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ISLAMIC PUBLIC INFRASTRUCTURE FINANCING: AN ANALYSIS OF ALTERNATIVE FINANCING INSTRUMENTS WITH APPLICATION IN DEVELOPING COUNTRIES

By: **Saiful Islam**

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Advisors: **Robert M McNab,**
Carmelita Troy

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This project examines the structure of public infrastructure financing in Indonesia and examines whether financing based on Islamic principles is a feasible alternative to current financing mechanisms. The structure of public infrastructure investment can be determined by comparing the amount of public saving or domestic resources relative to foreign debt resources. Typically, public infrastructure investment flows consist of 20 to 40 percent domestic investment and 60 to 80 percent foreign investment. This financing mixture, however, may lead to fiscal constraints when debt service occurs. If the investment funds are unproductive, then the infrastructure project may not generate sufficient revenue to offset debt service obligations. This problem is compounded in the presence of corruption, crime, and other forms of the absence of the rule of law. The funding constraint mitigates the dominant role of government and encourages private entities to provide and finance public infrastructure. Islamic project financing, through such vehicles as debt, hybrid, and equity instruments, may be able to respond to this challenge.

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Saiful Islam
Civilian, Indonesian Ministry of Finance
B.S., Kosgoro School of Management, Jakarta, 1999

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June 2004

Author: Saiful Islam

Approved by: Robert M. McNab
Thesis Advisor

Carmelita Troy
Support Advisor

Douglas A. Brook
Dean, Graduate School of Business and Public Policy

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I would like to appreciate the insights, patience and encouragement given by my advisors Professor Robert M McNab and Professor Carmelita Troy. I also acknowledge the support of my former co-workers at Sub Directorate of Foreign Grant and Debt Administration, Indonesian Ministry of Finance who were ready and willing to support my research by providing data and answering my questions. Lastly I would like to thank my wife, Ena, my kids, Khansa and Rifqi, for their understanding and support during this long process.

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I. INTRODUCTION

A. MOTIVATION

From 1969 to 1996, Indonesian development policy adopted the central arguments of Lewis (1955) and Rostow (1960). Lewis and Rostow argue that increased savings and investment result in an acceleration of economic growth.[1] As a result of this development policy, flows of various types of international financial instruments from developed countries were sought out and secured by the Indonesian government. These financial flows consisted of foreign direct investment (FDI) from multinational corporations, loans from foreign commercial banks and multilateral financial institutions, grants from foreign governments and multilateral financial institutions, aid from non-governmental organization (NGO's) and portfolio flows (Kirkpatrick, 2002, 86).

While official developmental policy sought these funds for investment purposes, in reality, these flows subsidized government consumption, stimulating economic growth to a rate of 7 percent per annum. However, the inflows would necessitate future outflows necessary to service the debt. Currently, debt service obligations absorb more than 40 percent of the routine or discretionary expenditures of the central government's budget.[2] Increased debt service over time has led to lower budget allocations for other functions, reducing the magnitude of government services that can be provided.

Given existing fiscal constraints, an analysis of the financial resources necessary to support sustainable economic growth and a more equitable distribution of government expenditures is important. A reduction in foreign investment flows may be necessary to reduce long-term debt service obligations. Such a reduction may only be possible if alternative funding mechanisms are available.

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[1] Colin Kirkpatrick and others, eds., *Handbook on Development Policy and Management*. (Massachusetts: Edward Elgar Publishing, Inc., 2002), 16.

[2] On the next chapters, I use discretionary expenditure term to state the routine expenditure as common term on Indonesian government budget.

B. THESIS

In this project, I examine the structure of public infrastructure financing in Indonesia and examine whether financing based on Islamic principles is a feasible alternative to current financing mechanisms. The structure of public infrastructure investment can be determined by comparing the amount of public saving or domestic resources relative to foreign debt resources. Typically, public infrastructure investment flows consist of twenty to forty percent domestic investment and sixty to eighty percent foreign investment.[3] This financing mixture, however, may lead to fiscal constraints when debt service occurs. If the investment funds are unproductive, then the infrastructure project may not generate sufficient revenue to offset debt service obligations. This problem is compounded in the presence of corruption, crime, and other forms of the absence of the rule of law. The funding constraint mitigates the dominant role of government and encourages private entities to provide and finance public infrastructure. Islamic project financing, through such vehicles as debt, hybrid, and equity instruments, may be able to respond to this challenge.

The objective of this study is to explore alternative financing instruments for public infrastructure projects in Indonesia. I compare and contrast Islamically oriented financing instrument with more convention infrastructure investment vehicles. The project analyzes Profit-Sharing Agreements and Yielding Predetermined Rate of Return instruments to determine whether these instruments are appropriate for financing public infrastructure projects and whether these instruments are less expensive in terms of cost for borrower or operator. Furthermore, this study will examine whether increasing the use of the Islamic-orienting financing instruments will enhance public infrastructure investment flows and enhance the application and development of the principles of Islamic finance.

C. OVERVIEW OF THE PROBLEM

The Indonesian government's development policy from 1969 to 1996, which emphasized the growth of national income, led to a heavy reliance on foreign loans

[3] Mansoor Dailami and Michael Klein, "Government Support to Private Infrastructure Projects in Emerging Markets": Proceedings of the Conference "Managing Government Exposure to Private Infrastructure Projects: Averting a New-Style Debt Crisis" Held in Cartagena, Colombia, 29-30 May 1997, 6.

because the domestic savings rate was insufficient to meet investment requirements. While foreign loans may theoretically accelerate economic development, particularly through infrastructure provision, mismanagement, misallocation, corruption, and inefficiency, as well as currency risk factors, can detract from their effectiveness. Additionally, the structure of debt service, which consists of principal, interest and other fees that have to be paid using foreign currency, can contribute to a shortage of government resources when repayments come due. Whether foreign investment is ultimately useful depends on its final use by the host government.

Islamic finance, found in the Quran and the sayings of the Prophet Muhammad (Sunnah), provides some financing models that may be appropriate to financing investments in public infrastructure. Nevertheless, Islamic finance has yet to prove that it can raise sufficient capital relative to conventional interest bearing financial instruments. One possible explanation for the limited impact of Islamic-oriented financing instruments is their relatively new position in global financial markets, and their apparent dependence on oil prices.

The impact of foreign loans and the emergence of Islamic financing instruments may challenge the existing structure of infrastructure financing in developing countries. The challenge for the Indonesian government is how to employ alternative methods of infrastructure financing that minimize government expenditure while sustaining economic growth. The challenge for financiers is whether these alternative infrastructure instruments will produce an acceptable rate of return.

D. ORGANIZATION

In Chapter II, I review the capital structure of Indonesian public infrastructure financing during the economic growth-focused development policy period from 1969 – 1996 and its resulting impact on the government budget. In Chapter III, I discuss the concepts of Islamic public infrastructure finance and discuss the component cost of capital, cost of equity, cost of debt and methods for choosing an optimal capital structure. In Chapter IV, I analyze Profit Sharing Agreements that operate on the basis of risk sharing and Yielding Predetermined Rate of Return instruments, particularly the

Murabahah contract. Finally in Chapter V, I summarize the findings of study and examine the prospects of the Islamic public infrastructure financing.

II. BACKGROUND

A. MOTIVATION

The role of public infrastructure in society is to provide the basic services that allow the public and business communities to develop their economic and social activities. The availability of efficient and effective infrastructure influences the pace of economic development. Efficient infrastructure involves complicated choices as to what kinds of infrastructure are needed, how to finance them, how to repay their financing, and who will operate them. Traditionally, the government undertook the main responsibility for building and operating public infrastructure. As consequence, the government allocated funds to finance public infrastructure investment, although, due to the magnitude of expenditures required, the government typically funded only a portion of the cost of infrastructure projects through discretionary expenditures. In many cases, the majority, if not all, of the associated infrastructure development costs were financed through the issuance of debt to private investors. Whether the borrowed funds were from domestic or foreign investors depended on the capacity of the domestic financial market.

In the case of Indonesia, the government relied heavily on international financial markets for the development (or lack there of) of public infrastructure. This reliance, coupled with the devaluation of the Indonesian Rupiah relative to the U.S. Dollar, Japanese Yen, and British Pound Sterling, has led to relatively high levels of foreign debt service to Gross Domestic Product and other measures of debt service capacity. The Government of Indonesia must repay international lenders in foreign currency, but revenues from operators of public infrastructure are received in local currency. With devaluation, revenues have declined and payments increased in real terms, compounding the burden on the public budget. This situation encourages the government to explore alternative financing arrangements that could reduce debt service obligations.

In this chapter I explore the structure of public infrastructure capital in Indonesia. I discuss how the capital structure influences the public budget process. I conclude the chapter with an examination of the potential role of Islamic financing instruments.

B. THE CAPITAL STRUCTURE OF PUBLIC INFRASTRUCTURE FINANCING IN INDONESIA

Most infrastructure projects in developing countries are financed with a significant amount of foreign capital. A typical financing mix consist 20 to 40 percent domestic equity (provided by project promoters) and 60 to 80 percent debt, in the form of syndicated commercial bank loans, bond issues, bridge and backup facilities, and multilateral and export credit agency loans and guarantees. In 1995, about 60 percent of total cross-border infrastructure finance was in the form of bank loans, about 20 percent bonds, and the rest in the form of equity capital.[4] For Indonesia, during the 1971-1996 period, a typical proportion of domestic source to foreign capital in terms of any public project development was 35 percent domestic to 65 percent foreign.

In terms of the Indonesian government's budget, development expenditures are any expenditures to finance either physical or non-physical projects that have termination. Project termination can be defined as the end of project activity because the project has achieved its goals or it has been unsuccessful or superseded. Further, the project can integrated or be a part of the parent organization.[5] For the most part development expenditures are for public infrastructure development projects. Nevertheless, when the government pays service debt obligations, those payments are, for the most part, from discretionary expenditures and not from income received from the project.

Development expenditures are invested in two types of project categories. The first are projects that have a vital role. These projects do not generate revenue to service the debt incurred in the development. The projects are built as a matter of government policy. Irrigation systems, bridges, roadways, and public school buildings may all be examples of this category. The second are projects that have a vital role and also generate revenues. The government charges a price, which may be up to the market price, for these services. These projects may contribute directly to pay off debt obligations. Toll roads,

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[4] Mansoor Dailami and Danny Leipziger, "Infrastructure Project Finance and Capital Flows: A new perspective": Proceedings of the Conference on "Financial Flows and World Development" Held in the University of Birmingham, United Kingdom, 7-8 September 1997, 9.

[5] http://www.imse.hku.hk/imse3002/overview%20HTML/7-18.htm, The Four Main Reasons for Project Termination, cited May 21, 2004.

telecommunications, water and sanitation services, and electricity generation may be examples of projects in this category. Whether a project generates revenue is often a choice of public policy rather than the economics underlying the project itself.

As stated previously, project revenues, however, are often obtained in local currency, while foreign debt obligations are paid in foreign currency. Fluctuations in the exchange rate of the domestic currency create risk for both borrower and foreign investor alike. The risk for borrower is the shortage of hard currency in the fiscal year when debt payments come due, even though their investment may be performing well in terms of the local currency. The risk for financiers is the possibility of not receiving full principal and interest payments as scheduled even though they still generating interest revenues on outstanding loans and commitment fees of undisbursed loans.

C. EFFECTS OF HEAVY DEBT FINANCING COMPONENT FOR THE GOVERNMENT BUDGET

Countries that are unable to generate sufficient domestic savings to fuel their aspirations for economic growth have historically sought financing from other countries.[6] The Indonesian government, from 1983-1987 sought out and secured foreign debt at relatively reasonable terms. The typical loan averaged 15 years to maturity with a grace period of five years and an average interest rate of nine percent.[7] If the period between the loan effective date and last disbursement averages three years, the total loan life will be 23 years, which is comparable with the twenty-year maturity of US Treasury Bonds. The nine percent interest rate charged to Indonesia was less expensive than the normal required return, which consists of risk-free rate return plus a premium for risk. For example, using twenty-year maturity US Treasury Bonds, in 1983 Indonesia average rate should be 11.34 percent plus risk premium. The relatively low cost of debt and longer repayment periods, has attracted developing countries to borrow more than they would at prevailing interest rates at the level 9 percent, that was equal 166 basis points below average yield on US Treasury Bonds twenty-year maturity (Figure 1).

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6 Malcolm Gillis and others, *Economic of Development*. (New York: W.W. Norton & Company, third edition, 1992), 372.

7 Glenn P. Jenkins and Henry B.F. Lim, "The External Financing of Indonesia's Imports," *Technical Papers of Organization for Economic Co-operation and Development, Paris 1991*, 17.

Official Development Assistance (ODA), which can be divided into bilateral loans and multilateral loans, is offered at lower than corresponding private market interest rates.[8] Nevertheless, from 1970 to early 1984, the share of ODA grants and loans declined drastically from 91 percent to 25 percent of total foreign debts and grants, while the share of export credits (commercial loans) increased from 7 percent to 73 percent. Other financial flows not characterized as ODA or private market credit, remained steady at 2 percent of the total foreign debts and grants.[9] The surge in private investment resulted from the increase in oil prices in 1973-1974 and again in 1978-1979, which generated large dollar surpluses, that were invested in world markets. The influx of petrodollars pressured commercial banks to expand their investment portfolios into developing countries, especially in South America and Asia.[10]

The increase in funds available for investment led to a decline in the cost of capital, resulting in an increased use of export credits and multilateral loans. The terms and interest rates of these loans differed from ODA-guaranteed loans. First, the LIBOR (London Interbank Offered Rate) was the standard interest rate. Second, unlike ODA, private loans are not linked to conditions, that is, macroeconomic and fiscal reforms. As such, bilateral loans, as a percentage of total loans, declined through 2001 (Table 1). With the increase in the total loan portfolio and the shift to commercial and multilateral loans, total debt service increased steadily.

While foreign debt may benefit a domestic economy, if used effectively, excessive borrowing can lead to a debt crisis. Aside from how a country distributes its foreign borrowing to competing uses, the level of total debt and the structure of debt determine whether the country can benefit from additional foreign investment. Indonesia, with its increasing reliance on commercial and multilateral debt, may be at such a point in time.

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8 Bilateral Loan is a loan from any Government to other Government (G to G loan), whereas Multilateral Loan is a loan from International Financial Institution, such as the World Bank, IMF and the Asian Development Bank to any Government.

9 Jenkins and Lim, 19.

10 Malcolm Gillis and others, *Economic of Development*. (New York: W.W. Norton & Company, third edition, 1992), 398.

Indonesia, having undergone a monetary crisis in 1997 - 1998, currently carries a relatively heavy burden of foreign debt (private and public), the fourth largest in the world after Brazil, Argentina and Mexico.[11] Its capacity to repay this debt is also limited. The debt service ratio averaged 50 percent of earning exports during 1997 to 2002 period (Table 2). During the last decade, debt payments as a percentage of a discretionary expenditure has increased from 24.3 percent in the 1994/1995 fiscal year to 43.5 percent in the 2003 fiscal year (Figure 2).

In order to reduce the effect of loans on the government budget, I argue that the Indonesian government needs to implement three significant efforts. First, from the expenditure side, the Indonesian government should reduce debt accumulation by limiting commercial borrowing by the public sector. This action necessitates an increase in self-financing or equity financing. Second, driven by fiscal constraints and a growing disenchantment with the performance of state-provided infrastructure services, there should be a trend to shift the provision and financing of infrastructure from the public sector to private sector. (Mansoor Dailami and Michael Klein, 1997, 1). Third, from the revenue side, the government should generate additional income from existing investment projects. This revenue could contribute directly to retiring existing debts, if, of course, the government of Indonesia is able to charge users for these services. Thereby, in order to contribute debt repayments in the future, the government should allocate obtained loans for productive projects that generate monetary benefit.

In conclusion, it is reasonable to borrow capital if such capital is used effectively to spur economic development. Nevertheless, excessive debt may still result in a debt crisis and disproportional share of government expenditure devoted to debt service. By reducing the commercial loans for development expenditures and only investing the new loans for productive projects, the negative effects of infrastructure in Indonesia may be mitigated.

[11] http://lists.essential.org/pipermail/stop-imf/2000q1/000066.html, Indonesian Anti Debt Coalition, cited January 26, 2004

D. ISLAMIC FINANCE ROLE

Islamic financial instruments have steadily grown in acceptance over time. Islamic based systems are operated by more than 100 financial institutions in over 75 countries, which are either Islamic in nature or where there is a sizable Muslim community. Since 1992 the Islamic financial industry has grown at an annual rate of 15 percent, and its asset base was more than $230 billion.[12] While relatively small by Western standards, the Islamic system is growing in importance.

Several factors contributed to the growth of Islamic finance. Those factors initially were the current account surpluses of oil exporting Islamic countries in the 1970s and the desire for a sociopolitical and economic system based on Islamic principles. Later, the introduction of broad macroeconomic and structural reforms in financial systems, the liberalization of capital movements, privatization, and the global integration of financial markets, paved the way for the expansion of Islamic finance.[13]

The term "Islamic financial system" is relatively new, appearing only since the mid 1980s. The previous term related with financing, commercial or mercantile activities conforming to Islamic principles was called interest-free or Islamic banking. The philosophical foundation of Islamic financial system goes beyond the interaction of the factors of production and economic behavior. While conventional financial systems focus primarily on the economic and financial aspects of transactions, Zamir Iqbal comments that the Islamic system "places equal emphasis on the ethical, moral, social, and religious dimensions, to enhance equality and fairness for the good of society as a whole." (Iqbal 1997, 2).

The Islamic financial system is based on Shariah law, which governs the economic, political and cultural aspects of Islamic societies. Shariah originates from the Quran and its practices, and explanations rendered by the Prophet Muhammad (Sunnah).

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12 http://www.islamicbanking-finance.com/facts.html, "Facts and Figures on Islamic Finance", Cited May 21, 2004

13 Zamir Iqbal, "Islamic Financial System" [Lkd. Finance and Development] (1997); available from World Wide Web @ http://www.worldbank.org/fandd/english/0697/articles/0140697.htm [Cited 7 April 2004]

Further elaborations of the rules are provided by the Islamic scholars. The basic principles of an Islamic financial system involve the prohibition of interest, risk sharing, prohibition of speculative behavior, sanctity of contracts, and Shariah-approved activities. The system should be stable since the term and structure of the liabilities and the assets are symmetrically matched through profit-sharing arrangements, no fixed interest cost accrues, and refinancing through debt is not possible.[14]

The emphasis on profit and risk sharing arrangements and the lack of fixed interest costs may be appropriate to achieving the objective of reducing the debt component of public infrastructure development projects. Broadly speaking, there are two methods in which Islamic financial system could mobilize investments for public sector projects related to infrastructure.[15] The first method is based on profit and risk sharing which is appropriate to finance projects capable of yielding measurable monetary returns. This instrument is called a Profit-Sharing Agreement (Mudharabah) whereby the capital is invested in broadly defined activities, and the terms of profit and risk sharing are customized for each investment. The second method is based on purchasing deferred payments from the providers that build and sell them to the government for a reasonable price. Ijara (leasing), Istisna (pre-production finance), Salam (pre-payment for the delivery of goods in the future), and Murabahah (cost-plus or markup sales) are instruments of yielding predetermined rate of return that might be appropriate for public infrastructure projects with no direct measurable monetary return. Detailed concepts and the specific basis in Islamic Law of Mudharabah and Murabahah instruments are discussed on chapter III.

E. CONCLUSION

Public infrastructure development requires the commitment of significant resources investments that are typically insufficiently covered by discretionary expenditure. As with other countries, the Indonesian government took the main role in building public infrastructure by using the foreign debt as the dominant portion of

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[14] Ibid., 3.

[15] Dr Muhammad Nejatullah Siddiqi, "Financing Infrastructure Building: Role of Islamic Financial Institutions" [Lkd. Seminar on Cooperation Between Government and the Private Sector in Financing Economic Projects] (1999 [cited 2 November 2003]); available from World Wide Web @ http://islamic-finance.net/islamic-economics/eco3.html

investment. This policy led to a cash flow problem and a disproportional share of discretionary expenditure devoted to debt service.

An Islamic financial system encourages risk sharing and requires no predetermined-fixed interest while investing funds. By using Profit Sharing Agreement (Mudharaba) and Murabaha vehicles while building public infrastructure, the study will analyze whether those models work more efficiently than commercial loans on the financial perspective. The finding will be important to contribute sustainability of public infrastructure development for developing countries and provides alternative investments for the Islamic finance institutions.

(%)

Year	Years Maturity			
	1	5	10	20
1983	8.86	10.79	11.10	11.34
1984	9.91	12.26	12.46	12.49
1985	7.76	10.12	10.62	10.97
1986	6.07	7.30	7.67	7.84
1987	6.33	7.94	8.39	NA
Average	7.786	9.682	10.048	10.66

Source: US Federal Reserve Bank

Figure 1. Yields on US Treasury

Fiscal Year	Current Expenditure (Rupiah Trillion)	Debt Payment (Rupiah Trillion)	Portion (%)
1994/1995	25.5	6.2	24.3
1995/1996	28.5	6.6	23.2
1996/1997	37.1	6.6	17.8
1997/1998	60.6	10.8	17.8
1998/1999	104.5	32.9	31.5
1999/2000	156.8	42.7	27.2
2000	162.6	50.1	30.8
2001	218.9	87.1	39.8
2002	200.4	91.6	45.7
2003	188.6	82	43.5

Source: Indonesian Ministry of Finance

Figure 2. Portion Debt Payment Over Discretionary Expenditure

(Million USD)

Description	1997	1998	1999	2000	Jun-01
Total Government Debt	53,865	67,328	75,862	74,916	72,496
By type of loan					
Bilateral	19,517	22,373	26,160	24,645	23,223
Multilateral & Commercial*	34,348	44,955	49,702	50,271	49,273
Portion of Bilateral	36%	33%	34%	33%	32%
Portion of Commercial & Multilateral	64%	67%	66%	67%	68%

Source: Bank Indonesia

* Consists of Export Credit Facility, Leasing, Commercial, Domestic Securities by Non Resident owned

Table 1. Outstanding of Indonesian Government's Foreign Debt, 1997-2001

Year	DSR			(Million USD)
		Total Outstanding Foreign Debt	Government	Private
1997	44.50	136,088	53,865	82,223
1998	57.90	150,886	67,328	83,558
1999	56.80	148,097	75,862	72,238
2000	41.10	141,693	74,916	66,777
2001	45.30	138,901	72,496	66,405
2002	52.50	NA	NA	NA
Average	50			

Source: Bank Indonesia, Indonesian Financial Statistic, Various Issues

Table 2. Indonesia's Debt Service Ratio, 1997-2002

III. LITERATURE REVIEW

A. PUBLIC INFRASTRUCTURE AND PROJECT APPRAISAL: AN ISLAMIC PERSPECTIVE

Islam is not an ascetic religion and does not deprive Muslims of the good things that God has provided (Al Quran 7:32) within the framework of the values for righteous living. These values involve all sectors of human activity where action in every field, including economic activity, is assessed as worship. In the Islamic view, the economic system is dedicated to human brotherhood accompanied by social and economic justice and equitable distribution of income, and to individual freedom within the context of social welfare.[16] Economic development can be used as a vehicle to bring into reality these various purposes.

The economic development of a country is dependent on the development of its public infrastructure. Public infrastructure is not simply about the construction of large projects. It is about providing and delivering basic services that people need for everyday life such as water, sanitation, modern energy, roads and other aspects of transport, and accessing to modern communications technology. [17] Because of the importance of public infrastructure for human living, Muslim economists and practitioners realize that financial instruments must be developed that are appropriate for an Islamic economy.

Public infrastructure projects typically require substantial investments and long term financing. These characteristics lead to relatively more uncertainty and risk. Accordingly, it is common to employ project appraisal methodologies to determine whether the benefits to be gained from a project are sufficient to justify the costs of implementing and operating the project. The approach used to answer this question is referred to as cost-benefit analysis, where the cost and benefits are predominantly monetary. [18] The net present value (NPV) or the internal rates of return (IRR) of the

16 Muhammad Umar Chapra, "Objectives of The Islamic Economic Order," in *An Introduction to Islamic Finance*, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali (Kuala Lumpur: Quill Publishers, 1992), 15.

17 World Bank Group – Infrastructure, A Revitalized Drive on Infrastructure, http://www.worldbank.org/infrastructure/, cited April 2, 2004

18 Introduction to Project Appraisal, http://www.switched-on.org/MoneyTalks/Projectappraisal.htm, cited February 20, 2004.

project are the most often used indices. Calculation of their numerical values is very much influenced by considerations of the time stream of benefits and costs, the relevant values of the various cost-benefit components, and the discount rate chosen.[19]

Muhammad Akram Khan suggests ranking higher those projects that lead to greater distribution of income, alleviation of poverty of greater numbers of citizens, give preference to the provision of basic needs, and have positive implications in term of their consequences. Additionally, development projects should be designed to benefit the region from which resources are collected (based on the Prophet Muhammad's guidance to spend the zakah collected from a locality in that very area), and to remove injury prior to providing the benefit.[20]

In terms of quantitative tools dealing with project appraisal, discounting is permitted. The reason being that prevention of israf (waste) is an important goal and discounting does not require the acceptance of interest, Anas Al-Zarqa concluded, "The rate of return on equity is the proper discount rate in the uncertain world in which we live. Thus, on the grounds of efficiency, that discounting by a rate of return is desirable to achieve the Islamic objective of avoiding israf (waste)". [21]

B. THE COST OF CAPITAL

The cost of capital is the minimum rate of return necessary to attract capital to an investment. It has been defined as:

"The expected rate of return prevailing in capital markets on alternative investments of equivalent risk."[22]

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19 Syed Aftab Ali, "Social Preferences and Project Evaluation: an Islamic Perspective," in *An Introduction of Islamic Finance*, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali (Kuala Lumpur: Quill Publishers, 1992), 170.

20 Muhammad Akram Khan, "Time Value of Money," in An Introduction of Islamic Finance, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali (Kuala Lumpur: Quill Publishers, 1992), 137-139.

21 Muhammad Anas Al-Zarqa, "An Islamic Perspective on the Economics of Discounting in Project Evaluation," in *An Introduction to Islamic Finance,* ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali (Kuala Lumpur: Quill Publishers, 1992), 112.

22 Kolbe, Read, and Hall, *The Cost of Capital,* (Cambridge, Massachusetts: The MIT Press, 1984), 13.

The cost of capital is also a key factor in decisions relating the use of debt versus equity capital. In the business sector, most firms employ different types of capital with different risks. These varied risks require different rates of return. The cost of capital used to analyze capital budgeting decision is called the weighted average cost of capital or WACC. The analysis suggests that the lower WACC, the better the cost of capital. Finally, the cost of capital is also an important factor in the regulation of electric, gas, and telephone companies. The rates set by the regulatory agencies are designed to permit the company to earn its cost of capital, no more and no less.[23]

In the Islamic framework, the cost of capital can be represented by the rate of return on alternate opportunities for investment of comparable risk. It is obviously important for both investors and capital users in the Islamic world to determine appropriate annualized benchmark profit returns for the commitment of funds. The task is more challenging than in the West, where financial markets are liquid and deep and estimates of the cost of capital are readily available to determine appropriate returns for equity investments with different characteristics. According to Vogel and Hayes "the difficulty in identifying a riskless rate within the closed Islamic market and the absence of a diversified portfolio benchmark make application of the Capital Asset Pricing Model (CAPM) to contemporary Islamic finance a dubious proposition." [24] As the solution, they suggest using Mudharabah Profit-Sharing Arrangement approach to determining appropriate hurdle rates instead of one that relies on outside market data.

C. COST OF EQUITY

The two sources of equity capital used to calculate the weighted average cost of capital consist of the cost of preferred stock (k_{ps}) and the cost of common stock (k_s). The cost of preferred stock is the preferred dividend (D_{ps}), divided by the net issuing price (P_n), which is the price the firm receives after deducting flotation costs.

$$k_{ps} = \frac{D_{ps}}{P_n}$$

23 Eugene F. Brigham and Michael C. Ehrhardt, *Financial Management: Theory and Practice*, (South-Western: Thomson Learning, 2002), 420.

24 Frank E. Vogel and Samuel L. Hayes, III, *Islamic Law and Finance: Religion, Risk, and Return*, (Boston: Kluwer Law International, 1998), 206.

Whereas debt and preferred stock are contractual obligations that have easily determined costs, it is more difficult to estimate the cost of common stock. However, it can be determined by using : (1) the Capital Asset Pricing Model (CAPM), (2) the Discounted Cash Flow (DCF) method, and (3) the bond-yield-plus-risk-premium approach. Therefore, when faced with the task of estimating cost of equity, the conventional model generally uses all three methods and then chooses among them on the basis of confidence in the data used for each in the specific case.[25]

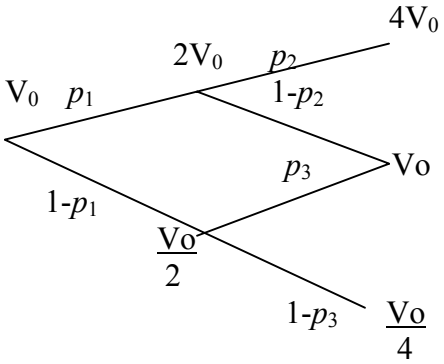
Due to the prohibition on interest, conventional debt financing is not fit for projects or businesses in the Islamic world, even though debt transactions itself are not prohibited (Al Quran 2:282). The Al Quran requires that debt contracts be without rate interest, for a specified fixed period and drawn in terms of equity. As consequence, in the Islamic world there is relatively heavy reliance on equity funds to finance projects or business activities. In business, the equity ownership may take the form of individual proprietorship, a business trust, a corporation, or some of the other organizational devices employed. The most popular collaborations between financier and capital user are Musharakah and Mudharabah contracts.

The Musharakah is a system similar that of Joint Ventures whereby the financier enters into partnership for limited period for a particular project.[26] Both the financier and the client contribute to the capital, with the client maintaining the right to gradually buy back the financier's shares. In the Mudharabah, in which there is a marriage of capital and expertise, the financier provides the capital, as a sleeping partner, and the capital user provides the technical know-how and the actual management of project. The proportions of profits or losses are split according to agreement and not on the basis of capital contribution. If many projects are available for investment, and many financiers are willing to invest in a particular project under consideration, the financier has a lower bound on the opportunity cost of his equity capital, and the finance user has an upper limit on what he is willing to pay. The financier will invest in the project if the expected return is greater than or equal to the rate of alternative investments. The finance user will

25 Brigham and Ehrhard, 425.

26 Muhammad Mohsin, "Assessment of Corporate Securities in Terms of Islamic Investment Requirements," in *An Introduction of Islamic Finance, ,* ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali (Kuala Lumpur: Quill Publishers, 1992), 190

use the financier's fund if the implied cost of capital is less than or equal to his cost from other sources. The profit-sharing arrangement is only acceptable to both parties if those conditions are satisfied. Even though finance user publishes sufficient information about the project for financier to make informed decision, due to information asymmetry (the finance user typically has better information), the finance user's estimated cost of capital will differ from the return expected by the financier. By using probability tree analysis, the cost of capital to the financial user or the expected return to the financier when they agree to apply Mudharabah Profit-Sharing Arrangement can be calculated as follow (Vogel and Hayes, p. 209-211):



by assuming that:

V_0: the amount of the initial investment

x: the profit percentage taken by the finance use

p_1: probability that the value will double by the end of the first period

$1\text{-}p_1$: the probability that the value will halve during this time

p_2 and p_3: the probabilities that the value will double in each of the two possible outcomes after the second period.

Expected return to the financier would be:

$$\left[p_1 p_2 (4V_0 - V_0)(1-x) + (1-p_1)(1-p_3)\left\{\left(V_0/4\right) - V_0\right\}\right] / V_0$$
$$= 3p_1 p_2 (1-x) - 3(1-p_1)(1-p_3)$$

Expected cost of capital to the finance user would be:

$$p_1 p_2 [V_0 + 3V_0 (1-x)] / V_0$$
$$= p_1 p_2 \left[1 - \left(3x/4\right)\right].$$

D. COST OF DEBT

The cost of debt, used to calculate the weighted average cost of capital, is determined by the rate of return debt holders require, k_d. The debt could be fixed rate or floating rate debt, straight or convertible debt, or debt with or without sinking funds. The component cost of debt is the after-tax cost of new or marginal debt:

After-tax component cost of debt = Interest rate – Tax savings

$$= k_d - k_d T$$

$$= k_d (1 - T)$$

In Islamic finance, where interest-bearing lines of credit are forbidden, close substitutes to the line of credit are found in the Murabahah (cost plus sale), the Salam (sale by description), and the Ijara (leasing). The Murabahah is similar to that of consignment business, where the financier purchases a commodity or goods for the user at a known price and resells it to the user with particular a profit. For example, if a user needs to finance $100,000 of goods, he can arrange for an financier to purchase the goods on his behalf, add a profit margin, and then resell him the goods for, say, $110,000, with payment to be delayed for one year by installment payments. The amount $10,000 as profit margin is completely allowed according to Islamic law. It is seller's (financier's) profit expected that consists of a return of capital, a charging of risk and opportunity cost. If x is the administrative cost of obtaining the credit, as a percentage of a loan's face value, and the gross proceeds of a loan are P, the net proceeds to the user are $P(1-x)$. If there are two semiannual installments of value I, and y internal rate of return (IRR) on annualized basis, then the net proceeds to the user are:[27]

$$P(1-x) = I/(1+y) + I/(1+y)^2$$

Solving for y will give the estimated cost of capital to the user capital. This cost of capital will be accepted by the finance user if it is less than or equal to other alternative fund resources.

27 Vogel and Hayes, 213.

E. THE OPTIMAL CAPITAL STRUCTURE

The optimal capital structure on the conventional business is the mix of debt and equity that minimizes the WACC and maximizes the stock price.[28] In the Islamic financial system, all-equity capital structure is optimal if sufficient equity funds are available. In fact, there is much empirical evidence that Islamic financial institutions are heavily involved in trade financing and other short-term investments, rather than long-term investments. The suggestion that Islamic firms would seek out debt as an affirmation of their creditworthiness seems less reasonable than an argument contending that new debt capital is simply less costly to the firm than new equity. Khan concludes "the cost of debt funds is lower than that of equity funds because the terms of the debt contract give enhanced protection to the lender, reducing the need for detailed oversight of the borrower's activities".[29]

Even though Islamic finance is often described as "equity-based", however, the use of debt-like contracts is widespread. Thereby, Islamic finance recognizes cost both equity and debt as the cost of capital's component. In conclusion, the conventional method of calculating the weighted cost of both debt and equity capital is both possible and the most likely to lead to better investment decision-making within Islamic financing.

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[28] Brigham and Ehrhard, 637

[29] Waqar Masood Khan, "Towards an Interest Free Islamic Economic System," in Khan and Mirakhor, Collected Papers (Washington, DC: International Monetary Fund, 1987)

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IV. ANALYSIS OF PROFIT SHARING AGREEMENT AND YIELDED PREDETERMINED RATE OF RETURN

A. INTRODUCTION

Shiddiqi (1999) proposed a Profit Sharing Agreement instrument for revenue generating projects and Yielded Predetermined Rate of Return instrument for non-monetary generating projects. Monzer Kahf (2002) suggested using Non-Debt financing instruments, including Mudharabah, and Public Debt modes and certificates, as instruments to overcome budget deficits in Islamic Economies.[30] These proposals, however, did not explain how these instruments should work and what are the expected impacts on the government budget. Advanced research on both proposals is also not available.

With respect to current practice, most of the Islamic financial institutions are heavily involved in short-term (Murabahah) rather than long-term investment (Mudharabah and Musharakah) financing. During 1985 – 1991, Bank Islam Malaysia Bhd (BIMB) employed Mudharabah financing for less than one percent of its financing. Similarly, Musharakah financing was less than 1 percent during 1989 – 1991, a decrease from 2.2 percent during 1984 – 1988 period. Bank Islam Malaysia Bhd used a Murabahah and Bai Bithaman Ajil (BBA) short-term instruments for 86.9 percent of total financing from 1984 – 1991.[31] More recently, in Indonesia, in 2003, Bank Muamalat Indonesia channeled 71.2 percent of its total financing through Murabahah instruments, whereas financing through Musharakah and Mudharabah instruments was only 20.3 percent.[32] While Musharakah instrument is a long-term financing, the focus of this paper will be on Mudharabah and Murabahah instruments.

As banks appear to rarely employ Mudharabah instruments, there is a lack of data on their practice and outcomes. The Murabahah instrument, which dominates Islamic financing, was developed by Islamic economists. The Islamic Development Bank, the

30 Monzer Kahf, *Instruments of Meeting Budget Deficit in Islamic Economy*, Research Paper at IRTI, 2002.

31 http://islamic-finance.net/islamic-microfinance/harran5.html, Islamic Finance Needs a New Paradigm, cited April 14, 2004.

primary government co-partner for Islamic oriented financing, has employed Murabahah instrument principles to build public infrastructure in some developing countries. Thereby data relating to projects of Mudharabah basis are relatively easier to obtain.

This chapter will explain methodology of data collection, compute cost of capital using Mudharabah and Murabahah instruments. Furthermore it discuss the cost effectiveness by comparing those proposed instruments and the current practice instruments. Finally this chapter will compute the contribution of the Profit Sharing Agreement instrument in reducing Debts Service Ratio, to strengthen the Indonesian fundamental economy.

B. METHODOLOGY

I focus on the question how do Profit Sharing Agreements (PSA) and Yielding Predetermined Rate of Return (YPR) work with respect to public infrastructure financing. I also examine what is the impact of these instruments on discretionary expenditures. The methodology to analyze the problem is divided into two parts:

First, with respect to Profit Sharing Agreements, I employ the Profit Sharing Arrangement model developed by Vogel and Hayes to determine the expected return for the financier and cost of capital for the user. Then, using three assumptions, optimistic, moderate, and pessimistic, and crystal ball software, I simulate the model to produce expected return and cost of capital. Since there is no actual data or any experience in Indonesia of the use of Mudharabah instrument for building infrastructure, the model will be applied by using subjective assumption and a simple numerical example.

Second, with respect to the Yielding Predetermined Rate of Return instrument, I combine both the Murabahah modified model developed by Vogel and Hayes and an example of project financing in Indonesia. The model and data project are combined to produce the project's cost of capital for this particular project.

The results of both cost of equity (Profit Sharing Agreement) and debt (Yield Pre-Determined Rate of Return) will be used to determine Net Present Value and Internal Rate of Return (IRR). Then I compare these results with current practice to determine

32 http://www.kompas.com, April 26, 2004, cited May 13, 2004.

which is more efficient. I also explore the impact these instruments on the debt service ratio.

C. PROFIT SHARING AGREEMENT ANALYSIS.

Kahf (2002) classified Mudharabah, which is a Profit Sharing Agreement as non-debt financing instrument. This instrument is fit for profit making projects only and it is not acceptable for financing discretionary expenditures. The Mudharabah may be used for short, medium or long-term public sector projects and the management of the project is retained in the hands of the government.

Vogel and Hayes developed the model of the Mudaharabah as follows:

Expected return to the financier is calculated by the formula:

$$\left[p_1 p_2 (4V_0 - V_0)(1-x) + (1-p_1)(1-p_3)\left\{\left(V_0/4\right) - V_0\right\}\right]/V_0$$
$$= 3p_1 p_2 (1-x) - 3(1-p_1)(1-p_3)$$

Expected cost of capital (k_s) to the finance user would be:

$$p_1 p_2 [V_0 + 3V_0(1-x)]/V_0$$
$$= p_1 p_2 \left[1 - \left(3x/4\right)\right].$$

Note:

V_0:	the amount of the initial investment
x:	the profit percentage taken by the finance user
p_1:	probability that the value will double by the end of the first period
1-p_1:	the probability that the value will halve during this time
p_2 and p_3:	the probabilities that the value will double in each of the two possible outcomes after the second period.

To determine both cost of capital and expected return, I make three assumptions:

- Optimistic Assumption: high probability of double value, high profit percentage for finance user.
- Moderate Assumption: moderate probability of double value, moderate profit percentage for finance user.
- Pessimistic Assumption: low probability of double value, low profit percentage for finance user.

Using crystal ball software for simulation (see Appendices A, B, and C), the results of the annual cost of equity and expected return are shown on Figure 3.

Under the optimistic assumption, the financing produces an extremely high-expected return that is likely to be accepted by financier since the return may equal or exceed his opportunity cost. Nevertheless, the finance user may find the cost of capital has risen. Generally the finance user will use the financier's funds if the implied cost of capital to user is less than or equal to his cost from other sources. Under the Pessimistic assumption, the cost of equity is competitive, but this financing will produce negative return for financier so that the financier will invest his funds to other projects. Under both assumptions, there is little possibility to reach equilibrium between financier and finance user.

The Moderate assumption produces normal results that support Vogel and Hayes model. Under the moderate assumption, the annual cost of equity for finance user will be 13.3 percent and the expected return for financier will be 16.2 percent. In my opinion, those results are in the range of required return for the western market.

D. YIELDED PREDETERMINED RATE OF RETURN ANALYSIS

Shiddiqi (1999) classified Murabahah as a Yielded Predetermined Rate of Return instrument. This instrument is fit for building infrastructure that does not generate monetary income. Murabahah instruments may be issued for short, medium or long-term public sector projects, where the management of the project is retained in the hands of the government.

Indonesia has a project financed by Islamic Development Bank that uses Murabahah principles in determining the installment payments. The detailed project is shown on figure 4.

The future value of the total disbursement is I.D. 2,744,786.69 (Table 3). The total future value furthermore is used to determine installment amount (Table 4) using the following formula:

$$\text{Installment} = \frac{D*r*(1+r)^n}{(1+r)^n - 1}$$

Where:
R = Mark-up rate
r = Semi annual mark-up rate = $(1+R)^{0.5}-1$

D = Total Future Value of amount disbursed
n = Number of installments
Using present value and equal payment method where:
Semi annual installment (PMT) = I.D. 245,542.64
Number of installment (N)= 15
Present Value (PV) = I.D. 2,460,000.00
The cost of debt (I/Y) will be 5.53 percent semi annual or 10.56 percent annually.

Vogel and Hayes developed Murabahah formula as follows:

$$P(1-x) = I/(1+y) + I/(1+y)^2$$

In this project:
I = installment = I.D. 245,542.64 semi annually or I.D. 491,1085.28 annual
y = 8 % per annum
P = the gross proceeds of a loan = I.D. 2,460,000.00

Using modified Vogel and Hayes Model as shown on Figure 4, I add administrative cost (x) to gross proceeds of loan (P) instead of subtracting. The cost of administrative (x) is 11.23 percent, which is greater than the actual cost of capital (10.56 percent).

E. DISCUSSION

1. Profit Sharing Agreement

Under the moderate assumption the simulation produces an annual cost of equity for financial user and an expected return for financier of 13.3 percent and 16.2 percent respectively. Compared with Indonesian government bonds that yielded from 11.40 percent to 12 percent,[33] the cost of Mudharabah is higher by 1.5 percent. The cost of Mudharabah is also higher than cost of loan by 4.3 percent (13.3 % - 9 %). Nevertheless, unlike government bonds and loans that require future expenditure for bondholders or lenders, the Profit Sharing Agreement does not require future payments. Therefore, over the long run, Profit Sharing Agreements may reduce government budget burden.

33 http://web.lexis-nexis.com, Headline "Indonesian government issues bonds amid strong demand", cited June 5, 2004.

The investment produces an annual potential expected return for the financier of 16 percent. For the domestic investors, this rate is more attractive than the benchmark of SBI (Certificate Bank of Indonesia) average annual rate of interest of 11.40 percent in 2003.[34]

To compare two different projects and determine which one is more profitable, I use NPV and IRR measurements to valuate financial project performance. The following calculation (Appendix D) examines similar project in term of all aspects except for fund resources and assets distribution while project is ended. For Mudaharabah financing, the project asset at the end of project (year 8) will be divided proportionally based on agreement (65 percent for financer over 35 percent for GoI). I assume GoI as the user initially has profit share is 28.4% of total profit (Figure 3), then GoI also obtain 35% of new total profit as his participation on this project. I use the SBI rate to reflect the opportunity cost of equity of GoI portion.

From the preceding calculation, the current practice and Mudharabah financing produce Internal Rate of Return 10.39 percent and 18.31 percent respectively. The current practice IRR of 10.39 percent is higher than the cost of capital of 10.05 percent. The Mudharabah financing IRR of 18.31 percent is also higher than the opportunity cost of 10 percent; thereby both the models indicate this as an acceptable investment. Mudharabah financing provides an expected Net Present Value of $1,048 K, higher than current practice that produces $154 K. In other words, with a similar investment amount, alternative-financing works appears to be more profitable. Mudharabah financing also produces an IRR of 18.31 percent, higher than current practice by nearly eight percentage points. NPV and IRR measurements suggest that a project financed by Mudharabah provides higher economic benefit for finance user.

Finally Mudharabah, in this case, produces a potential expected return for financier of 16 percent. The rate is competitive with respect to the SBI benchmark, but lower than Dow Jones' Islamic Index (Figure 6).

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34 http://laksamana.net, Government Bond Market Consolidation Welcomed, cited May 5, 2004.

2. Yielding Predetermined Rate of Return

By using PV and equal payment methods, the discount rate (I) of the project investment using YPR instrument is 10.56 percent annually. Compared with Indonesian government bond that yielded from 11.40 percent to 12 percent,[35] the cost of Murabahah (the discount rate) on this project is slightly lower. But the cost of Murabahah is higher than the cost of commercial loan by 1.56 percent (10.56 % - 9 %).

To compare the current practice and Murabahah financing to determine which one is more efficient, I use the total payment on the future to valuate the financial project performance. The following calculation (Appendix E) examines a similar project in term of all aspects except on fund resources. I use the SBI rate as the opportunity cost to determine cost of equity of GoI portion.[36]

From that calculation, the project that uses Murabahah financing produces total payment on the future I.D. 3,683.14 K slightly higher than current practice financing that produces total payment on the future I.D. 3,563.10 K. In other words, with similar investment amount, Murabahah financing is higher than the current practice by I.D. 120.04 K or 5 percent of the project I.D. value (I.D. 120.04 ÷ I.D. 2,460.00). Nevertheless, Murabahah financing does not require a portion of government financing of I.D. 861.00 K (35 percent of the project I.D. value) in the beginning of project. In term of cash flow management, it would be providing opportunity for government to spend on other services.

Investment on public infrastructure using Murabahah instrument produces potential yield for the financier as 10.56 percent annually. The rate is competitive compared with other investment, either on conventional or Islamic finance as shown in Figure 6.

3. Debt Service Ratio and Islamic Finance Instruments Opportunity

Currently, the capital structure of public infrastructure projects is 35 percent GoI and 65 percent foreign debts. By assuming 35 percent GoI requires 12 percent cost of

35 http://web.lexis-nexis.com, Headline "Indonesian government issues bonds amid strong demand", cited June 5, 2004.

36 Note: The average SBI rate for 2002 and 2003 is 11.25%.

equity (opportunity cost of SBI investment) and 65 percent foreign debts require 9 percent cost of debt, the WACC:

$$w_d(k_d) + w_{ce}(k_s) = 65\% \ (9\%) \ + \ 35\% \ (12\%)$$

$$= 10.05\ \%$$

This capital structure contributed to current Debt Service Ratio, which was during 1997 to 2002 period averaged 50 percent of earning exports (Table 2).

Debt Service is defined as a payment made by a borrower to a lender including any or all of the following: payment of interest, repayment of loan principal and loan commitment fees. When those amounts are divided by earnings from exports of goods and services in any period the result is Debt Service Ratio.[37]

$$DSR = \frac{DS}{Ex}$$

DSR=Debt Service Ratio, DS=Debt Service, Ex=Export earning.

The equation implies that by reducing Debt Service amount, ceteris paribus, the Debt Service Ratio will go down. The DSR will also go down if export earnings increase, ceteris paribus.

As reported in Table 5, Indonesia has the highest Debt Service Ratio among the South East Asian countries. The other countries have average Debt Service Ratios less than 20 percent, Indonesia's average is 50 percent. In order to improve macroeconomic performance, using the DSR of South East Asian Countries as a benchmark, Indonesia should lower its DSR at least by 30 percent. Reducing the DSR by only relying on export earnings is not simple, as export growth has not been significantly increasing. During 1996 – 2002, earning exports fluctuated and the annual average rate of growth was 3.66 percent (Figure 7). The Indonesian government, I argue, should simultaneously lower Debt Service and increase export growth to reach the target level.

[37] Glossary of Development Terms and Abbreviations, cited May 9, 2004 http://www.dfid.gov.uk/aboutdfid/files/glossary_d.htm,

By assuming the export growth is stable at 7.5 percent as 2003-year growth and the Debt Service payment does not change significantly, the Debt Service Ratio will go down by 3 percent to 42.33 percent. If, at the same time, the Debt Service payment goes down by 7.5 percent (at $4,213,758.88), the Debt Service Ratio will go down by 6 percent. As conclusion, the total change of 15 percent will lower DSR by 6 percent. In other words, every 2.36 percent change, either by decreasing debt service or by increasing export growth, reduces the Debt Service Ratio by 1 percent (Figure 8).

If we assume that the Indonesian government has not signed new loan since 2004, we can predict that Service Payment will decrease by 2 percent annually and the outstanding loans will be zero in next 22 years (Table 6). The 2 percent decrease in service payments, solely, will lower DSR by 1 percent annually. The intention to reduce the DSR by reducing service payments lead to consequence of reducing debt portion on one side or increasing government portion on the other side. Here, the Mudharabah provides an opportunity to replace debt portion. However, the requirement of equity funds to replace debt portion is far greater than available fund in Islamic financial market.

In 2004 fiscal year, Indonesia needs $3.24 billion of foreign loan to finance development expenditures that cannot be covered by domestic revenue.[38] Islamic finance institutions ability to supply Mudharabah financing on the market is around $11.50 billion (5 percent share of $230 billion assets). By assuming one cycle Mudharabah investment is 8 years, annual available funds will be $1.44 billion. If, every Islamic Development Bank's country members have equal risk level and opportunity as finance user, Indonesia will receive $26.18 million ($1.44 billion divided by 55 countries). The Mudharabah financing provides only one percent of total Indonesian foreign debt in 2004. Hence, the commitment not to add new debt requires the government to provide self-financing more than previously required to cover the remaining amount.

[38] Down to Earth IFIs Factsheet No 32, March 2004, http://dte.gn.apc.org/Af32.htm, cited May 21, 2004

Assumption	(%) Cost of Equity	(%) Expected Return	(%) Portion User
Optimistic	17.8	37	26.5
Moderate	13.3	16	28.4
Less Moderate	9.5	-6	22.9

Figure 3. Cost of Equity, Expected Return and Portion User Under Three Assumptions

1. Date of Signature of Agreement		August 23, 1994
2. Total amount approved	US$	3,400,00.00
3. Total amount disbursed	I.D.	2,460,00.00
4. Date of first disbursement		June 19, 1996
5. Date of last disbursement		November 19, 1998
6. Gestation period		30 months from date of first disbursement i.e. from 06/19/1996 to 12/18/1998
7. Repayment period		10 years including gestation period of 30 months
8. Number of installment		15 equal and consecutive semi-annual installments
9. Date of 1st installment		Six months from the end of gestation period, but made to fall on 06/30/1999
10.Mark-up rate		8.00% p.a.
11.Semi-annual installments	I.D.	245,542.64

Figure 4. Al Islam General Hospital, Republic of Indonesia

$$P(1-x) = I/(1+y) + I/(1+y)^2 + ... + I/(1+y)^{15}$$

		491,085	491,085	491,085	491,085	491,085	491,085	491,085	245,543
		1.08	1.17	1.26	1.36	1.47	1.59	1.71	1.37
	=	454,709	421,026	389,843	360,959	334,231	309,462	286,548	179,412
	=	2,736,189							
(Px)	=	2,736,189							
		(2,460,000) +							
	=	276,189							
(x)	=	-11.23%							
X	=	**11.23%**							

Figure 5. Cost of Capital Using Vogel and Hayes Model

Investment	Return (%) 2002	2003
Mudharabah	16%	
Murabahah	11.06%	
SBI (Certificate Bank Indonesia)	13	9.5
Dow Jones Islamic Index	27.25	28.12

Figure 6. Annual Return on Investment

Year	Value ($ million)	Growth
1996	49,814.90	
1997	53,443.50	7.28%
1998	48,847.60	-8.60%
1999	48,665.40	-0.37%
2000	62,124.00	27.66%
2001	56,320.90	-9.34%
2002	57,158.80	1.49%
2003	61,793.30	7.50%
Average		3.66%

Figure 7. Indonesian Export Growth

	Change	Debt Service	Export	DSR	
Year 2003		$ 4,555,415.00	$10,011,901.10	45.50%	1)
Export Growth	7.50%	$ 4,555,415.00	$10,762,793.68	42.33%	
Debt Service Drop	7.50%	$ 4,213,758.88	$10,762,793.68	39.15%	2)
Change Result	15.00%			6.35%	1) - 2)
Changed by	2.36%	*)		1.00%	

*) 15.00%/6.35%

Figure 8. Effects of Export Growth and Changed Debt Service on Debt Service Ratio

	Actual Disbursement			I.D. Equivalent		Future Value Calculation		
		Original				No. of	No. of	
	Date	Currency	Amount			Days	Years	FV in ID
1	19-Jun-96	US$	94,274.40	65,036.11		912	2.50	78,825.76
2	19-Jun-96	US$	32,135.40	22,168.92		912	2.50	26869.41
3	19-Jun-96	US$	117,034.00	80,737.05		912	2.50	97855.78
4	5-Jul-96	US$	15,223.50	10,546.17		896	2.45	12739.23
5	5-Jul-96	US$	194,957.93	135,058.25		896	2.45	163143.42
6	5-Jul-96	US$	66,081.78	45,778.54		896	2.45	55298.12
7	5-Jul-96	US$	47,528.00	32,925.30		896	2.45	39772.07
8	5-Jul-96	US$	86,090.87	59,639.95		896	2.45	72041.99
9	24-Oct-96	US$	26,122.00	18,133.48	470,023.77	785	2.15	21397.6
10	8-Apr-97	US$	131,717.85	95,844.29		619	1.70	109206.7
11	8-Apr-97	US$	231,286.23	168,295.07		619	1.70	191758.41
12	18-Sep-97	US$	166,348.00	122,030.27		456	1.25	134345.89
13	18-Sep-97	US$	552,842.85	405,556.79		456	1.25	446486.65
14	23-Sep-97	US$	1,183,398.74	872,648.58		451	1.24	959706.26
15	24-Sep-97	US$	112,473.90	82,883.62	1,747,258.62	450	1.23	91133.09
16	19-Nov-98	ID	242,717.61	242,717.61	242,717.61	29	0.08	244266.31
Total				2,460,000.00	2,460,000.00			2,744,846.69

Source: Indonesian Ministry of Finance

Table 3. Disbursement Profile

No	Due Date	Amount (in ID)
	30-Jun-99	245,542.64
	31-Jun-99	245,542.64
	30-Jun-00	245,542.64
	30-Dec-00	245,542.64
	30-Jun-01	245,542.64
	31-Dec-01	245,542.64
	30-Jun-02	245,542.64
	31-Jun-02	245,542.64
	31-Dec-02	245,542.64
	30-Jun-03	245,542.64
	31-Dec-03	245,542.64
	30-Jun-04	245,542.64
	31-Dec-04	245,542.64
	30-Jun-05	245,542.64
	30-Jun-06	245,542.64
Total		3,683,139.60

Source: Indonesian Ministry of Finance

Table 4. Installment Schedule

Country	1999	2000	2001	2002	2003	Average (%)
Cambodia	1.70	4.20	4.00	4.00	3.00	3.38
Indonesia	56.80	41.10	41.10	45.30	45.50	45.96
Laos People's Democratic Rep.	11.40	10.10	10.10	10.50	9.20	10.26
Malaysia	5.60	5.40	5.40	6.00	6.10	5.70
Philippines	13.40	12.70	12.70	16.40	15.00	14.04
Singapore	NA	NA	NA	NA	NA	NA
Thailand	19.40	15.40	15.40	17.40	15.50	16.62
Vietnam	12.80	11.20	10.20	10.20	6.80	10.24

Source: Asian Development Bank Outlook 2002

Table 5. Debt Service Ratio of Southeast Asian Countries

($ million)

Year	Outstanding Loan	Principal	Interest (3% of 2)	Service Payment (3 + 4)	Decreased Service Payment (% from base year = 2003)
1	2	3	4	5	6
2003*)	80,099.00	4,000.00	2,450.00	6,450.00	0
2004	76,099.00	4,000.00	2,282.97	6,282.97	-0.03
2005	72,099.00	4,000.00	2,162.97	6,162.97	-0.04
2006	68,099.00	4,000.00	2,042.97	6,042.97	-0.06
2007	64,099.00	4,000.00	1,922.97	5,922.97	-0.08
2008	60,099.00	4,000.00	1,802.97	5,802.97	-0.10
2009	56,099.00	4,000.00	1,682.97	5,682.97	-0.12
2010	52,099.00	4,000.00	1,562.97	5,562.97	-0.14
2011	48,099.00	4,000.00	1,442.97	5,442.97	-0.16
2012	44,099.00	4,000.00	1,322.97	5,322.97	-0.17
2013	40,099.00	4,000.00	1,202.97	5,202.97	-0.19
2014	36,099.00	4,000.00	1,082.97	5,082.97	-0.21
2015	32,099.00	4,000.00	962.97	4,962.97	-0.23
2016	28,099.00	4,000.00	842.97	4,842.97	-0.25
2017	24,099.00	4,000.00	722.97	4,722.97	-0.27
2018	20,099.00	4,000.00	602.97	4,602.97	-0.29
2019	16,099.00	4,000.00	482.97	4,482.97	-0.30
2020	12,099.00	4,000.00	362.97	4,362.97	-0.32
2021	8,099.00	4,000.00	242.97	4,242.97	-0.34
2022	4,099.00	4,000.00	122.97	4,122.97	-0.36
2023	99.00	4,000.00	2.97	4,002.97	-0.38
2024	-	99.00	2.97	101.97	

Table 6. Prediction of Decreased Service Payment

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V. CONCLUSION

The Indonesian's government development policy during 1969 to 1996 period, which emphasized the growth of national income, led to not only high annual economic growth at average seven percent, but also heavy reliance on foreign loans since domestic resources were insufficient to cover development expenditure. When debt service comes due, it absorbs a high proportion of discretionary expenditures and mitigates the magnitude of other government expenditures. While foreign loans were expected to accelerate economic development, particularly through infrastructure provision, in fact, mismanagement and devaluation of the Indonesian currency have contributed their lack of long-term effectiveness. The debt effect also made Indonesian's Debt Service Ratio one of the highest among South East Asian countries.

In order to strengthen the macro economy, it is important to reduce the Debt Service Ratio to a reasonable level. The effort to reduce the debt portion is tied to the emergence of the Islamic financial system that provides Profit Sharing Agreements and Yielding Predetermined Rate of Return in dealing with public infrastructure financing.

Simulation, computation and analysis produce findings as follows:

First, a project infrastructure financed by Profit Sharing Agreements (PSA), even though it may require a higher cost of capital than the current practice, nevertheless it produces a higher Net Present Value and Internal Rate of Return. The PSA instrument also produces a higher return than the SBI benchmark, but its return is lower than the prominent Dow Jones Islamic Index.

Second, the Yielding Predetermined Rate of Return instrument has a higher cost of capital than current practice. The model has total payment on the future higher than current practice by 3 percent of current practice. Nevertheless, the model is helpful for finance user to provide needed goods or services without any expenditure at the start year (year 0). The model also produces potential yield slightly higher than average SBI benchmarks in 2003.

Third, a one-percent reduction in the debt service ratio can be obtained either by reducing Debt Service payments by 2.36 percent or increasing export earnings by 2.36 percent, ceteris paribus. If annual debt service payments decrease by two percent and the export earnings export increase by 3.3 percent, Indonesia would need 15 years to reach a Debt Service Ratio comparable to the current DSRs of other countries in South East Asia.

Fourth, if government commits not to add new loans for development expenditures, it would require around $3.24 billion equity funding. Islamic financial institutions now can only contribute one percent of needed financing. Assuming a change of paradigm in the Islamic financial system, the employment of more Mudharabah instruments and 15 percent growth annually of the Islamic finance industry, this amount may increase slightly in the future.

Fifth, there are some constraints to enhancing the use of profit sharing agreements.

Islamic financial institutions prefer investing their funds in the short-term investments. This practice is conducted to meet their depositors' expectations of a reasonable return in the short time. Revenue-generating infrastructure projects need large investments over the long-term. Frequently, those projects are financed by a syndication that uses both debt and equity. Involving Profit Sharing Agreement instruments in existing projects will create complex calculations. The simpler way to employ Profit Sharing Agreement is involving the model on the new and medium or small projects.

This project has limitations as follows:

First, the analysis of Mudharabah instrument is not supported by actual data. It would mitigate the precision on the current practice.

Second, the more recently Mudharabah and Murabahah financing data on the international market are not available. It would affect to the state-of-the-art of the topic.

Finally, the analysis only uses NPV, IRR, and total payment on the future as comparative measurements. It cannot describe more advances the difference of current practice and Islamic financing model.

Based on those project findings, my suggestions are:

First, the Indonesian government should make to reducing the Debt Service Ratio a high priority by increasing export earnings at least 3.3 percent annually and reducing debt inflow by 2 percent annually. The debt portion can be replaced by Profit Sharing Agreement instruments.

Second, due to limited experience and available funds, the use of Profit Sharing Agreements should initially be limited to new and medium size revenue generating infrastructure projects. This opportunity will develop and enhance Mudharabah application.

Third, the use of Yielding Predetermined Rate of Return instruments in building non-monetary return projects can be considered to overcome shortage budget on the start year. Nevertheless, as with other models, this model may detract commitment to minimize debt portion.

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LIST OF REFERENCES

Ali, Syed Aftab, "Social Preferences and Project Evaluation: an Islamic Perspective," in *An Introduction of Islamic Finance*, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali, Kuala Lumpur: Quill Publishers, 1992.

Al-Zarqa, Muhammad Anas, "An Islamic Perspective on the Economics of Discounting in Project Evaluation," in *An Introduction to Islamic Finance,* ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali, Kuala Lumpur: Quill Publishers, 1992.

Brigham, Eugene F., and Michael C. Ehrhardt, *Financial Management: Theory and Practice*, South-Western: Thomson Learning, 2002.

Chapra, Muhammad Umar, "Objectives of The Islamic Economic Order," in *An Introduction to Islamic Finance*, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali, Kuala Lumpur: Quill Publishers, 1992.

Dailami, Mansoor, and Michael Klein, "*Government Support to Private Infrastructure Projects in Emerging Markets*": Proceedings of the Conference "Managing Government Exposure to Private Infrastructure Projects: Averting a new-style debt crisis" Held in Cartagena, Colombia, 29-30 May 1997.

Dailami, Mansoor, and Danny Leipziger, "*Infrastructure Project Finance and Capital Flows: A new perspective*": Proceedings of the Conference on "Financial Flows and World Development" Held in the University of Birmingham, United Kingdom, 7-8 September 1997.

Gillis, Malcolm, eds., *Economic of Development*. New York: W.W. Norton & Company, third edition, 1992.

Iqbal, Zamir, "Islamic Financial System" [Lkd. Finance and Development] (1997 [Cited 7 April 2004]); Available from World Wide Web at http://www.worldbank.org/fandd/english/0697/articles/0140697.htm, [17 paragraphs]

Jenkins, Glenn P., and Henry B.F. Lim, "The External Financing of Indonesia's Imports," *Technical Papers of Organization for Economic Co-operation and Development, Paris 1991.*

Kahf, Monzer, *Instruments of Meeting Budget Deficit in Islamic Economy*, Research Paper at IRTI, 2002.

Khan, Muhammad Akram "Time Value of Money," in *An Introduction of Islamic Finance*, ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali Kuala Lumpur: Quill Publishers, 1992.

Khan, Waqr Masood, *"Towards an Interest Free Islamic Economic System,"* in Khan and Mirakhor, Collected Papers, Washington, DC: International Monetary Fund, 1987.

Kirkpatrick, Colin, eds. *Handbook on Development Policy and Management*. Massachusetts: Edward Elgar Publishing, Inc., 2002).

Kolbe, Read, and Hall, *The Cost of Capital,* Cambridge, Massachusetts: The MIT Press, 1984.

Mohsin, Muhammad, "Assessment of Corporate Securities in Terms of Islamic Investment Requirements," in *An Introduction of Islamic Finance,* ed. Sheikh Ghazali Sheikh Abod, Syed Omar Syed Agil, and Aidit Hj. Ghazali, Kuala Lumpur: Quill Publishers, 1992.

Siddiqi, Muhammad Nejatullah, "Financing Infrastructure Building: Role of Islamic Financial Institutions" [Lkd. Seminar on Cooperation Between Government and the Private Sector in Financing Economic Projects] (1999 [cited 2 November 2003]); available from World Wide Web at

http://islamic-finance.net/islamic-economics/eco3.html, [20 paragraphs].

Vogel, Frank E., and Samuel L. Hayes, III, *Islamic Law and Finance: Religion, Risk, and Return*, Boston: Kluwer Law International, 1998.

Down to Earth IFIs Factsheet No 32, March 2004, [cited May 21, 2004]. Available from World Wide Web at http://dte.gn.apc.org/Af32.htm, [22 paragraphs].

Facts and Figures on Islamic Finance, [cited May 21, 2004]. Available from World Wide Web at http://www.islamicbanking-finance.com/facts.html, [1 page].

Government Bond Market Consolidation Welcomed, [cited May 5, 2004]. Available from World Wide Web at http://laksamana.net.

Glossary of Development Terms and Abbreviations, [cited May 9, 2004]. Available from World Wide Web at http://www.dfid.gov.uk/aboutdfid/files/glossary_d.htm

Headline "Indonesian government issues bonds amid strong demand", [cited June 5, 2004]. Available from World Wide Web at http://web.lexis-nexis.com

Indonesian Anti Debt Coalition [cited January 26, 2004]. Available from World Wide Web at http://lists.essential.org/pipermail/stop-imf/2000q1/000066.html, [7 paragraphs].

Introduction to Project Appraisal, [cited February 20, 2004]. Available from World Wide Web at http://www.switched-on.org/MoneyTalks/Projectappraisal.htm, [1 page].

Islamic Finance Needs a New Paradigm, [cited April 14, 2004]. Available from World Wide Web at http://islamic-finance.net/islamic-microfinance/harran5.html, [39 paragraphs].

The Four Main Reasons for Project Termination, [cited May 21, 2004]. Available from World Wide Web at http://www.imse.hku.hk/imse3002/overview%20HTML/7-18.htm, [1 page].

World Bank Group – Infrastructure, A Revitalized Drive on Infrastructure, [cited April 2, 2004]. Available from World Wide Web at http://www.worldbank.org/infrastructure/, [4 paragraphs].

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APPENDIX A. OPTIMISTIC ASSUMPTION

Assumptions	Range	Mostly
Probability1 (p1)	50% - 90%	80%
Probability2 (p2)	40% - 80%	70%
Probability3:(p3)	50% - 90%	80%
Portion User (x)	10% - 40%	30%
Period = 2		

Using crystal ball software, the result will be:

Result:

p1: 0.697488505
p2: 0.634015921
p3: 0.736593739
x:

Cost of Equity (two period) $= p_1 p_2 \left[1 - \left(3x/4\right)\right]$ =

Cost of Equity (one period) = 0.177175818 → 17.7%

Expected Return (two period) $= 3p_1 p_2 (1-x) - 3(1-p_1)(1-p_3)$

= 0.736137464

Expected Return (one period) = 36.8%

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APPENDIX B. MODERATE ASSUMPTION

Assumptions	Range	Mostly
Probability1 (p1)	50% - 80%	60%
Probability2 (p2)	40% - 70%	50%
Probability3:	50% - 80%	60%
Portion User (x)	10% - 40%	25%
Period = 2		

Using crystal ball software, the result will be:

Result:

p1: 0.634388975
p2: 0.534077082
p3: 0.631731589
X 0.283794544

Cost of Equity (two period) $= p_1 p_2 \left[1 - \left(3x/4\right)\right]$

= 0.266697734

Cost of Equity

= 0.133348867

(one period) = 13.3%

Expected Return (two period) $= 3p_1 p_2 (1 - x) - 3(1 - p_1)(1 - p_3)$

= 0.324049351

Expected Return (one period) = 16.2%

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APPENDIX C. PESSIMISTIC ASSUMPTION

Assumptions	Range
Probability1 (p1)	40% - 70%
Probability2 (p2)	30% - 60%
Probability3:	40% - 70%
Portion User (x)	10% - 40%
Period = 2	

Using crystal ball software, the result will be:

Result:

p1:	0.534578429
p2:	0.434290309
p3:	0.532941718
x:	0.229661935

Cost of Equity (two period) $= p_1 p_2 \left[1 - \left(3x/4\right)\right]$

= 0.192173111

Cost of Equity (one period) = 0.096086555 / 9.6%

Expected Return (two period) $= 3p_1 p_2 (1-x) - 3(1-p_1)(1-p_3)$

= -0.11560679

Expected Return (one period) -5.8%

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APPENDIX D. COMPARISON OF MUDAHARABAH AND COMMERCIAL LOAN FINANCING

A. Current Practice

($ thousands)

	Loan	GOI
Portion %	65%	35%
Portion $	$ 6,500	$ 3,500
Cost	9%	12%

Cost of Capital (65%*9%) + (35%*12%) 10.05%
Investment: $ 10,000
Value of project termination: $ 3,500

($ thousands)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
Outflows:									
Initial Investment	(10,000)								
Inflows				2,000	2,500	3,000	3,000	3,500	3,500
Net Cash Flow	(10,000)	0	0	2,000	2,500	3,000	3,000	3,500	3,500

Net Present Value**	$154
Internal Rate of Return	10.39%

* See appendix 4 for more detail
** Discounted rate is cost of capital = 10.05%

B. Mudharabah Financing with 35% Government Participation

Five stpes to determine GoI Net Cash Flow:
1. Determine GoI Profit share by multiplying Total Inflow with 28.40% the portion user GoI (Figure 3)
2. Determine New Inflow by subtracting the Total Inflow with the GoI Profit Sharing (result step 1)
3. Determine GoI Participation by multiplying New Inflow with 35%
4. Determine GoI Inflow by adding GoI Profit Sharing and GoI Participation (result step 1 plus result step 3)
5. Determine GoI Net Cash Flow

	Mudharabah	GoI
Portion %	65%	35%
Portion $	$ 6,500	$ 3,500
Cost	13.30%	12%

Cost of Capita (65%*13.30%) + (35%*12%) 12.85%
Profit Sharing for User 28.40%
Investment: $ 10,000
Value Project of Termination on year 8 $ 3,500
GOI portion $ 1,225
Financier portion $ 2,275

($ thousand)

Cash Flow:	Year 0	Year 1	Year 2	Year 3	Year4	Year 5	Year 6	Year 7	Year 8
Total Inflow				2,000	2,500	3,000	3,000	3,500	3,500
GoI Profit Share		0	0	568	710	852	852	994	1,225
New Inflow		0	0	1,432	1,790	2,148	2,148	2,506	2,275
GoI Participation		0	0	501	627	752	752	877	-
GoI Profit Share		0	0	568	710	852	852	994	1,225
GoI Participation		0	0	501	627	752	752	877	-
GoI Inflow		0	0	1,069	1,337	1,604	1,604	1,871	1,225
Investment	(3,500)								
GoI Net CF	**(3,500)**	**0**	**0**	**1,069**	**1,337**	**1,604**	**1,604**	**1,871**	**1,225**

Net Present Value*	$ 1,048
Internal Rate of Return	18.31%

* 12% Discount Rate as opportunity cost

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APPENDIX E. COMPARISON OF MURABAHAH AND COMMERCIAL LOAN FINANCING

A. Current Practice

(I.D. thousands)

	Loan	GOI
Portion %	65%	35%
Portion I.D.	1,599.00	861.00
Cost	9%	12%

Annual Cost of Capital (65%*9%) + (35%*12%)		10.05%
Investment:	I.D.	2,460.00

Total Payment of Loan	2,233.35
Total Opportunity Cost of GoI	1,329.75
Total Payment*	3,563.10

* See Appendix 5 for more detail

B. Murabahah Financing

(I.D. thousands)

	Murabahah	GOI
Portion %	100%	0%
Portion I.D.	2,460.00	0.00
Cost	11.06%	0%

Annual Cost of Capital:	11.06%
Investment:	2,460.00

Total Payment of Murabahah	3,683.14
Total Opportunity Cost of GoI	0.00
Total Payment**	3,683.14

** See Table 4

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