity in which case given the nonnegative matrix W is primitive, we have $\lim_{k \to \infty} W^k = we^T$, implying that it is sufficient to raise the primitive stochastic matrix W to large powers to yield the limit outcome; (2) there are other roots of unity that cause cycling, in which case Cesaro sum is applied[5] ; and (3) λ_{max} = 1 is a multiple root, in which case the Sylvester's formula with λ_{max} = 1 is applied[6]. Hence, the powers of the supermatrix do not converge unless it is stochastic, because then its largest *eigenvalue* is one. When a convergence is failed to achieve (a cyclic case) the average of the successive matrices of the entire cycle gives the final priorities (Cesaro sum), in which the limit cycles in blocks and the different limits are summed and averaged and again normalized to one for each cluster[7].

In practice, however, one simply needs to raise the stochastic supermatrix to large powers to read off the final priorities in which all the columns of the matrix are identical and each gives the relative priorities of the elements from which the priorities of the elements in each cluster are normalized to one. At any rate, raising the stochastic supermatrix to large powers gives what is known as *limiting supermatrix*.

Hence, there are 3 supermatrices: (1) the original unweighted supermatrix of column eigenvectors obtained from pairwise comparison matrices of elements; (2) the weighted supermatrix in which each block of column eigenvectors belonging to a cluster is weighted by the priority of influence of that cluster, rendering the weighted supermatrix

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[4] If the clusters influence and be influenced by other clusters, paired comparisons on the clusters are to be made as well.

[5] Cesaro' summability basically stipulates that if a sequence converges then the sequence of arithmetic means formed from that sequence also converges to the same limit as the sequence (see Saaty, 2001).

[6] James Joseph Sylvester (1814 – 1897), who was an English poet and great creators of terms in mathematics, developed a mathematical formula that allows limit priorities to be obtained from a reducible stochastic matrix W with $\lambda_{max} = 1$ being a multiple root.

[7] In other words, one has to compute the limit priorities of the stochastic supermatrix according to whether it is irreducible (primitive or imprimitive [cyclic]) or it is reducible with one being a simple or a multiple root and whether the system is cyclic or not.

column stochastic; and (3) the limiting supermatrix obtained by raising the weighted supermatrix to large powers.

f.   Steps of ANP Research

Based on ANP discussion, the main steps of ANP modeling are: 1) Decomposition, which is the development of ANP network of the problem; 2) Measurement, which is pairwise comparisons on the elements and relative weight estimation of all dependence and feedback relationships in the ANP network; and 3) Synthesis, which includes construction and calculation of original unweighted supermatrix, weighted supermatrix, and limiting supermatrix (the global priority weights).

PHASE 1 Model Construction	Literature Review	F G D
	Indepth Interview	
	ANP Model Construction	
	ANP Model Validation	
PHASE 2 Model Quantification	RESEARCHER	Pair-wise Questionnaire Design	EXPERTS
		Pair-wise Questionnaire Testing	
		Pair-wise Survey	
		Data Synthesis & Analysis	
PHASE 3 Results Analysis		Results Validation	
		Results Interpretation	
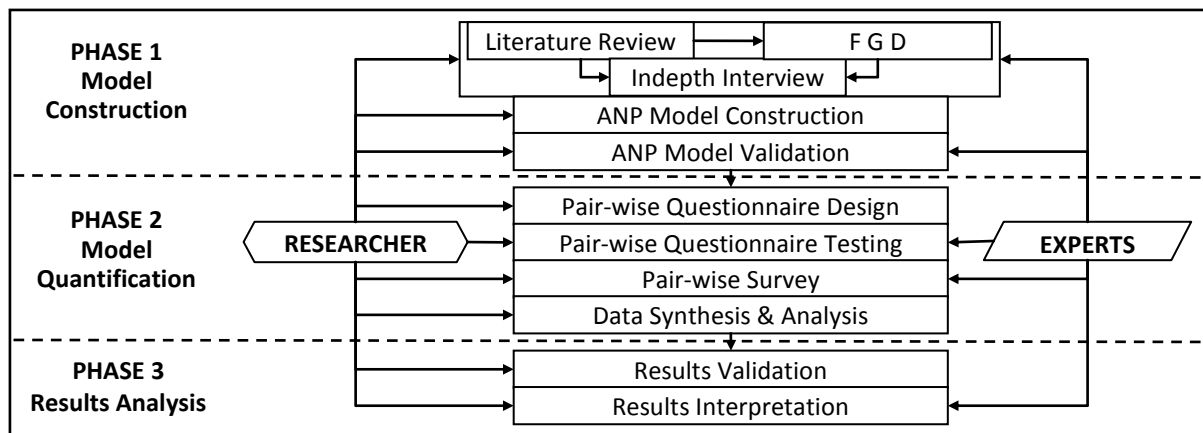
Figure 6. Steps of Research

This study comprises of several extended steps of main ANP modeling, which can be grouped into three phases. Phase 1 is model construction or decomposition to identify, analyze and structure the complexity of the problems into an appropriate ANP network, which includes: a) Literature reviews, questionnaires and in-depth interviews with experts and practitioners (Islamic bankers) to comprehend the problem fully; b) Construction of ANP network; and c) Validation of ANP network. Phase 2 is model quantification or pair-wise comparison, includes: a) Design pair-wise questionnaires in accordance with ANP network; b) Test the pair-wise questionnaires to respondents (experts and/or Islamic bankers); and c) Survey to respondents to fill out pair-wise questionnaires. Phase 3 is synthesis and results analysis, which includes: a) Data processing and synthesis using ANP software SUPERDECISIONS, as well as results analyses to calculate geometric mean and rater agreement; b) Validation of the results; and c) Interpretations of the results.

1.   Model Construction

To construct ANP model in phase 1, based on theoretical and empirical literature reviews of the problem, open questionnaires are sent via email to 20 practitioners (Islamic bankers) from various Islamic banks and 15 Islamic banking experts from various institutions, universities and consulting firms. Follow-up is conducted through in-depth interviews to garner more detailed information to be able to comprehend the real problems. Based on this comprehensive understanding, ANP network is developed and refined further by validation from experts and/or Islamic bankers. ANP network is then inputted to the computer using SUPERDECISIONS software.
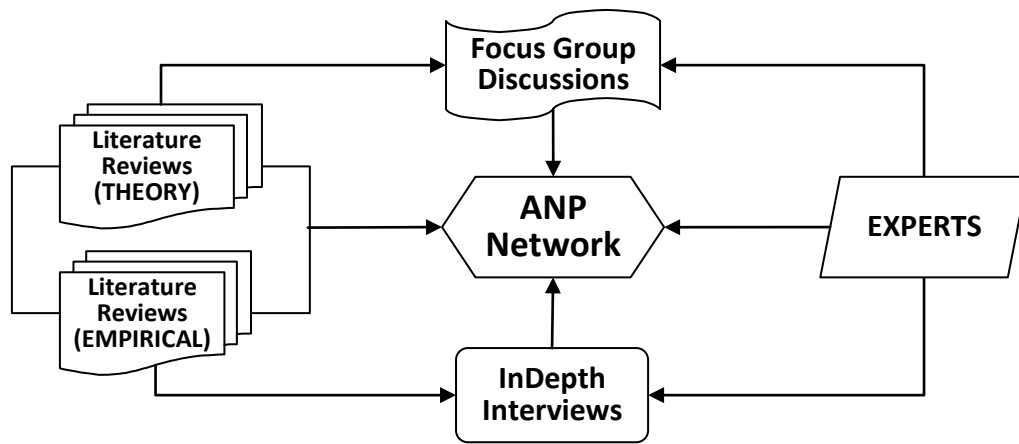
Figure 7. ANP Model Development

2.   Model Quantification

To quantify and measure the ANP model or network in phase 2, pair-wise questionnaires are drawn based on final ANP network designed in phase 1, which has been automatically formed in SUPERDECISIONS software. To make sure that the questionnaires are worked effectively within allowable inconsistency, questionnaire testing is conducted to respondents. In this step, modification to questionnaires might be needed to improve its effectiveness to gather appropriate data. Subsequently, pair-wise surveys to experts and Islamic bankers are conducted using final pair-wise questionnaires. Pair-wise data collected are then inputted to the ANP Network in SUPERDECISIONS software to be processed to produce outputs in the form of priorities and supermatrices. Each respondent will be inputted into one individual ANP network.
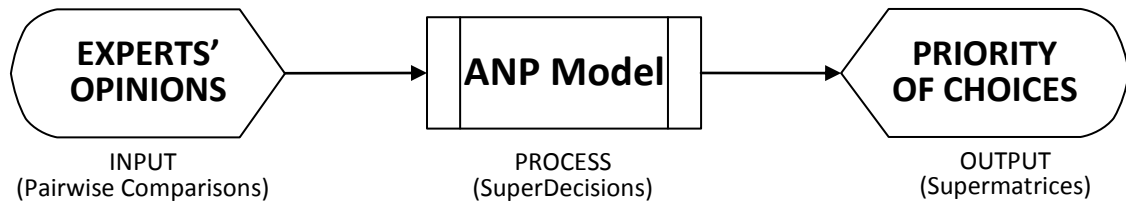
Figure 8. Input-Output Process of ANP

3. Synthesis and Analysis

In phase 3, Results or synthesis of ANP network in SUPERDECISIONS software for each respondent can be generated. The data are then exported to excel worksheet to be manipulated to produce the desired outputs. To produce scientific 'consensus' results, geometric means of all respondents' responses are calculated, re-inputted to ANP network in SUPERDECISIONS software, and re-synthesized. To make sure that all results are correct, validation is done for each step of procedure. Kendall's coefficient of concordance can be calculated to assess the agreement among respondents. Finally, interpretation of detailed (individual) and overall (geometric mean) results is completed to be able to draw conclusions and to propose policy recommendations.
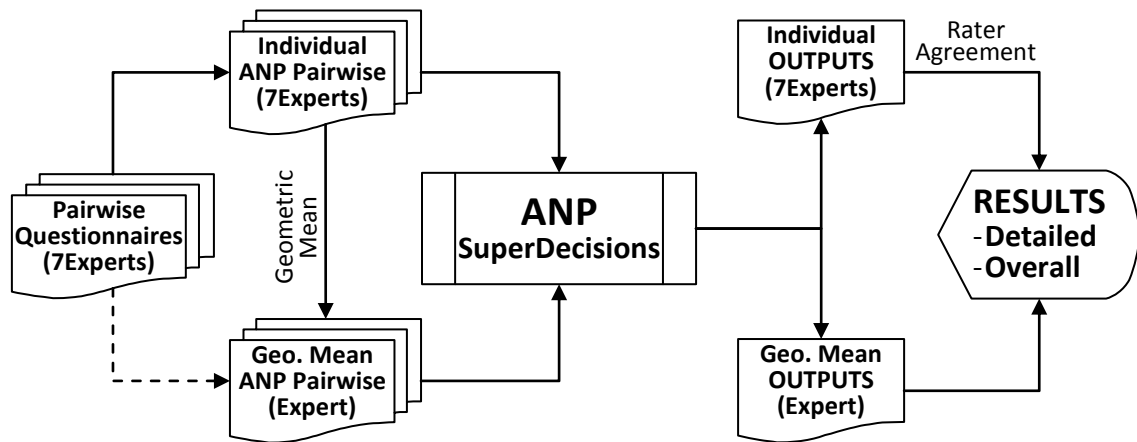
Figure 9. Detailed Input-Output Process of ANP

g. Geometric Mean

The Geometric Mean, which is a theorem in mathematics, is the unique way to combine group judgments. Instead of obtaining pairwise questionnaires from FGD consensus of all respondents, pairwise questionnaires of each respondent can be combined to obtain geometric mean consensus.

Geometric mean is a type of mean or average in mathematics, which indicates the central tendency or typical value of a set of numbers. To calculate geometric mean, the

numbers are multiplied and then the nth root of the resulting product is taken (n is the count of numbers in the set). The geometric mean of a data set {a_1, a_2, ..., a_n} is given by:

$$(\textstyle\prod_{i=1}^{n} a_i)^{1/n} = \sqrt[n]{a_1 a_2 \dots a_n} \tag{3.9}$$

The geometric mean of a data set is less than or equal to the data set's arithmetic mean (the two means are equal if and only if all members of the data set are equal). This allows the definition of the arithmetic-geometric mean, a mixture of the two which always lies in between.

h.   Rater Agreement

Kendall's coefficient of concordance or Kendall's W is a non-parametric statistic, which measures and assesses the level of agreement among raters or respondents. Kendall's W is a normalization of the statistic of the Friedman test, which ranges from 0 (no agreement) to 1 (complete agreement). If the value of W is 1, it means that all the survey respondents have been unanimous, and each respondent has assigned the same order to the list of concerns. If the value of W is 0, it means that there is no overall trend of agreement among the respondents, and their responses may be regarded as essentially random. Intermediate values of $0 < W < 1$ indicate a greater or lesser degree of unanimity among various respondents.

To calculate Kendall's W, suppose that object i is given the rank $r_{i,j}$ by judge number j, where there are in total n objects and m judges. Then the total rank given to object i is:

$$R_i = \textstyle\sum_{j=1}^{m} r_{i,j} \tag{3.10}$$

and the mean value of these total ranks is:

$$R = \tfrac{1}{2} m(n + 1) \tag{3.11}$$

The sum of squared deviations, S, is defined as:

$$S = \textstyle\sum_{i=1}^{n}(R_i - \bar{R})^2 \tag{3.12}$$

and then Kendall's W is defined as[8]:

$$W = \frac{12S}{m^2(n^3 - n)} \tag{3.13}$$

When the value of test statistic W is 1, it can be concluded that all the judges or survey respondents have been unanimous, and each judge or respondent has assigned the same order to the list of objects or concerns. When the value of test statistic W is 0, it can be concluded that there is no overall trend of agreement among the respondents, and their

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[8] Legendre, P (2005) Species Associations: The Kendall Coefficient of Concordance Revisited. *Journal of Agricultural, Biological and Environmental Statistics*, 10(2), 226–245.

responses may be regarded as essentially random. Intermediate values of test statistic $0 < W < 0$ indicate a greater or lesser degree of unanimity among the various judges or respondents.

i. ANP Model

Based on literature reviews, in-depth interviews and previous survey experience, the problem of expensive microfinance will be structured as follows.

PROBLEMS			
INPUT	PROCESS	OUTPUT	EXTERNAL
COST OF FUNDING • High Deposit Margin • High Channeling Margin **FUNDING STRUCTURE** • Low Portion of Cheap Funding • High Portion of Ch. • Low Demand of Dep. **LABOR** • Lack of HR Capability • High Cost HR **ASSET** • Lack of IT	**OWNER'S POLICY** • High Target ROA-ROE **MANAGEMENT** • Liquidity Maintenance • Poor Governance • Low Efficiency • Adverse Selection • Fraud **LEADERSHIP** • Risk Averse Behavior **INNOVATION** • Limited Products & Services	**PRICE OF FINANCING** • High Financing Margin • High Overhead Cost • Hidden Costs **FINANCING STRUCTURE** • High NPF • High Risk of Financing • ST Financing Oriented **ALTERNATIF OUTPUT** • No Alternative Outlet • Low Other Income	• Unfair Treatment • Seasonal Dependence • Competition with Other MFIs • Moral Hazard • Lack of Recognition • Inflation Risk **DEMAND** • Limited Access • Expensive
SOLUTIONS			
FUNDAMENTAL	TECHNICAL	MACRO STRATEGY	ROAD MAP
• Fair Treatment to Access Source of Fund • Improve HR Quality • Improve Governance • Increase Fee-based Income • Risk Shifting to Risk Sharing Behavior • Government Support & Commitment	• Incentive for L.Margin • Incentive for Efficiency • Incentive for Financial Self Sufficiency • Financing Diversification • Certification in MF • Technical Assistant	• Establish APEX Institution • Establish MF Insurance/Takaful • MF Rating System • Inclusion in Financial System • Low Inflation Target • Macroeconomic Stability	• Fit and Proper Test • Soc'n, Comm'n and Education Programs • Harmonization btwn. Soundness and FSS, Eff'cy, L.Margin, L.NPF • Fair Competition ACT • Standardization of Operations • Internationally Accredited

Therefore, the ANP model of the structured problem of expensive microfinance can be illustrated as follows.
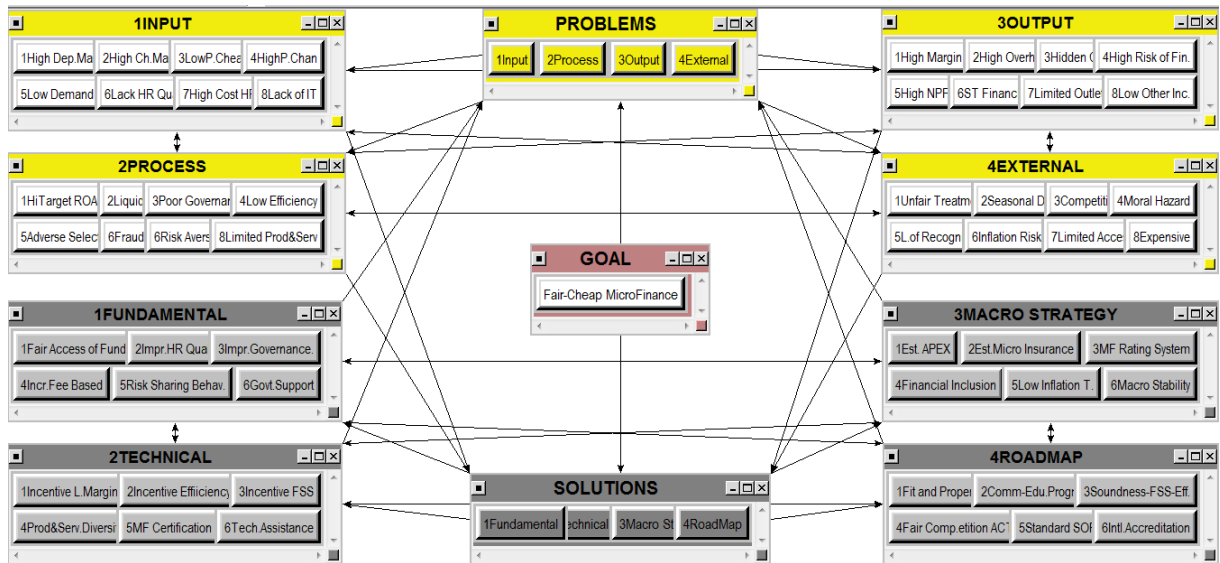
i. Data Envelopment Analysis (DEA)

This section will discuss the theory of efficiency, the measurement of efficiency, the connection of DEA to efficiency theory, and then discuss their details. Moreover, bank's efficiency can be measured from its functions. Three approaches to measure the efficiency of bank's functions are intermediation approach, production approach, and modern or asset approach. The theory of efficiency in general, its relation to parametric and non-parametric methods, and the measurement of bank's efficiency can be described in figure 10.
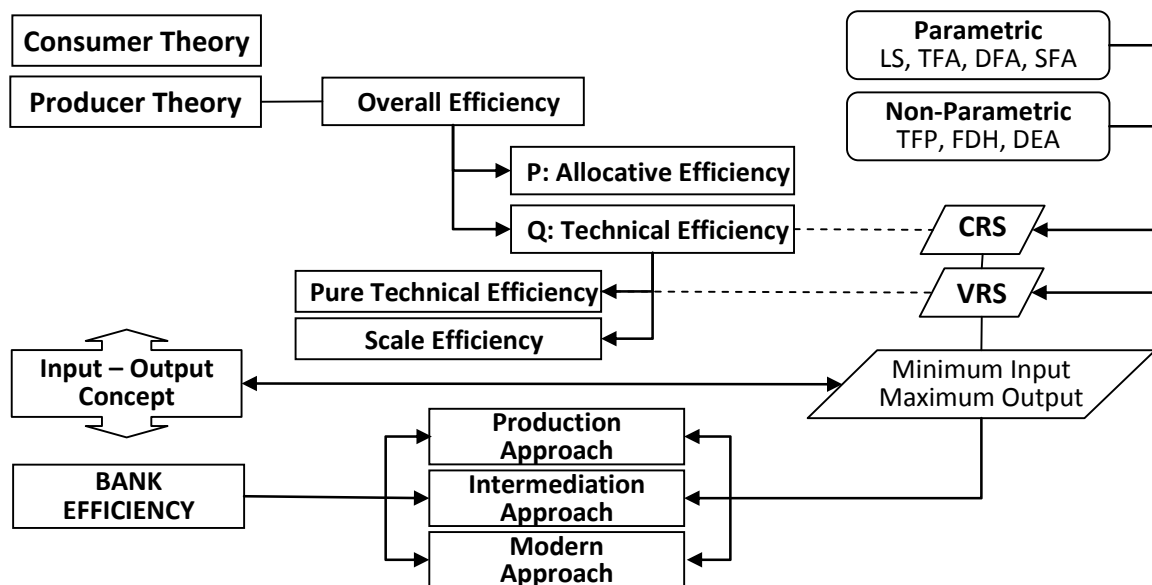
Figure 10. Theory of Efficiency

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a.   The Theory of Efficiency

The concept of efficiency rooted from the microeconomic concept, namely, consumer theory and producer theory. Consumer theory tries to maximize utility or satisfaction from individual point of views, while producer theory tries to maximize profit or minimize costs from producer point of views.

In the producer theory, there is a production frontier line that describes the relationship between inputs and outputs of production process. This production frontier line represents the maximum output from the use of each input. It also represents the technology used by a business unit or industry. A business unit that operates on the production frontiers is technically efficient.

Figure 11 shows the production frontier line from production process with single input (x) to produce single output (y). Production frontier $0F'$ represents the maximum output attainable from each input level. Point B and C represent efficient points with productivity (y_1/x_0) and (y_0/x_1), respectively. Point A represents an inefficient point with productivity (y_0/x_0), since technically it could increase output to y_1 (the level associated with point B) without requiring more input; or it could decrease input to x_1 (the level associated with point C) to produce similar y_0.
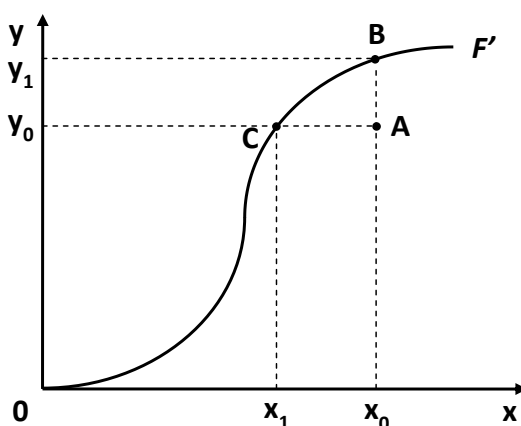
Figure 11. Production Frontier Line

According to Farell (1957), efficiency (from producer theory) comprises of two components, namely:

1. Technical efficiency describes the ability of a business unit to maximize output given certain amount of input.
2. Allocative efficiency describes the ability of a business unit to utilize inputs in optimal proportion based on their price.

When the two types of efficiency combined, it will produce economic efficiency or cost efficiency or overall efficiency (OE). A company is considered to be economically efficient if it can minimize the production costs to produce certain output within common technology level and market price level.

Overall efficiency (OE) is equal to allocative efficiency (AE) multiplied by technical Efficiency (TE). Meanwhile, technical efficiency can be breakdown into pure technical efficiency (PTE) and scale efficiency (SE), so that:

OE = AE * TE

TE = PTE * SE

OE = AE * PTE * SE

Kumbhaker and Lovell (2000) argue that technical efficiency is only one of many components economic efficiency as a whole. Nevertheless, in order to achieve economic efficiency a company should produce maximum output with certain amount of input (technical efficiency) and produce output with the right combination within certain price level (allocative efficiency).

b.   The Measurement of Efficiency

In the past few years, performance measurement of financial institution has increasingly focused on frontier efficiency or X-efficiency (rather than scale efficiency), which measures deviation in performance of a financial institution from the best practices or costs-efficient frontier that depicts the lowest production costs for a given level of output. X-efficiency stems from technical efficiency, which gauges the degree of friction and waste in the production processes, and allocative efficiency, which measures the levels of various inputs.

Frontier efficiency is superior for most regulatory and other purposes to the standard financial ratios from accounting statements, such as, return on asset (ROA) or cost/revenue ratio, that are commonly employed by regulators, managers of financial institutions, or industrial consultants to assess financial performance. This is because frontier efficiency measures use programming or statistical techniques that removes the effects of differences in input prices and other exogenous market factors affecting the standard performance ratios in order to obtain better estimates of the underlying performance of the managers (Bauer, *et al.*, 1998).

Frontier efficiency has been used extensively in regulatory analysis to measure the effects of merger and acquisition, capital regulations, deregulation of deposit rates, removal of geographic restrictions on branching and holding company acquisitions, etc.,

on financial institution performance. Furthermore, Bauer *et al.* (1998) argue that the main advantage of frontier efficiency over other indicators of performance is that it is an objectively determined quantitative measure that removes the effects of market prices and other exogenous factors that influence observed performance.

Tools to measure efficiency could be parametric and non-parametric. Parametric approach to measuring efficiency uses stochastic econometric and tries to eliminate the impact of disturbance to inefficiency. There are three parametric econometric approaches, namely:

1. Stochastic frontier approach (SFA);
2. Thick frontier approach (TFA); and
3. Distribution-free approach (DFA).

These approaches differ in the assumptions they make regarding the shape of the efficient frontier, the treatment of random error, and the distributions assumed for inefficiencies and random error. The parametric methods have disadvantages relative to the non-parametric methods of having to impose more structure on the shape of the frontier by specifying a functional form for it. However, an advantage of the parametric methods is that they allow for random error, so these methods are less likely to misidentify measurement error, transitory differences in cost, or specification error for inefficiency (Bauer, *et al.*, 1998).

Meanwhile, non-parametric linear programming approach to measuring efficiency uses non-stochastic approach and tends to combine disturbance into inefficiency. This is built based on discovery and observation from the population and evaluates efficiency relative to other units observed. One of the non-parametric approaches, known as data envelopment analysis (DEA), is a mathematical programming technique that measures the efficiency of a decision making unit (DMU) relative to other similar DMUs with the simple restrictions that all DMUs lie on or below the efficiency frontier (Seiford and Thrall, 1990). The performance of a DMU is very relative to other DMUs, especially those that cause inefficiency. This approach can also determine how a DMU can improve its performance to become efficient.

DEA was first introduced by Charnes, Cooper, and Rhodes in 1978. Since then its utilization and development have grown rapidly including many banking-related applications. The main advantage of DEA is that, unlike regression analysis, it does not require an a priori assumption about the analytical form of the production function so imposes very little structure on the shape of the efficient frontier. Instead, it constructs the best practice production function solely on the basis of observed data, and therefore the

possibility of misspecification of the production technology is zero. On the other hand, the main disadvantage of DEA is that the frontier is sensitive to extreme observations and measurement error (the basic assumption is that random errors do not exist and that all deviations from the frontier indicate inefficiency). Moreover, there exists a potential problem of "self-identifier" and "near-self-identifier".

c.   Data Envelopment Analysis

Data Envelopment Analysis (introduced by Farrel in 1957) is a linear programming-based technique for measuring the performance efficiency of organizational units which are termed Decision-Making Units (DMUs). This technique aims to measure how efficiently a DMU uses the resources available to generate a set of outputs (basic model introduced by Charnes et al. 1978). Decision-making units can include manufacturing units, departments of big organizations such as universities, schools, bank branches, hospitals, power plants, police stations, tax offices, prisons, defense bases, a set of firms or even practicing individuals such as medical practitioners. DEA has been successfully applied to measure the performance efficiency of all these kinds of DMUs.

DEA provides an alternative approach to regression analysis. While regression analysis relies on central tendencies, DEA is based on extremal observations. While the regression approach assumes that a single estimated regression equation applies to each observation vector, DEA analysis each vector (DMU) separately, producing individual efficiency measures relative to the entire set under evaluation (Jemrić and Vujčić, 2002). DEA is a non-parametric, deterministic methodology for determining the relative efficient production frontier, based on the empirical data on chosen inputs and outputs of a number of DMUs. From the set of available data, DEA identifies reference points (relatively efficient DMUs) that define the efficient frontier (as the best practice production technology) and evaluate the inefficiencies of other, interior points (relatively inefficient DMUs) that are below the efficient frontier (Jemrić and Vujčić, 2002). Besides producing efficiency value for each DMU, DEA also determines DMUs that are used as reference for other inefficient DMUs.

$$Efficiency \cdot of \cdot DMU_0 = \frac{\sum_{k=1}^{p} \mu_k y_{k0}}{\sum_{i=1}^{m} v_i x_{i0}}$$

DMU = decision making unit   n : number of DMU evaluated

m : different inputs x_{ij} : number of input i consumed by DMU_j

p : different outputs $\qquad$ y_{kj} : number of output k produced by DMU$_j$

There are two DEA models that are most frequently used, namely, the CCR model (Charnes, Cooper, and Rhodes, 1978) and the BCC model (Banker, Charnes, and Cooper, 1984). The main difference between these two models is the treatment of return to scale. The CCR assumes that each DMU operates with constant return to scale, while the BCC assumes that each DMU can operate with variable return to scale.

CCR model assumes that the ratio of additional input and output is equal (constant return to scale). It means that an additional input of x times will produce additional output of x times. Another assumption is that every DMU operates on an optimal scale. Therefore the efficiency of DMU can be measured as a maximum of a ratio weighted outputs to weighted inputs. Meanwhile, BCC model assumes that every DMU has not (or not yet) operated on optimal scale. This model assumes that the ratio of additional input and output is not equal (variable return to scale). It means that an additional input of x times will not produce additional output of exactly x times, but it can be less or greater than x times.

Generally, the efficiency score of CCR model for each DMU will not exceed the efficiency score of BCC model. This is because BCC model analysis each DMU "locally" (i.e. compared to the subset of DMUs that operate in the same region of return to scale) rather than "globally (Jemrić and Vujčić, 2002). Furthermore, a business or DMU, like bank, has similar characteristics one to another. However, each bank usually varies in size and production level. This indicates that size matters in relative efficiency measurement. CCR model represents (the multiplication of) pure technical and scale efficiencies, while BCC model represents technical efficiency only. Therefore, the relative scale efficiency is a ratio of CCR model and BCC model.

$$S_k = q_{k,CCR} / q_{k,BCC}$$

If the value of S = 1 means that the DMU operates in the best relative scale efficiency, or in optimal size. If the value of S is less than 1 means that there still exists scale inefficiency of the DMU. Therefore, the value of (1-S) represents the level of inefficiency of the DMU. Consequently, when a DMU is efficient under BCC model, but inefficient under CCR model, this means that the DMU has scale inefficiency. This is because the DMU is technically efficient, so that the inefficiency that exists comes from the scale.

$$TE = PTE \times SE \qquad \text{-->} \qquad SE = TE / PTE$$

TE: technical efficiency of CCR Model; PTE: pure technical efficiency of BCC Model.

d.   Measuring the Activity of Financial Intermediation Institution

The efficiency measurement, parametric or non-parametric, of financial institution like bank and microfinance institution can be approached from their activities. There are three main approaches to explain the relationship between input and output of financial institution. Two approaches, namely, production (or operational) approach and intermediation approach, apply the classical microeconomic theory of the firm, while one approach, namely modern (or assets) approach applies modified classical theory of the firm by incorporating some specificities of financial institution' activities, namely risk management and information processing, as well as some form of agency problems, which are crucial for explaining the role of financial intermediaries (Freixas and Rochet, 1998).

1.   Production Approach

The production approach describes banking activities as the production of services to depositors and borrowers using all available factors of production, such as labor and physical capital. This approach, initiated by Benston (1965) and Bell and Murphy (1968), considers banks as producer of deposit accounts to depositors and loans to borrowers. Therefore, this approach defines input as number of workforce, capital expenses on fixed assets and other materials, and defines output as the sum of all deposit accounts or other related transactions.

According to Freixas and Rochet, (1998), the production approach suits well the case of a local branch that is "financially transparent" in the sense that the money collected from depositors is fully transferred to some main branch. Similarly, all the money lent to borrowers is made available by the same main branch. The only outputs of the local branch are its services to depositors and borrowers, and its only inputs are labor and physical capital.

Parametric measurement of production approach has some difficulties. *First*, disaggregation of costs prevents the study of scale and scope economies. *Second*, production approach suffers from a basic problem on what the relevant measure of output volumes is. *Third*, Cobb-Douglas specification for monotonicity of average cost prevents the existence of an efficient size.

The first difficulty has been addressed by Baumol, Panzar, and Willig (1982) and the existence of Functional Cost Analysis (FCA) program that allowed separate cost functions to be estimated for all product lines. Disaggregated cost data for five categories of banking activities identified are demand deposits, term and savings deposits, real estate

loans, consumer loans, and business loans. Cost functions of the Cobb-Douglas type (one per activity i) are as follows:

$$\log C_i = \varepsilon_i \log Q_i + a_i \log w_i + (1 - a_i) \log r_i + const$$

i = 1, …, 5, C_i (total cost), Q_i (volume of output), w_i (wage rate), r_i (interest)

The second difficulty is to choose output volume among the number of accounts, the number of operations on these accounts, or the dollar amounts. Among these three output volumes, the dollar amounts are more readily available. To correct possible biases, heterogeneity factors for homogenizing the data (size, activity, and composition of accounts) are introduced.

The third difficulty, the monotonicity of average cost (increasing if $\varepsilon_i > 1$, decreasing if $\varepsilon_i < 1$, and constant if $\varepsilon_i = 1$), has been addressed by Benston, Hanweck, and Humprey (1982) by applying a more convenient specification of translog cost function, in which the logarithm of the cost is quadratic with respect to the logarithms of output and input prices. They find that a U-shaped average cost function with an efficient size between 10 and 25 million dollars of deposits, which is surprisingly small (Freixas and Rochet, 1998).

Moreover, Gilligan and Smirlock (1984), Gilligan, Smirlock, and Marshall (1984), Berger, Hanweck, and Humprey (1987), and Kolari and Zardhooki (1987) use a multiproduct cost function, which allows the discussion of scope economies and cost complementarities. But, the results are not conclusive (Freixas and Rochet, 1998).

2.   Intermediation Approach

The intermediation approach describes banking activities as intermediary in charge of transforming the money borrowed from depositors (surplus spending units) into the money lent to borrowers (deficit spending units). In other words, deposits that are typically divisible, liquid, short-term, and risk less are transformed into loans that are typically indivisible, illiquid, long-term, and risky. Therefore, this approach defines input as financial capital (the deposits collected and the funds borrowed), and defines output as the volume of loans and investment outstanding.

According to Freixas and Rochet, (1998), the intermediation approach is complimentary to the production approach and is more appropriate to the case of a main branch, which is not directly in contact with customers. In this case, the total volume of loans granted by the local branches is in general different from the total volume of deposit collected. Therefore, the main branch may have to borrow (or invest) on financial markets.

Results of parametric measurement of the intermediation approach do not differ substantially from those of the production approach. But, this approach also has some difficulties. *First*, there is problematic behavior in determining deposits as output or input. There is not enough supporting argument in selecting the variables and their positions. *Second*, there is problematic behavior of the multi-product translog cost function when some of the outputs tend toward zero (the logarithms become infinite).

On the first problem, one interesting findings are given by Hancock (1991) who runs a linear regression of bank's profit on the real balances of the items in bank's balance sheet without presuming a priori which correspond to outputs and which to inputs. When these coefficients are positive they correspond to outputs (intuitively, the bank's profit increases when they increase), and when they are negative they are correspond to inputs. She found that loans and *demand deposits are outputs*; whereas labor, physical capital, materials, and cash are inputs. However, Hughes and Mester (1993) found that *deposits are inputs.*

On the second problem, several contributions have tried to correct it. For example, Hunter, Timme, and Yang (1990) use another specification (Minflex-Laurent) of the cost function, and McAllister and McManus (1992) adopt nonparametric approach.

3.   Modern Approach

The modern approach tries to improve the first two approaches by incorporating risk management, information processing, and agency problems into the classical theory of the firm. This approach introduces a possible discrepancy between bank's manager and owner in profit maximization behavior. If bank's managers are not risk neutral, they will typically chose a level of financial capital that is different from the cost minimizing one.

Parametric measurement of the modern approach done by Hughes and Mester (1994) find that, for larger banks, an increase in size (holding default risk and asset quality constant) significantly lowers the price of uninsured funds (too big to fail). Moreover, Berger and De Young (1997) find support for the "bad luck hypothesis" (problem loans cause banks to increase spending on monitoring). Also, "decreases in bank capital ratios generally precede increases in non-performing loans…evidence that thinly capitalized banks may respond to moral hazard incentives by taking increased portfolio risks" (Freixas and Rochet, 1998).

e.   Steps on DEA Research

The steps of study using DEA can be described in figure 12.
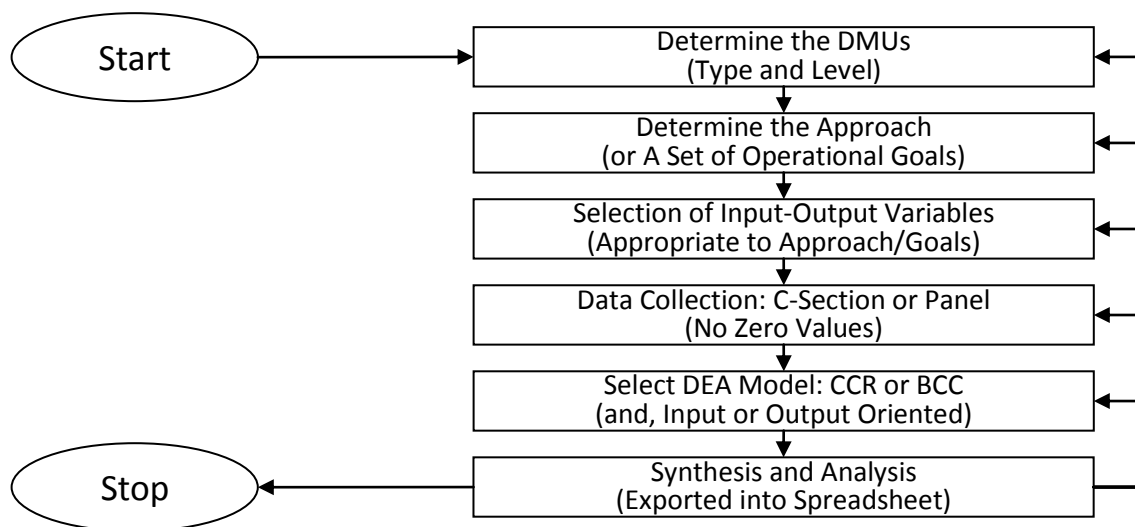
Figure 12. Steps in DEA

1. Determine the DMUs:

   - DMU refers to operational unit which acts as decision making entity, either for profit or not for profit oriented.

   - DMU could be any entity which is capable of turning inputs (resources) into outputs (results), such as factory, production center, operator, and machine.

   - Other Examples: Profit Center, Business Unit, Strategic Business Unit, Branch, Outlet, Ward, Team, Division, etc.

2. Determine the Approach:

   - In general, there is no specific approach to follow. Achievement of operational goals of the units will be used to measure "good performance".

   - In banking, there are three different approaches to measure performance of bank activities: 1) Production Approach; 2) Intermediation Approach; and 3) Asset Approach.

   - Selected approach will determine inputs and outputs variables to be selected.

3. Selection of Input – Output Variables:

   - The choice of variables in a DEA study is of paramount importance and as a precursor to the study it is important to analyze the processes will be assessed, to examine the variables and to pick those most appropriate to the goals against which "good performance" will be measured.

- The choice of variables is determined by the process under consideration, as is the classification as inputs or outputs. What may be an input when measured against one set of goals, may be an output when considered under another.
- An output may be physical goods or services or a measure of how effectively a unit has achieved its goals. Outputs are controllable.
- Inputs may include resources that are not a product but are an attribute of the environment in which the units operate. Inputs may be controllable or uncontrollable. Uncontrollable inputs are ones whose characteristics/quantities of use are outside the control of the management of the organization.
- The number of inputs multiplied by the number of outputs will be the number of units assessed as 100% efficient. Large data sets and a small number of key inputs and outputs lead to greater discrimination in the analysis of units.

4. Data Collection:
- A DEA data set is simply the group of units (DMUs) and the values of their inputs and outputs to be included in the analysis. Data could be cross-section or panel.
- The data set is usually presented in tabular form, often initially in a spreadsheet, where the unit names constitute the rows and the input and output variables constitute the columns. The data from the spreadsheet can be easily imported into *Frontier Analyst*.
- Zero values are not allowed in Frontier Analyst. Where the value of input or output is missing, that particular unit may have to be omitted from the data set, unless a substitute value can be agreed on (usually a very small relative value).
- DEA requires a data set of homogenous units (the degree of similarity between units). The operational goals of the units should be similar, as should their operational characteristics.
- The number of data (units) should be ≥ the total number of input-output variables.
- EXAMPLES: Islamic Banks → Intermediation Approach → Panel Data

5. Selection of DEA Model: CCR or BCC; Input or Output Oriented. For example:
- Run CCR Model (CRS)　　　→ Technical Efficiency;
- Run BCC Model (VRS)　　　→ Pure Technical Efficiency;
- CCR/BCC　　　　　　　　　→ Scale Efficiency.
- Choose Input Oriented　　　→ For internal improvement;
- Choose Output Oriented　　　→ To optimize output.

6. Synthesis and Analysis:

- Various outputs from DEA, such as efficiency, return to scale, reference sets and potential improvements can be used for analysis.

f.   DEA Model

Based on literature reviews, in-depth interviews and previous survey experience, the problem of expensive microfinance will be analyze using DEA method and intermediation approach, which requires inputs and outputs variables, follows.

INTERMEDIATION APPROACH	
INPUT	Labor Costs; Fixed Assets; Total Deposits (Saving Deposit, Time Deposit), Channeling from CB.
OUTPUT	Total Financing (Consumer Financing, Productive Financing, Free Loan); Other Income; Liquid Assets; Social Fund

IV. RESULTS AND ANALYSIS

4.1 DEA

4.1.1 Overall DEA Results

The overall DEA results of all conventional and Islamic MFIs in the sample can be seen in figure 13. Technical Efficiencies (TE), Pure Technical Efficiencies (PTE) and Scale Efficiencies (SE) of all MFIs have always been low and have just slightly improved to around 30%, 44% and 65%, respectively, in 2011.

In the past five years, the number of IRS (increasing return to scale) MFIs has been decreasing, the number of CRS (constant return to scale) or efficient MFIs has been increasing, while the number of DRS (decreasing return to scale) or inefficient MFIs has almost constant. At the end of 2011, most MFIs (58%) are still in the state of IRS (which could be expanded efficiently, since the addition of one unit input produces more than one unit of output), while only 16% MFIs are in the state of DRS (inefficient in scale, since the addition of one unit input produces less than one unit of output).
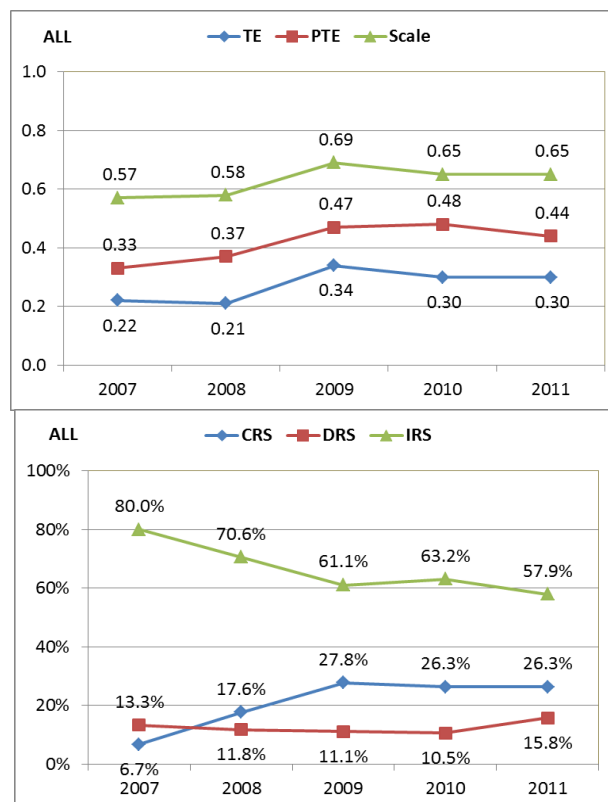
Figure 13. Overall Efficiency and Return to Scale

Note: TE = Technical Efficiency; PTE = Pure Technical Efficiency; and Scale = Scale Efficiency = TE/PTE. CRS = Constant Return to Scale; DRS = Decreasing Return to Scale; and IRS = Increasing Return to Scale.

The split results of conventional and Islamic MFIs efficiencies can be seen in figure 4.2. In the past five years, the efficiencies of conventional MFIs have been slightly improving, while the efficiencies of Islamic MFIs have been significantly improving, where the PTE of IMFI (0.45) has become better than that of CMFI (0.42) at the end of 2011. Overall technical efficiency of CMFI (0.32) is still slightly better than that of IMFI (0.29) at the end of 2011, due to CMFI better scale efficiency at 0.76 (compare to scale efficiency of IMFI at 0.53). At the end of 2011, CMFI's Technical Efficiency, Pure Technical Efficiency and Scale Efficiency have still been low at 0.32, 0.42 and 0.76, respectively, while IMFI's Technical Efficiency, Pure Technical Efficiency and Scale Efficiency have also been low at 0.29, 0.45 and 0.53, respectively.
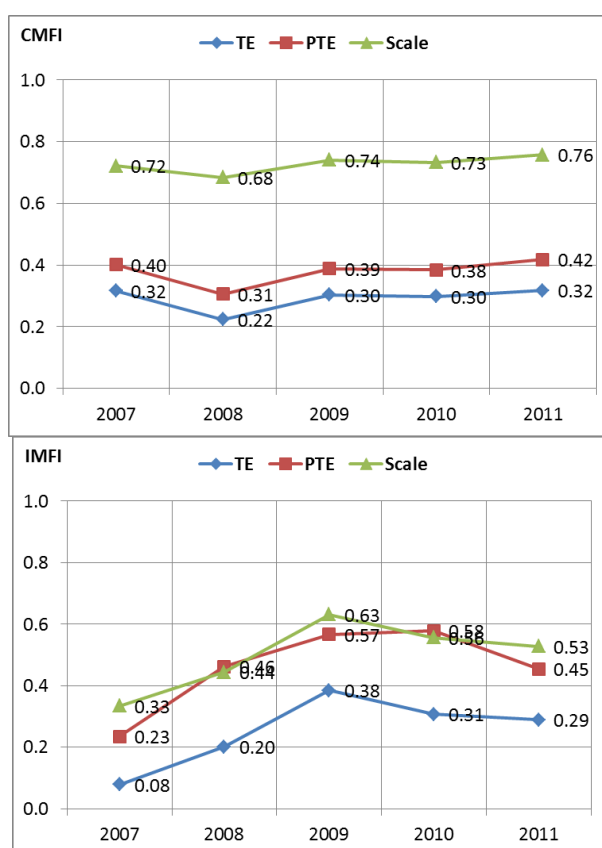
Figure 14. Efficiencies of Conventional and Islamic MFIs

For illustration, the efficiencies of conventional and Islamic banks from Ascarya, *et al.* (2009) can be seen in figure 14. It shows that the efficiencies of both conventional and Islamic banks have been improving to high levels. At the end of 2006, C-Bank's Technical Efficiency, Pure Technical Efficiency and Scale Efficiency have improved and reached high efficiency at 0.85, 0.88 and 0.96, respectively, while I-Bank's Technical Efficiency, Pure

Technical Efficiency and Scale Efficiency have also improved and reached high efficiency at 0.88, 0.89 and 0.99, respectively.
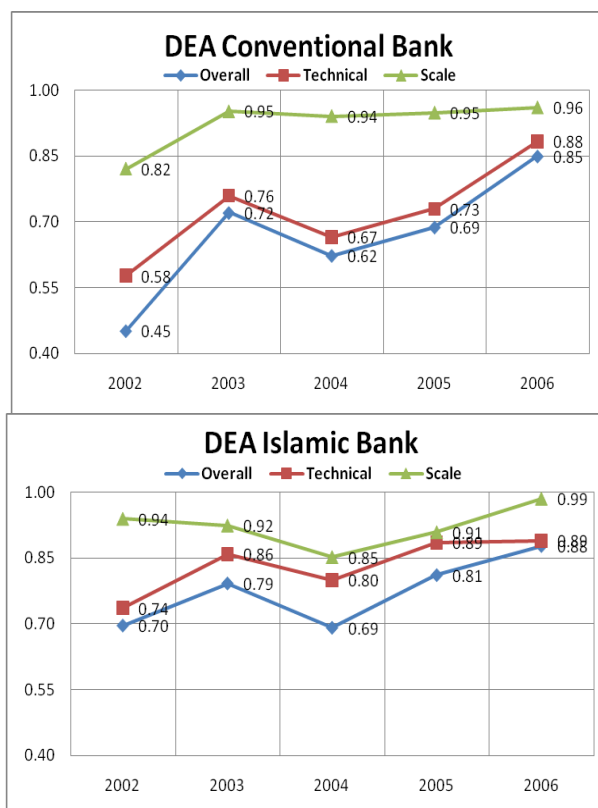
Figure 14. Efficiencies of Conventional and Islamic Banks

The split results of conventional and Islamic MFIs return to scale can be seen in figure 15. in the past five years, return to scale of CMFI has been oscillating but improving in 2011 with more CMFI reaching constant return to scale or CRS (scale efficient state) from previously increasing return to scale or IRS (improving scale efficient state), while return to scale of IMFI has been improving until 2010, but worsening in 2011 with less IMFI reaching IRS and more IMFI reaching decreasing return to scale or DRS (worsening scale efficient state). At the end of 2011, most CMFIs (60%) are still in the state of Increasing Return to Scale (could be expanded efficiently), while only 10% CMFIs which are in the state of Decreasing Return to Scale. Meanwhile, most IMFIs (56%) are still in the state of Increasing Return to Scale (could be expanded efficiently), while 22% IMFIs which are in the state of Decreasing Return to Scale.
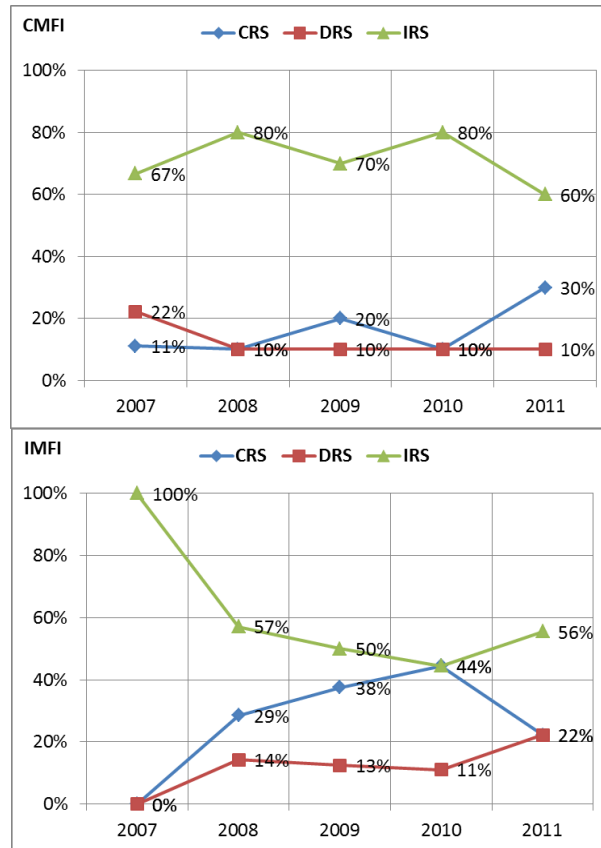
Figure 15. Return to Scale of Conventional and Islamic MFIs

Moreover, the inefficiency determinants of conventional and Islamic MFIs which can be potentially improved can be seen in figure 16. The most inefficient variable for CMFI is 'Financing', followed by 'Income', while the most inefficient variable for IMFI is 'Income', followed by 'Financing'.
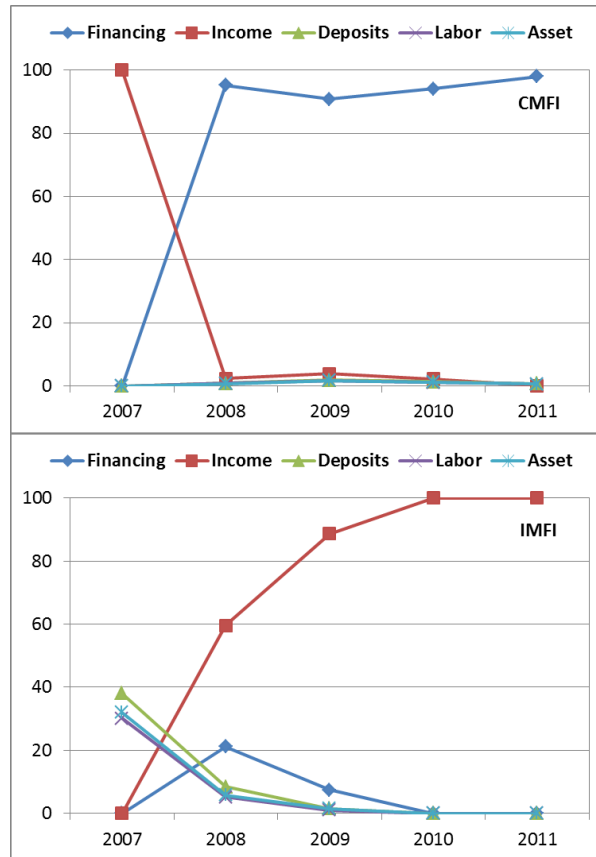
Figure 16. Potential Improvements of Conventional and Islamic MFIs

4.1.2 Cooperative and BMT Results

The efficiencies of Cooperation and BMT in the sample can be seen in figure 17. In the past five years, the efficiencies of Cooperation have been stagnant at low levels for TE and PTE and high level for SE, while the efficiencies of BMT have been improving until 2009 and worsening afterward at lower levels than those of Cooperation.

Technical Efficiencies and Pure Technical Efficiencies of Cooperation have been constantly low at around 0.39 and 0.40, respectively, while Scale Efficiencies of Cooperation have been stable and high at around 0.89. Efficiencies of BMT have been increasing in 2007-2009 and decreasing in 2009-2011 at low level. In 2011, TE, PTE and SE reached only 0.12, 0.38 and 0.38, respectively.
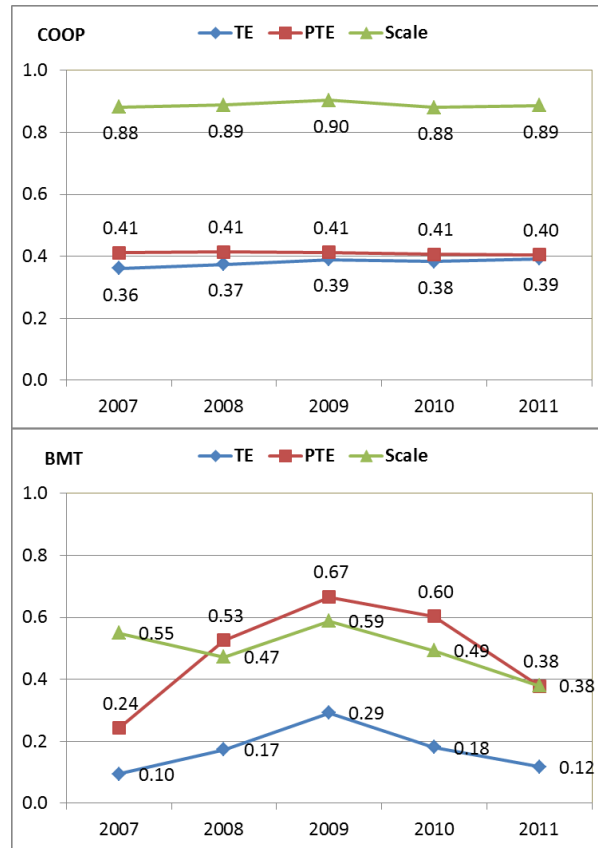
Figure 17. Efficiencies of Conventional Cooperative and Islamic BMT

Most Cooperation and BMT are still in the state of increasing return to scale (IRS), which counted for 67%, so that they have potential to expand and improve their return to scale. There are only 17% of Cooperation and BMT which already reached the efficient level constant return to scale (CRS).

The most inefficient variable for Cooperation and BMT is 'Other Income', since their core businesses are savings/investment and loan/financing, so that various micro financial services are very potential to be developed. The second most inefficient variable is 'Loan/Financing' (previously it was 'Deposits' in 2009-2010), since many new MFIs, especially CMB and IMB, enter similar market segment (such as, traditional market).
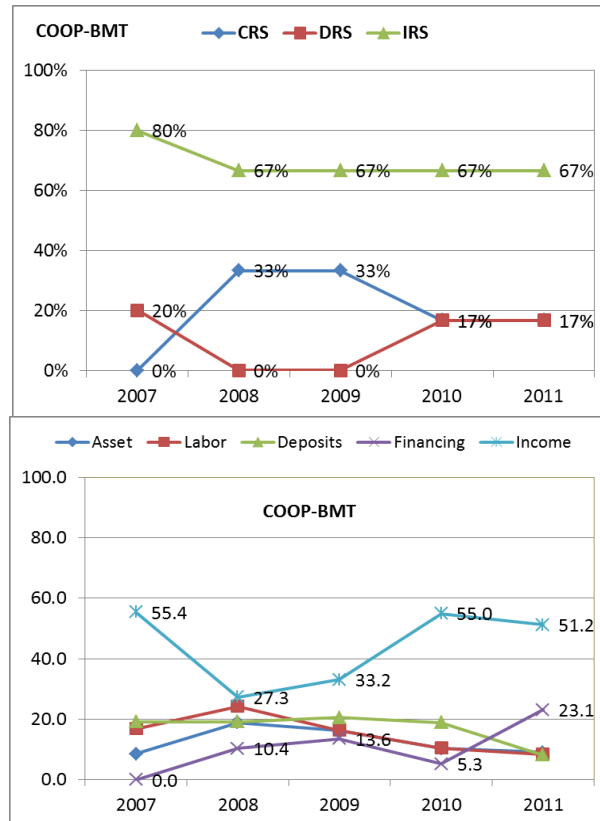
Figure 18. Return to Scale and Potential Improvement of Conventional Cooperative
and Islamic BMT

4.1.3 Conventional Rural Bank and Islamic Rural Bank

Efficiencies of CRB have experienced ups and downs. In 2011, TE, PTE and Scale have improved to 35%, 49% and 74%, respectively.

TE and Scale Efficiencies of IRB have been improving, but still at low levels. In 2011, TE, PTE and Scale reached 31%, 35% and 65%, respectively.
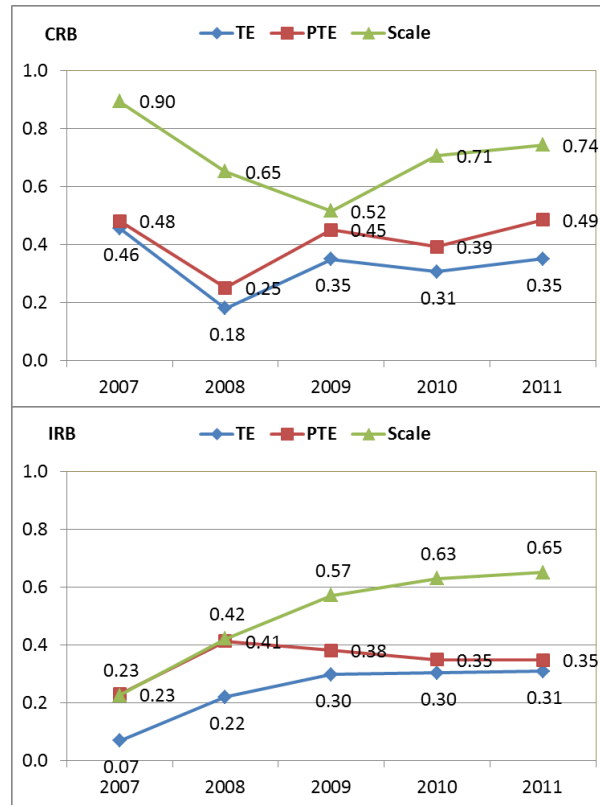
Figure 19. Efficiencies of Conventional Rural Bank and Islamic Rural Bank

Half conventional and Islamic rural banks are still in the state of increasing return to scale (IRS), so that they still have the potential to expand and improve their return to scale. There are only 25% of conventional and Islamic rural banks which already reached the efficient level constant return to scale (CRS). Unfortunately, there are an increasing number of conventional and Islamic rural banks which become inefficient and enter the state of decreasing return to scale (DRS).

The most inefficient variable for Rural Banks is 'Loan/Financing' (it was 'Other Income' in 2009-2010), since many new MFIs, especially CMB and IMB, enter similar market segment (such as, traditional market). The second most inefficient variable for Rural Banks is 'Other Income', since their core businesses are savings/investment and loan/financing, so that various micro financial services are very potential to be developed.
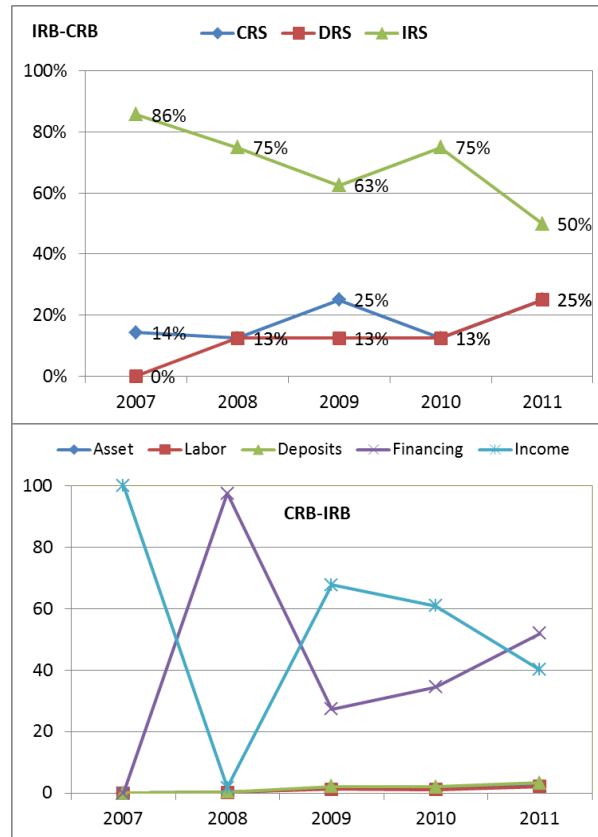
Figure 20. Return to Scale and Potential Improvement of Conventional Rural Bank and Islamic Rural Bank

4.1.4 Micro Banking Unit of Conventional and Islamic Banks

Efficiencies of CMB have been improving at low levels. In 2011, TE, PTE and Scale have improved to 20%, 34% and 64%, respectively.

Efficiencies of IMB are still in early stage with limited data. In 2011, TE, PTE and Scale reached 50%, 64% and 78%, respectively.
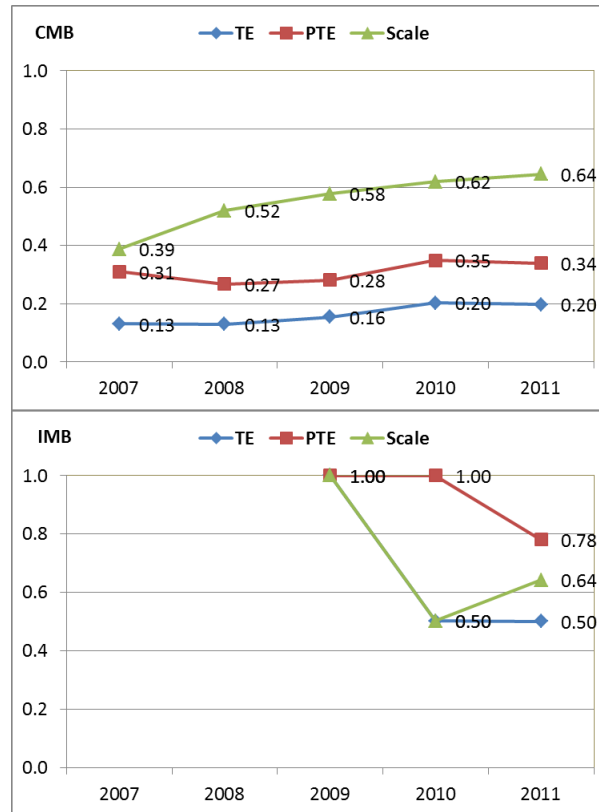
Figure 21. Efficiencies of Micro Banking Unit of Conventional and Islamic Banks

Most micro banking units are still in the state of increasing return to scale (IRS), which counted for 60%, so that they have potential to expand and improve their return to scale. There is also 40% of micro banking units which already reached the efficient level constant return to scale (CRS). There is no micro banking unit which has reached inefficient stage of decreasing return to scale (DRS).

The most inefficient variable for Micro Banking Units is 'Other Income' (it was "Labor' in 2010), since their core businesses are savings/investment and loan/financing, while various micro financial services have not been developed, yet. The second most inefficient variable for Micro Banking Units is 'Labor', since there have been many new CMB and IMB, which desperately needed experienced microfinance officers.
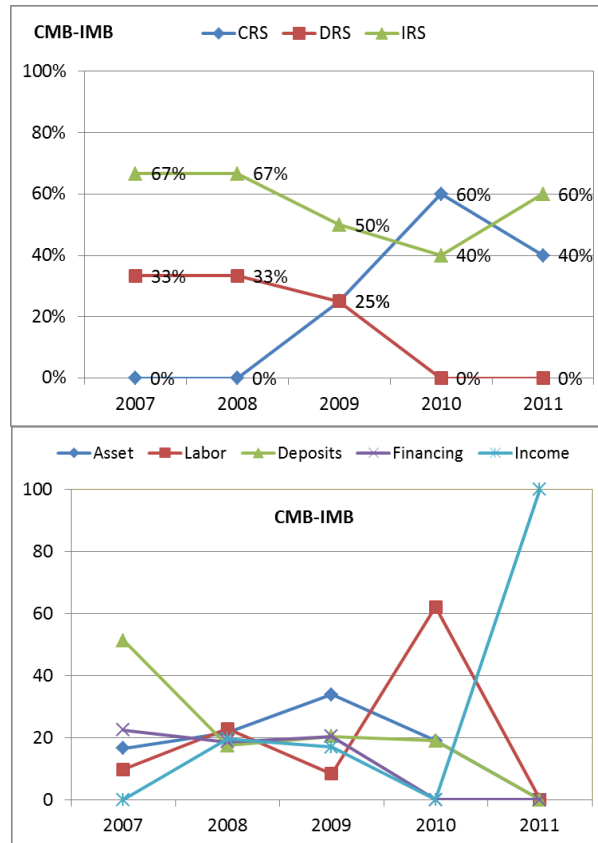
Figure 22. Return to Scale and Potential Improvement of Micro Banking Unit of Conventional and Islamic Banks

4.2   ANP

4.2.1   Overall ANP Results

The main problem area of each MFI is mostly unique. But, overall, the main problems are in the area of OUTPUT and INTPUT. The main problems of Cooperation are OUTPUT and INPUT. The main problems of BMT are INTPUT and EXTERNAL. The main problem of conventional rural bank (CRB) is EXTERNAL. The main problems of Islamic rural bank are INPUT and OUTPUT. The main problems of conventional micro banking unit (CMB) are PROCESS and INPUT. Meanwhile, the main problems of Islamic micro banking unit (IMB) are OUTPUT and EXTERNAL.
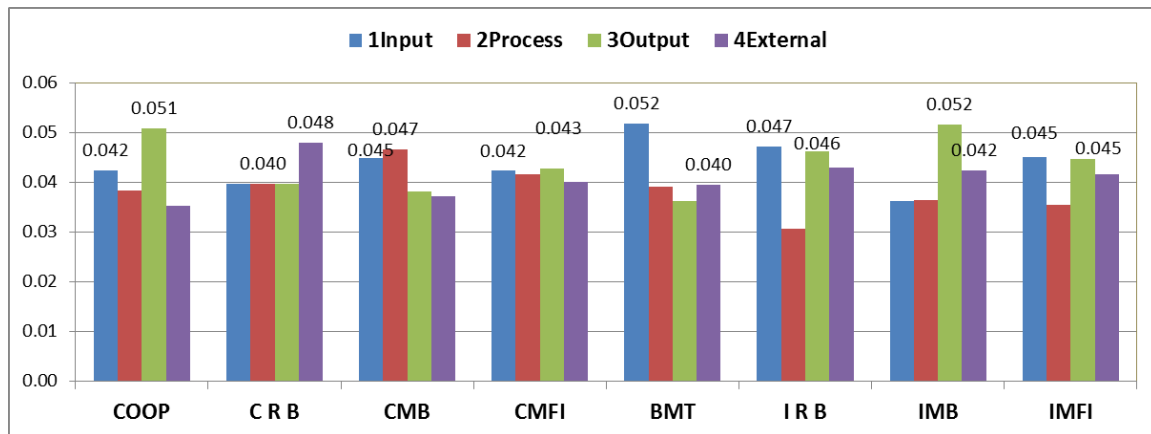
Figure 23. Main Problems of MFIs

The main detailed problems of each MFI are varying. But, overall, the main detailed problems are O2 High Overhead Cost, P2 Maintain Liquidity, E1 Unfair Treatment, I1 Low Demand of Deposits, and E6 Inflation Risk.
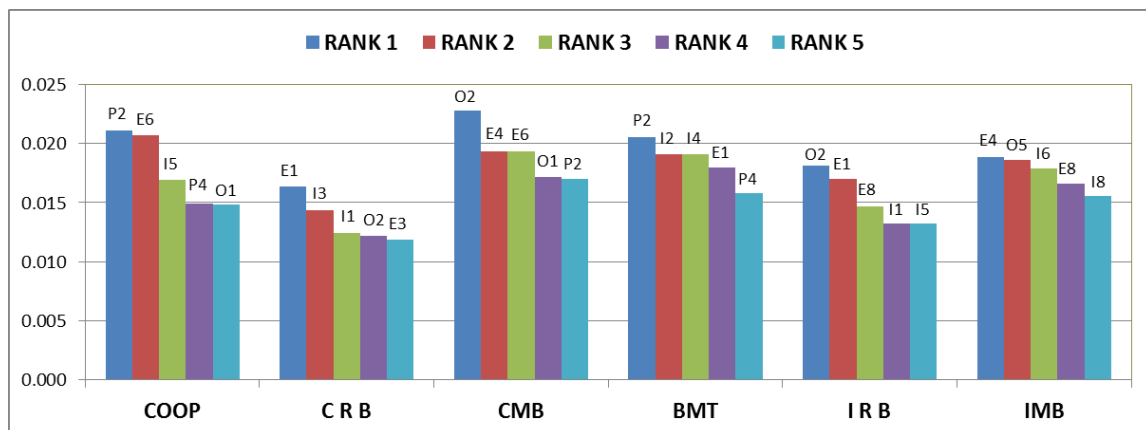
Figure 24. Main Detailed Problems of MFIs

The main solution area of each MFI is mostly unique. But, overall, the main solution is in FUNDAMENTAL, followed by ROADMAP (for IMFI) and TECHNICAL (for CMFI).
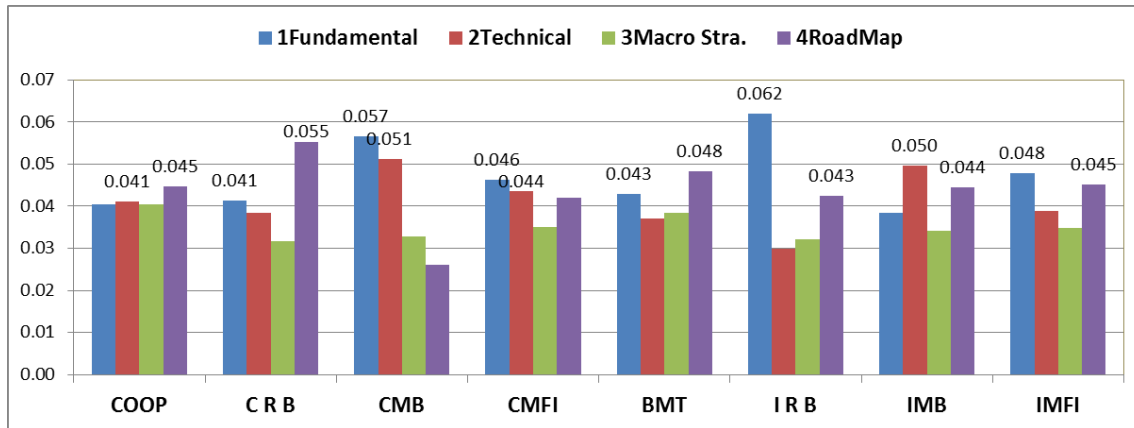
Figure 25. Main Solutions for MFIs

The main detailed solutions of each MFI are varying. But, overall, the main detailed solutions are F6 Government Support, M2 Establish Micro Insurance/Takaful, R3 MF Integrated Rating System, F1 Fair Access of Fund, and R4 Fair Competition Act.
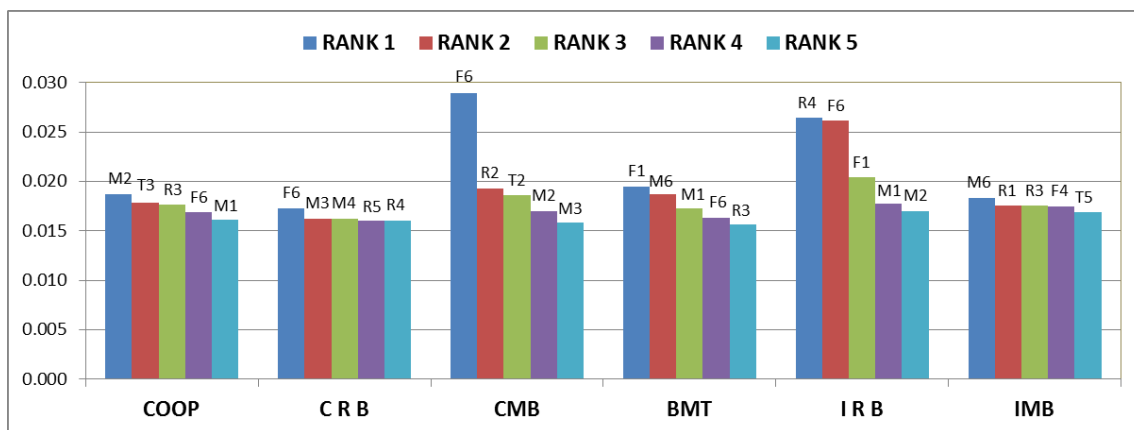
Figure 26. Main Detailed Solutions for MFIs

4.2.2 Cooperative and BMT Results

The main problems of conventional Cooperative (COOP) are OUTPUT (0.305) and followed in a distance by INPUT (0.254). Meanwhile, the main problems of Islamic BMT (BMT) are INPUT (0.310) and followed in a distance by EXTERNAL (0.237) and PROCESS (0.235).
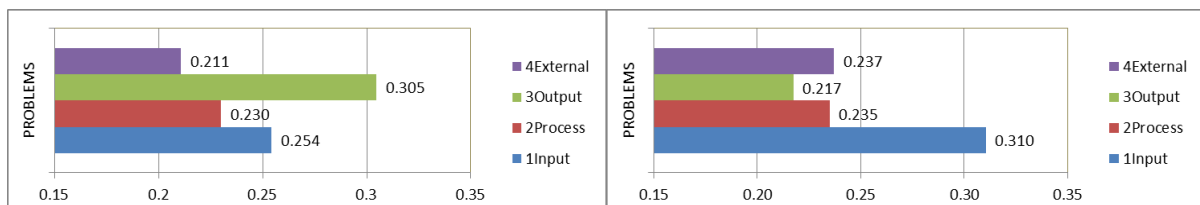
Figure 27. Main Problems of Conventional Cooperative and Islamic BMT

The main detailed problems of conventional Cooperative are P2 Liquidity Maintenance (0.0211), E6 Inflation Risk (0.0207), I5 Low Demand of Deposits (0.0170), P4 Low Efficiency (0.0150) and O1 High Margin of Financing (0.0148).
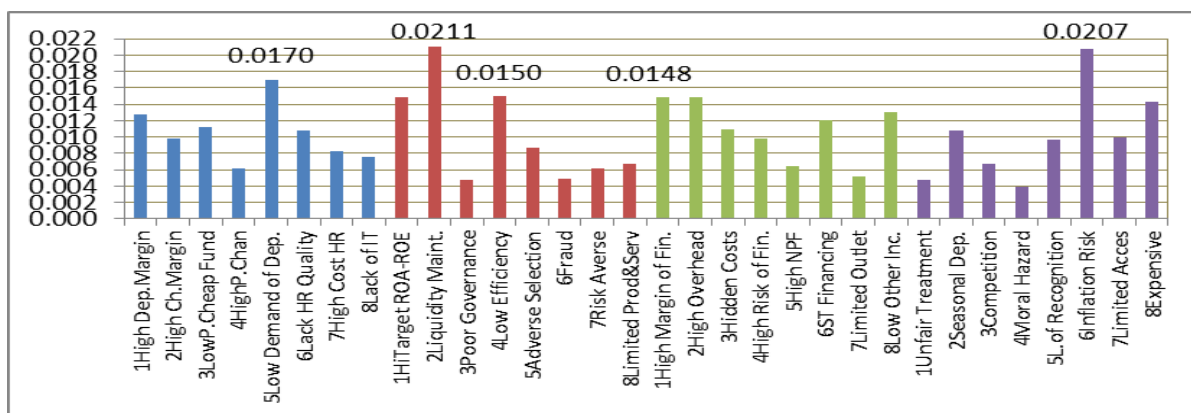
Figure 28. Main Detailed Problems of Conventional Cooperative

The main detailed problems of Islamic BMT are P2 Liquidity Maintenance (0.0205), I2 High Channeling Margin (0.0191), I4 High Portion of Channeling (0.0191), E1 Unfair Treatment (0.0180) and P4 Low Efficiency (0.0158).
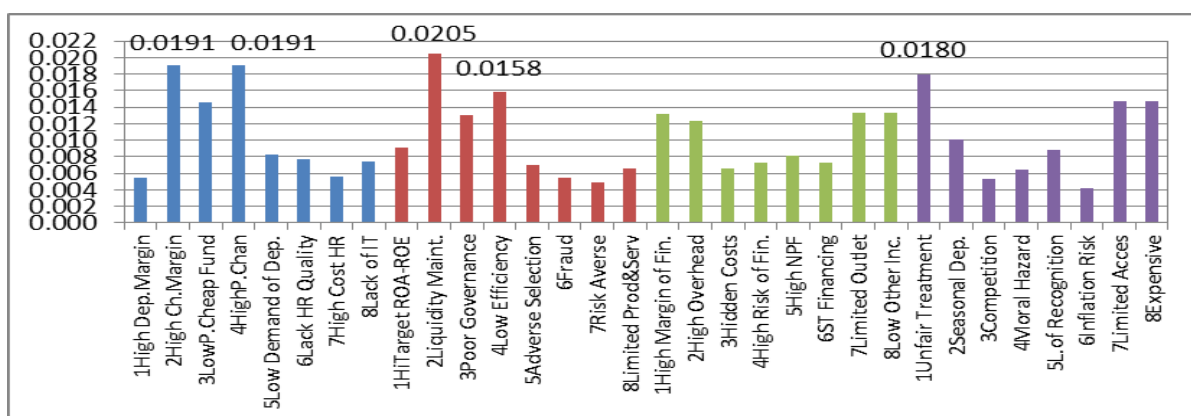
Figure 29. Main Detailed Problems of Islamic BMT

The main solutions of conventional Cooperative (COOP) are ROADMAP (0.269) and TECHNICAL (0.246). Meanwhile, the main solutions of Islamic BMT (BMT) are ROADMAP (0.290) and FUNDAMENTAL (0.258). Both conventional Cooperative and Islamic BMT share the main solution on ROADMAP.
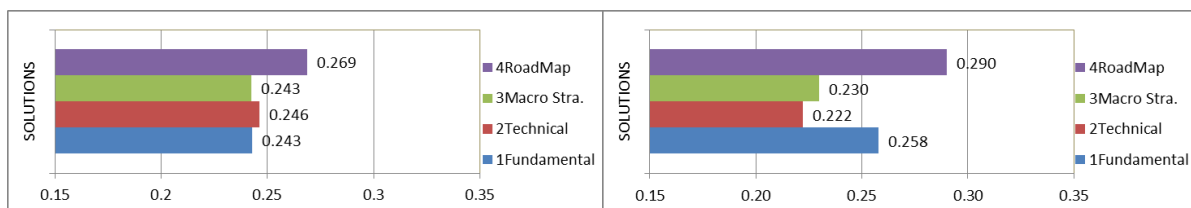
Figure 30. Main Solutions of Conventional Cooperative and Islamic BMT

The main detailed solutions of conventional Cooperative (COOP) are M3 Establishment of. Micro Insurance (0.0187), T3 Incentive for Efficiency (0.0178), R3 Harmonization of Soundness-FSS-Efficiency-Margin-NPF (0.0176), F6 Government Support (0.0169) and M1 Establishment of APEX Institution (0.0161).
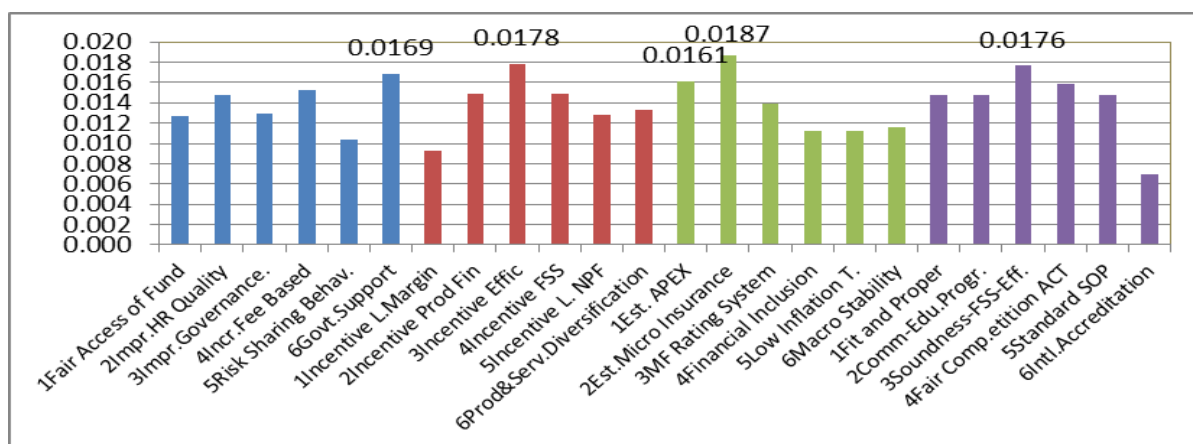

Figure 31. Main Detailed Solutions of Conventional Cooperative

The detailed solutions of Islamic BMT are F1 Fair Access of Fund (0.0194), M6 Macro Stability (0.0187), M1 Establishment of APEX Institution (0.0173), F6 Government Support (0.0164) and R3 Harmonization of Soundness-FSS-Efficiency-Margin-NPF (0.0156).
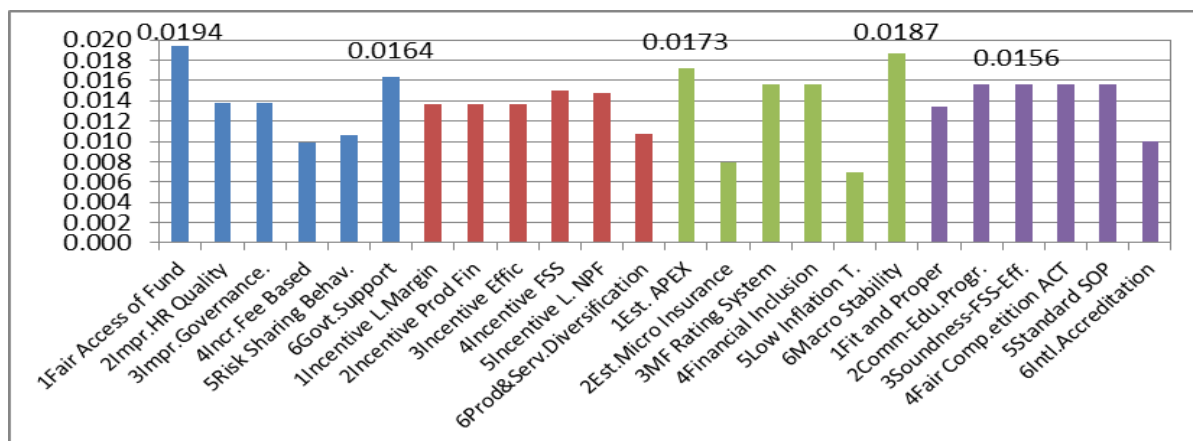
Figure 32. Main Detailed Solutions of Islamic BMT

4.2.3   Conventional Rural Bank and Islamic Rural Bank

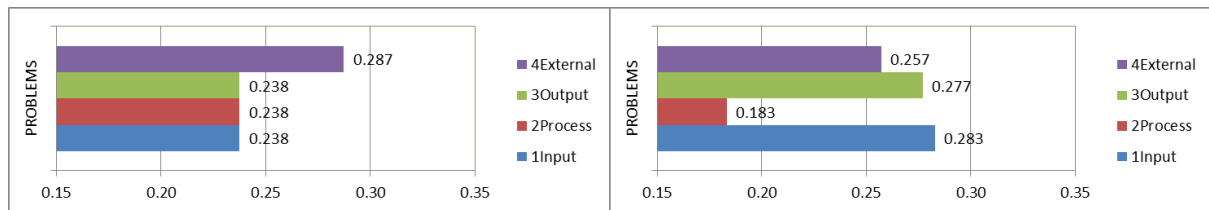CRB main problem: EXTERNAL. IRB main problem: INPUT.

Figure 33. Main Problems of Conventional and Islamic Rural Banks

CRB detailed problems: E1 Unfair Treatment, I3 Low Prop of Cheap Funding, I1 High Dep. Margin, O2 High Overhead and E3 Competition.
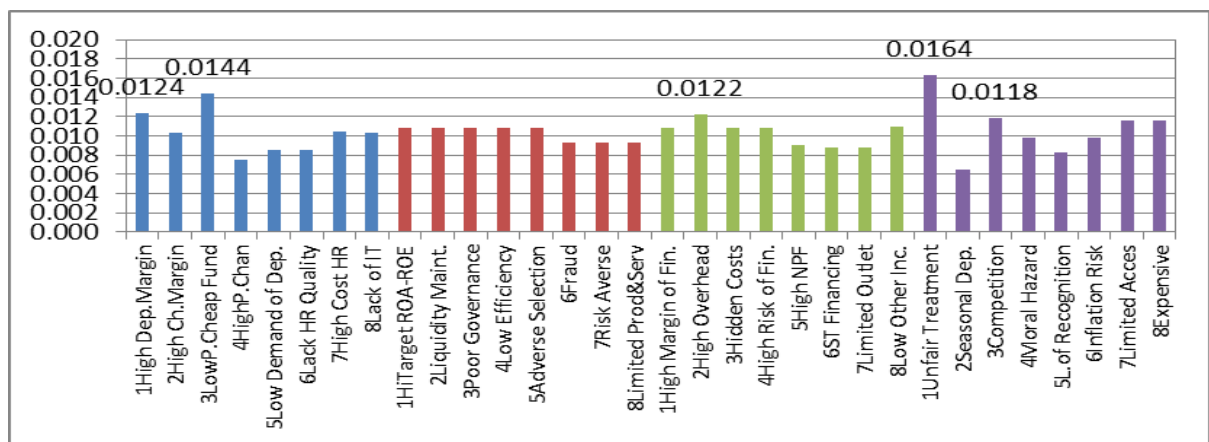

Figure 34. Main Detailed Problems of Conventional Rural Bank (CRB)

IRB detailed problems: O1 High Margin of Fin, E1 Unfair Treatment, E8 Expensive, I1 High Dep. Margin and I5 Low Demand of Deposits.
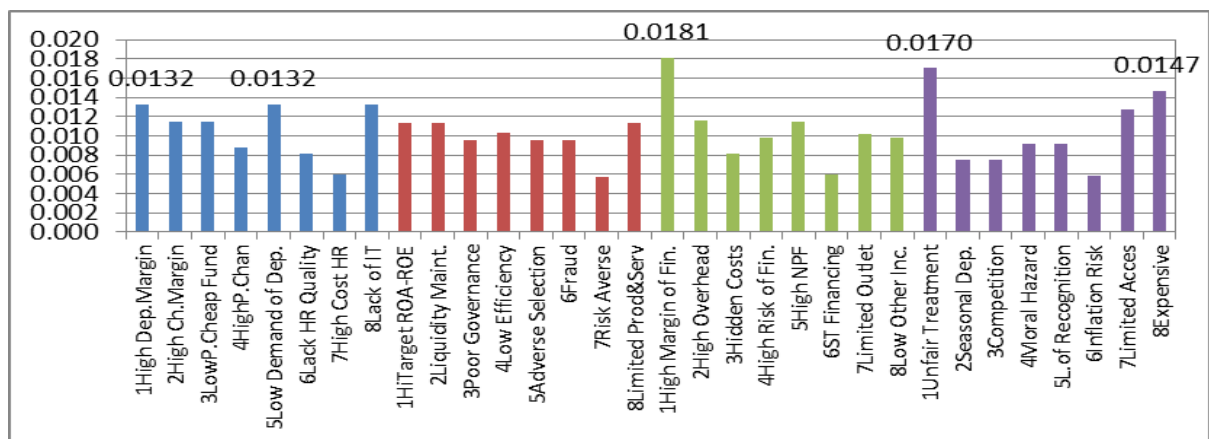

Figure 35. Main Detailed Problems of Islamic Rural Bank (IRB)

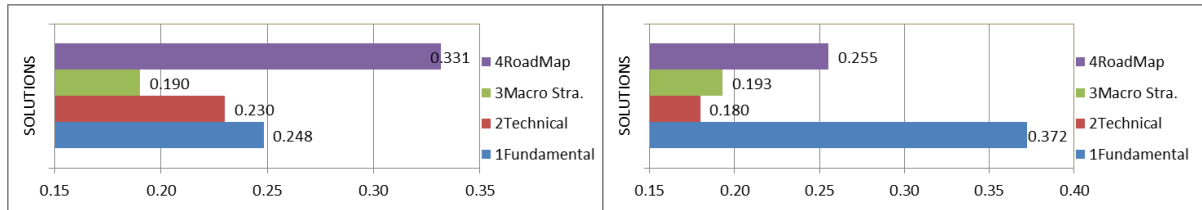CRB main solution: ROADMAP. IRB main solution: FUNDAMENTAL.

Figure 36. Main Solutions of Conventional and Islamic Rural Banks

CRB detailed solutions: F6 Govt. Support, M3 MF Rating System, M4 Fin. Inclusion, R5 Standard SOP and R4 Fair Competition ACT.
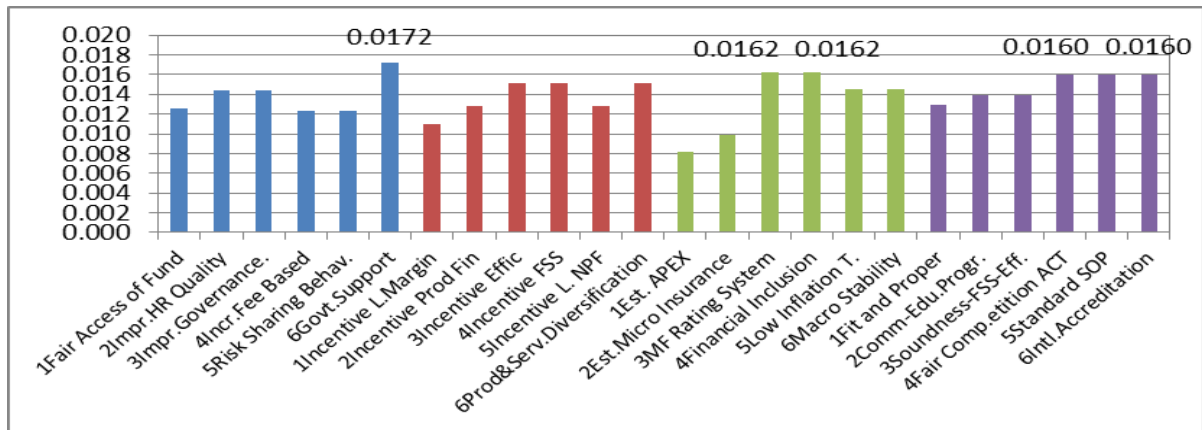

Figure 37. Main Detailed Solutions of Conventional Rural Bank (CRB)

IRB detailed solutions: R4 Fair Competition ACT, F6 Govt. Support, F1 Fair Access of Fund, M1 Est. APEX Institution and M2 Est. Micro Insurance.
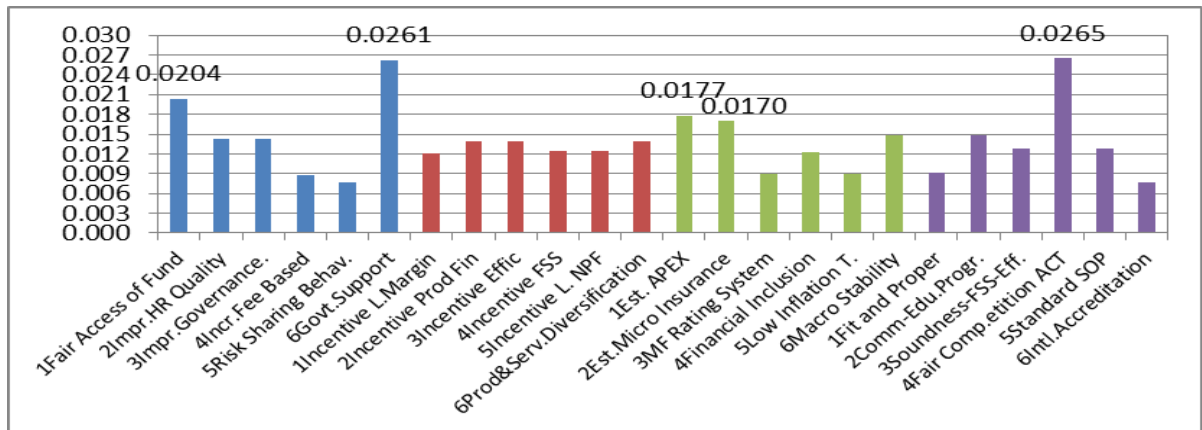

Figure 38. Main Detailed Problems of Islamic Rural Bank (IRB)

4.2.4 Micro Banking Unit of Conventional and Islamic Banks

a.   Main Problems

The main problems of conventional Micro Banking Unit (CMB) are PROCESS (0.279) followed closely by INPUT (0.269). Meanwhile, the main problems of Islamic Micro Banking Unit (IMB) are OUTPUT (0.310) and followed in a distance by EXTERNAL (0.255).
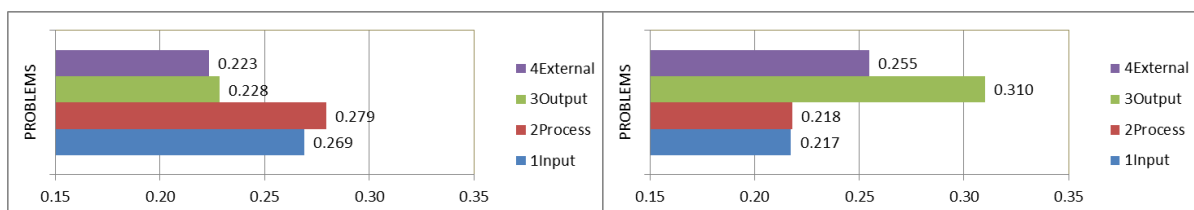

Figure 39. Main Problems of Conventional and Islamic Micro Banking Units

The main detailed problems of conventional Micro Banking Unit (CMB) are O2 High Overhead (0.0228), E4 Moral Hazard and E6 Inflation Risk (0.0193), O1 High Margin of Financing (0.0172) and P2 Liquidity Maintenance (0.0170).
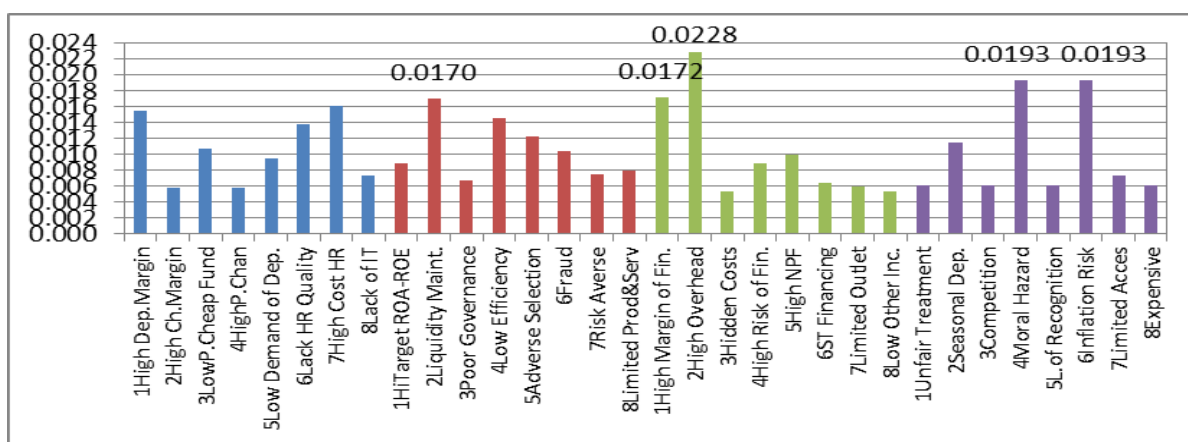

Figure 40. Main Detailed Problems of Conventional Micro Banking Unit (CMB)

The main detailed problems of Islamic Micro Banking Unit (IMB) are E4 Moral Hazard (0.0189), O5 High NPF (0.0186), I6 Lack HR Quality (0.0179), E8 Expensive (0.0166) and I8 Lack of IT (0.0155).
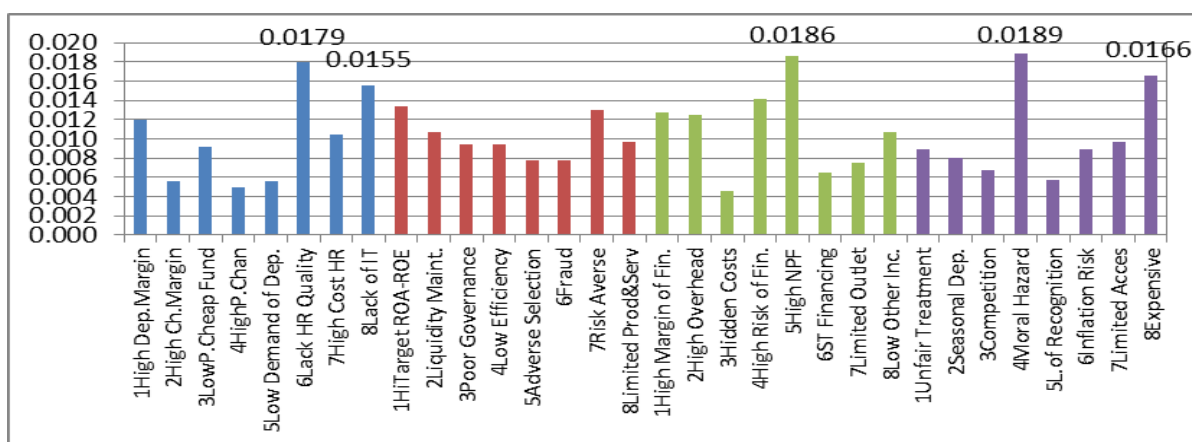

Figure 41. Main Detailed Problems of Islamic Micro Banking Unit (IMB)

b.   Main Solutions

The main solutions of conventional Micro Banking Unit (CMB) are FUNDAMENTAL (0.340) and followed closely by TECHNICAL (0.307). Meanwhile, the main solutions of Islamic Micro Banking Unit (IMB) are TECHNICAL (0.298) and followed closely by ROADMAP. TECHNICAL solutions are equally important for both CMB and IMB.
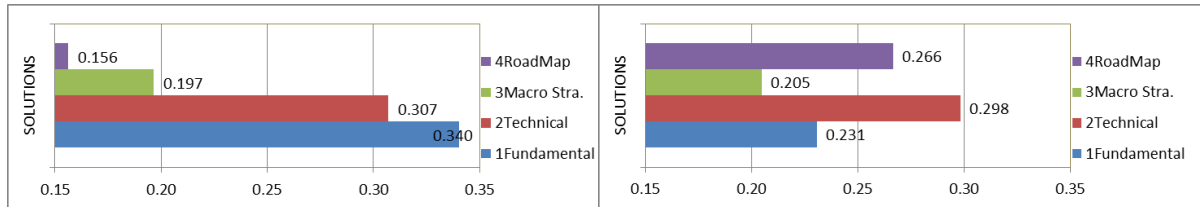

Figure 42. Main Solutions of Conventional and Islamic Micro Banking Units

The main detailed solutions for CMB are F6 Government Support (0.0289), folloed in a distance by R2 Socialization-Communication-Education Programs to stakeholders (0.193), T2 Incentive for Productive Financing (0.0186), M4 Financial Inclusion (0.0170) and T5 Incentive for Low NPF (0.0158).
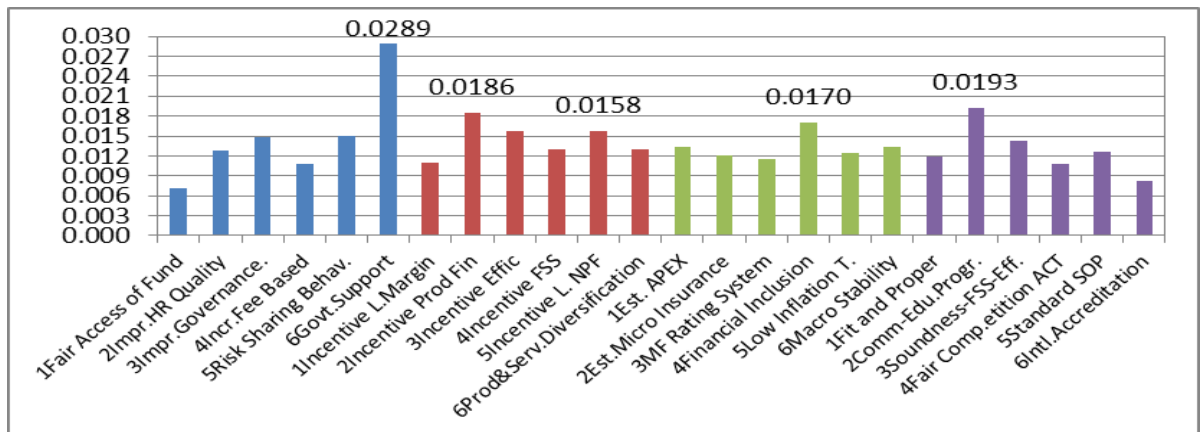

Figure 43. Main Detailed Solutions of Conventional Micro Banking Unit (CMB)

The main detailed solutions for IMB are M6 Macro Stability (0.0183), followed by R1 Fit and Proper, R3 Harmonization of Soundness-FSS-Efficiency-Margin-NPF, and F4 Increase Fee-Based Income (0.0175) and T5 Incentive for Low NPF (0.0169).
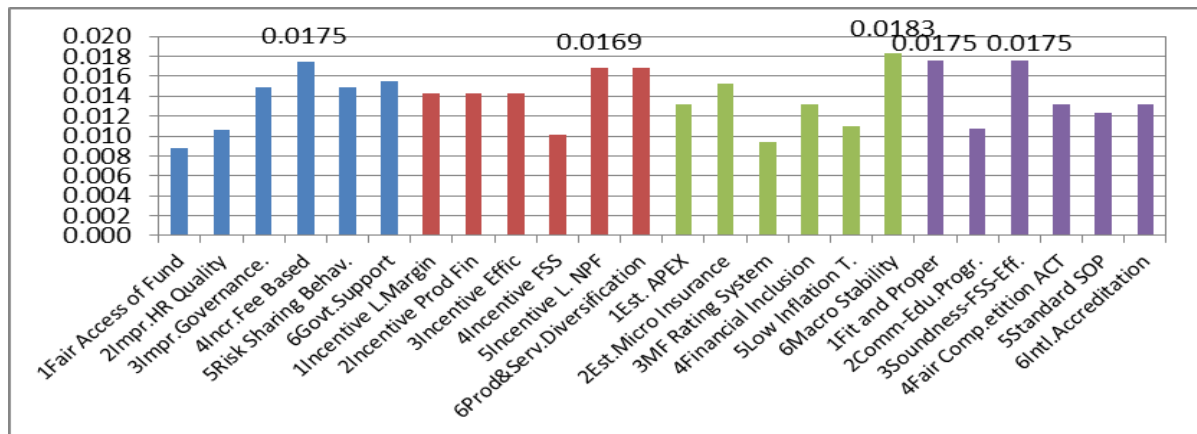
63

Figure 44. Main Detailed Solutions of Islamic Micro Banking Unit (IMB)

V. CONCLUSIONS AND RECOMMENDATIONS

5.1   CONCLUSIONS

a. Data Envelopment Analysis (DEA)

- DEA Results show that overall MFI is inefficient (TE, PTE and Scale), but most of MFIs (58%) could be improved by expansion. CMFI shows better efficiencies than IMFI. However PTE of IMFI is better than that of CMFI.

- Efficiencies of COOP > CRB > CMB, while efficiencies of BMT < IRB < IMB.

- COOP-BMT most inefficient variables: 'Other Income' and 'Financing', since their core businesses are savings/investment and loan/financing. Meanwhile, many new MFIs, especially CMB and IMB, enter similar market segment (such as, traditional market).

- CRB-IRB most inefficient variables: 'Financing' and 'Other Income'. CRB-IRB have been started to offer various financial services which have potentials to be expanded.

- CMB-IMB most inefficient variables: 'Other Income' and 'Labor'. There have been many new CMB and IMB, which desperately needed experienced microfinance officers.

b. Analytic Network Process (ANP)

- The main detailed problems of overall MFI are O2 High Overhead Cost, P2 Maintain Liquidity, E1 Unfair Treatment, I1 Low Demand of Deposits, and E6 Inflation Risk.

- The main detailed solutions of overall MFI are are F6 Government Support, M2 Establish Micro Insurance/Takaful, R3 MF Integrated Rating Sistem, F1 Fair Access ofFund, and R4 Fair Competition Act.

- COOP-BMT detailed problems: P2 Liquidity Maintenance and P4 Low Efficiency.

- COOP-BMT detailed solutions: R3 Harmonization of Soundness-FSS-Eff-Margin-NPF, F6 Govt. Support and M1 Est. APEX Institution.

- CRB-IRB detailed problems: E1 Unfair Treatment and I1 High Dep. Margin.

- CRB-IRB detailed solutions: F6 Govt. Support and R4 Fair Competition ACT.

- CMB-IMB detailed problems: E4 Moral Hazard.

- CMB-IMB detailed solutions: T5 Incentive L. NPF.

- CMB and IMB have wide characteristic differences.

- CRB and IRB have many similar characteristics.

5.2 RECOMMENDATIONS

- CMFIs and IMFIs could improve their efficiencies by expanding their scale of business and exploring new markets. CMFIs and IMFIs should start providing various micro financial services needed by MSEs and low income people.

- Lack of microfinance officers should be addressed. In the short-run, trainings and short courses for microfinance officers should be facilitated by regulator. In the long-run, there should be center of microfinance studies in universities which offer diploma, undergraduate and graduate degrees.

- APEX institutions are needed to be established for Cooperative-BMT and CRB-IRB to function similar to central bank for banking, so that the main problem of liquidity, which causes low efficiency and high margin, could be resolved.

- Conventional and Islamic rural banks (CRB and IRB) should be directed to become community banks which different from Cooperative-BMT or conventional-Islamic Micro Banking Units, so that the problem of expensive funding could be resolved by community trust. Standing facilities for CRB-IRB and Cooperative-BMT should be provided with fairness and inexpensive.

- CMB and IMB operate in close resemblance to their main banks so that overhead costs become high. To solve this problem, CMB and IMB should operate more like Cooperative-BMT or CRB-IRB so that overhead costs could be minimized and efficiency could be improved.

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