Developing a Computer Simulation Based Approach to Simulate Potency of Islamic Voluntary Sector to Alleviate the Poverty in Indonesia Using System Dynamics Methodology

Dian Masyita (<u>dianmasyita@fe.unpad.ac.id</u> and <u>dianmasyita@yahoo.com</u>) *The Faculty of Economics, Padjadjaran University, Bandung, Indonesia*

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Abstract

This research tries to find out the potency of Islamic Voluntary Sector as financial instrument to alleviate the poverty in Indonesia. This research also tries to offer a computer simulation based approach design of the cash waqf fund management system and zakah fund as a part of Islamic Voluntary Sector in a system dynamics model. Using the system dynamics methodology, we try to know the structure of the cash waqf funds management system and simulate the behaviour of cash waqf and zakah fund.

Zakah and Cash Waqf fund are expected to become the alternative instruments for the poverty alleviation programs in Indonesia. These programs require huge amount of fund that cannot be provided thoroughly by the government. Therefore, development of the voluntary sector for such a program is inevitable. In the Islamic sosio-economic concept, there are some sources of social fund that are economically and politically free of charge, namely cash waqf and zakah, infaq and shodaqah. In this research we focus in Cash Waqf Management and Zakah fund. In these concepts, *Nadzir* collects the fund from *Waqif* and invest the money in the real sector (mainly Small & Medium-sized Ventures) and in any *syariah*-based investment opportunities and Amil also collects the fund from Muzzaki. Amil will distribute all of Zakah fund for Mustahiq and Nadzir will then allocate all profits and returns gained from the investments to any poverty alleviation programs to enhance the quality of poor people's life, such as free education and health service, cheap basic food, etc.

Not just like Amil, who is allowed to distribute all of zakah fund, *Nadzir* is obliged to maintain the amount of fund in such a way that it does not go below the initial amount. Therefore, *Nadzir* not only should be highly capable, but also needs a financial institution, which has been proven to be experienced, highly capable and effective in helping Micro and SMEs development efforts, since such a microfinancing program is considered as the most vital portfolio in the poverty alleviation program. Therefore, it's necessary to design an instrument which is able to control the cash waqf management.

Keywords: the cash waqf fund, zakah fund, portfolio investment, microfinance, poverty alleviation, system dynamics

1. Preface

Since the Indonesian poverty rate has been still discouraging, development the Islamic voluntary sector is a must in a country that has almost ninety percent Moslim. Based on the Indonesian Statistics Central Bureau (BPS)'s data, there are about 40 million Indonesian people who are under the poverty line.

Indonesia has come into debt trap made by the Indonesian government and the private sectors. Large amount of debt has weakened Indonesian economy for the past ten years. Meanwhile, the government has been confronted with the deficit budget almost every year since 1997, which means that the government may find it difficult to cover its routine expenditures. Those regular balance sheet items require so large amount of fund that government cannot provide adequate fund for other strategic needs, such as good education, appropriate health, poverty, and Micro & SME's development. Mismanagement of debts is the largest of all factors that make Indonesia go into crisis. Consequently, all of citizens and their offsprings have to carry the heavy burden of that debt.

2. Problem Identification

The potential sources of fund to the necessity of sufficient fund for public needs are a special endowment fund, cash waqf, and zakah from people's donation. People donate their money as cash waqf by purchasing cash waqf certificate. The gathered fund will be then invested in various investment portfolio and the profit of which can be spent for the above mentioned public necessities. The gained profit will also be used for funding poverty alleviation programs, while the principal of funds will be reinvested in various highly profitable investment opportunities.

Waqif donates his/her money as waqf fund to *Mauquf'alaih* (a person who is entitled to get benefit from waqf fund) through *Nadzir* (a person/an institution being in charge for managing waqf fund and distributing returns of waqf investment). Only gains of the invested waqf fund will be delivered to *Mauquf'alaih*. The principal of funds keep being invested in potential investment opportunities. In relation to its role as waqf fund investment manager, *Nadzir* on behalf of Waqf Institution may allocate some waqf funds to financial portfolio and finance Micro & SMEs' businesses on the basis of profit-loss sharing system. The larger the investment returns, the more fund can be allocated to poverty alleviation program. In some countries¹, waqf fund management has reduced poverty effectively and enhanced people's welfare, by providing additional fund for education & health development programs, cheap houses & public facilities development programs, and so forth. On the other hand, Muzzakki (person who are obliged to pay zakah because they have wealth or properties that are subject to zakah) donates his/her money as zakah fund to Mustahiq (rightful recipient of

¹Mannan, M.A.Abdul, Cash Waqf Certificate- an Innovation in Islamic Financial Instrument: Global Opportunities for Developing Social Capital Market in the 21stCentury Voluntary Sector Banking", Presentation at the Third Harvard University Forum on Islamic Finance, October 1, 1999

zakah because they are included as one of those mentioned in Al-Quran as the recipient of zakah) through Zakah Management Institution.

3. Objectives of Research

This research is expected to be able to find out the potency of the Islamic Voluntary Sector, expecially cash waqf and zakah, to alleviate the poverty in Indonesia. This research also tries to offer a computer simulation based approach of the cash waqf fund investment management system and the distribution of zakah fund in a system dynamics model. Using the system dynamics methodology, we try to study the structure of cash waqf management and zakah distribution system and then simulate the behaviour of them.

4. Research Metodology

This research used system dynamics methodology to capture dynamic phenomenon of a system, in which variables change simultaneously as time moves. The field of system dynamics began in 1956 at the Massachusetts Institute of Technology, Cambridge, MA, USA. Since that time, the concept of dynamics behavior and feedback systems have enhanced the understanding of social, economic, management and physical systems².

For the research purposes, some of previously researches support it. One of them is a survey on possible implementation of cash waqf in Jakarta and West Java (Masyita, 2001). The survey concluded that most people did not trust any existing government institution to manage cash waqf fund and control its investment activities, especially because cash waqf management will involve large amount of endowment funds. Most of them also recommend that if a special purpose institution is established to manage cash waqf fund, it has to be highly capable of detecting any potential dishonesty and assessing performance of cash waqf fund manager, i.e. *nadzir*. Therefore, it's necessary to design an instrument which is able to control the cash waqf management.

Based on the survey's result, using exclusively designed computer program then simulated some scenarios of cash waqf implemention to formulate some policy concepts applicable in Indonesia. The computer program was designed to help the policy makers (1) estimate cash waqf potential in alleviating poverty in Indonesia, (2) supervise performance of *nadzir* or waqf fund management institution, and (3) identify appropriate policies conducive to poverty alleviation programs (Masyita, 2005).

For cash waqf data purposes, since there was no similar study preceding the research, some assumptions were applied. The ability of three national TV corporations (RCTI, SCTV, and Indosiar) to collect donation amounting IDR 2 billions in two nights in 2000 and the other charity programs to collect donation in 2001-2005 were used as an assumption basis of amount of fund could be gathered by cash waqf management institution. This research also used data supplied by

² Forrester, Jay.W. (1968), "Principle of System." Wright-Allen Press, Inc

Biro Pusat Statistik Republik of Indonesia (National Beaurau for Statistics), *BKKBN* Republic of Indonesia (National Coordinating Agency for Family Planning) and *Islamic* Financial Institution. For zakah fund data purposes, the potency of zakah fund in Indonesia is obtained from some zakah institution historical data and predictions.

5. Limitation of Research

This research put more emphasived on financial management expecially for raising, investing of cash waqf fund and distributing of zakah fund. The duties of Nazir, as a cash waqf fund manager, are to increase the cash waqf funds and invest those funds in profitable portfolios. On the other hand, the duties of Amil, as a zakah fund manager, are to increase the zakah fund and distribute these funds to the appropriate Mustahiq. As we know, the poverty alleviation problems are complicated. However, they need multi and interdiscipline knowledge to formulate and figure out the solutions. With this research we want to try to make an early design of poverty alleviation program in the financial viewpoint using system dynamics modeling.





6. General Description of System Conceptualization

The system conceptualization involves establishing model boundary, identifying causal relationships and policy framework³. In this research the model boundary includes all relevant factors that are considered important in the problem context. The model comprises seven interrelated components in the voluntary sector management as shown as Figure 3.



Figure 3. A Macro-view of Model

As depicted in the above causal loop, the model links among the rich, cash waqf fund, zakah fund investment portfolios, investment profits, available funds for the poverty programs and the poor.

A general system of cash waqf model, derived from a macro-view of model above, consists of six sectors i.e:

1). The cash waqf & zakah fund raising sectors (the rich links to the collected-cash waqf funds),

2) The Islamic financial portfolios sectors,

3) The global fund management sectors,

4) The direct investment in large and medium scale enterprises,

5) The microfinance sectors.

(number 2,3,4,5 are investment portfolios which link to investment profits)

6) The distribution sectors of the profits of cash waqf investment. (Investment profits link to the poor through the poverty programs).

The Interrelationship among variables can be seen in Figure 4.

³ Sushil (1993), System Dynamics "A Practical Approach for Managerial Problems", Wiley Eastern Limited.



Figure 4. The Interrelationship among Variables in the General System

The interrelationship among the six sectors is described as follows :

1) The cash waqf and zakah fund raising sectors

The responsibilities of this sector are collecting the cash waqf fund from the waqif and then distributing them to the investment portfolios. The profits of the investment will be distributed to the poor through the poverty alleviation programs. At which the profits will be distributed depend on the waqif requests such as the education, infrastructure, family rehabilitation, public health & sanitation. At the same time, this sector also collects the zakah fund from muzakki. Different than cash waqf, the zakah fund is directly distributed to the poor.

In the cash waqf raising sectors, there is several causal relationship among the rich, who have the potency as a waqif, the gathered cash waqf fund, the invested funds to various portfolios, and the gained profits from investment which will be distributed to the poor. (see figure 5a and 5b).



Figure 5a. Causal loop of The Cash Waqf & Zakah Fund Raising



Figure 5b. Flow Diagram of The Cash Waqf Fund Raising

2) The Islamic financial portfolios sectors

The responsibilities of this sector are investing the cash waqf efficiency and effectively. The gathered cash waqf will be then invested by Nazir, a fund manager, in Islamic financial portfolios. The structure of Islamic banking and finance is firmly rooted in the Qur'an and the teachings of Muhammad which is

called a Islamic Law⁴. Islamic Law has derived from revealed text a web of interrelated norms prohibiting interest-taking and undue speculative practices.

Generally, these portfolios are divided into four kinds i.e a). Islamic mutual funds, b). Islamic Capital Market, c). Islamic Banking Products (Mudharaba Deposits), d) Islamic Bonds (sukuk). All of them are issued by Indonesian financial institutions.

The gained profits will be distributed to meet the poor's basic needs and increase the quality of the poor's life. Meanwhile, the principal keep being invested in potential investment opportunities. (see Figure 6a and 6b).



Figure 6a. Causal loop of The Islamic Financial Portfolios

⁴ Frank E.Vogel and Samuel L.Hayes III (1998), Islamic Law and Finance "religion, risk and return." Published by Kluwer Law International.

Islamic Financial Portfolio Sector



Figure 6b. Flow Diagram of of The Islamic Financial Portfolios

3) The global fund management sectors

The responsibilities of this sector are to invest the cash waqf fund in the global financial portfolios as known a global funds management such as Amanah Fund, Lariba Fund, Islamic Indices, etc. A fund manager should choose the portfolios not only high return but also safety. The better Nazir choose the investment portfolios, the higher profits will be gained and the more funds will be acquaired by the poor.

The principal then will be reinvested in various highly profitably investment opportunities. (see Figure 7a and 7b)



Figure 7a. Causal loop of the global fund management portfolios



Figure 7b. Flow Diagram of The global fund management portfolios

4) The direct investment in large and medium scale enterprises

A cash waqf fund manager, Nazir, allocates the gathered funds to the big companies in the forms of stocks which the gained profits are dividends or capital gains. The nature of this sector is the long term. The other forms of direct investment are building the new waqf buildings and maintaining the existings waqf assets either for social projects or the commercial projects. (See Figure 8a and 8b.)



Figure 8a. Causal loop of the direct investment to real sectors



Figure 8b. Flow Diagram of the direct investment to real sectors



Figure 8b. (continue...) Flow Diagram of the direct investment to real sectors

5) The Microfinance Sectors

The microfinancing programs, which used the loss-profit sharing, are one of the most important sectors for poverty alleviation. Most of funds collected through cash waqf certificate issues will be allocated as loan for microenterprises. This microcredit program should particularly be aimed at helping poor people initiate their business and enhance their quality of life, accordingly. Nevertheless, merely supplying them with capital is not sufficient, since most of them do not have adequate knowledge and skill to choose and to run a business that is suitable to their condition. Consequently, relevant business technical assistance and spiritual treatment is needed to help them survive⁵.

Family's business activities have significantly influenced economy of a community, particularly in developing countries. Big manufacturing companies indeed dominate mass production processes, both for goods and services, but most of enterprises are initiated by family. In addition, family's consumption behaviour also affects production and marketing activities, as well as other business activities.

Government's programs for family business empowerment has to do with informal sector development efforts, as most of family businesses are operated in non formal format and business system. Family businesses, which absorb the largest number of employee, are also found mostly in small and medium scale. In most developing economies, these small and medium enterprises (SMEs) have limited access to formal financing practices, as well as to adequate government's technical assistance. (see figure 9a and 9b)

⁵ Muljawan, Dadang and Masyita, Dian et al. (2006), "*The Pilot Project of Linkage Program for Sharia Financial Institution in Indonesia*". Bank of Indonesia report.



Figure 9a. Causal loop of The Microfinancing Sectors



Figure 9b. Flow Diagram of The Microfinancing Sectors

6) The profits of cash waqf investment & zakaf fund distribution sectors The gained profits from the various portfolios will be distributed to the poor through the poverty alleviation programs such as basic needs, health services, sanitations, education, natural disasters victims, etc. The principal of cash waqf will be reinvented to various portfolio opportunities. On the other hand, the zakah fund collected by Amil is directly distributed to the poor through the poverty alleviation programs such as basic needs and natural disasters vistims. (see figure 10a and 10b).



Figure 10a. Causal Loop of the cash waqf profits & zakah fund distribution sectors



Figure 10b. Flow Diagram of the cash waqf profits & zakah fund distribution sectors

7. The Cash Waqf Management Control

Since the zakat is considered as the buffer against the poverty, all of the zakat fund will be directly distributed to the poor. Therefore, Amil (a person or body or organization that are specialized in managing zakah, infaq, and shadaqah) is allowed to spend all of the zakah funds to the mustahiq. Contrary to zakah, the cash waqf fund must be maintained in such a way that it does not go below the initial amount.

The survey concluded that most people did not trust any existing government institutions to manage cash waqf fund and control cash waqf investment activities, especially because cash waqf management will involve large amount of endowment funds⁶. Most of them also recommend that if a special purpose institution is established to manage cash waqf fund, it has to be highly capable of detecting any potential dishonesty and assessing performance of cash waqf fund manager, i.e. *nadzir*. Therefore, it's necessary to design an instrument which is able to control the cash waqf management. This model tries to design a control tools which is able to detect the human error in decision making either mismanagement or dishonesty quickly. (see figure 11.)



Figure. 11 Flow Diagram of The Control Function for Fund Management

⁶ Masyita, Dian (2001), Preliminary Implementation Model Design of Cash Waqf Certificate as Alternative Instrument for Poverty Alleviation in Indonesia using System Dynamics Methodologi, Thesis, ITB

The collected cash waqf fund from the waqif will be distributed to the various portfolios and then the usage will be controlled periodically. The early warning system will be prepaired by the system in order to the amount of cash waqf fund will not go below the initial amount. It is the difference of the cash waqf from the other sources of funds. Gold standard can be used as the currency standard because of its stability. (see figure 11a-d).



Figure 11a. The simulation result (short term)



Figure 11b. The Simulation result (short term)





Figure 11d The Simulation Result (long term)

The waqif and public can control or monitor the cash flow of cash waqf investment. If mismanagement and dishonesty occurred, the simulation result could demonstrate the deviation. (see figure 11e-f)



Figure 11e. The Simulation Result (short term)



Figure 11f. The Simulation Result (long term)

8. The Potency of Cash Waqf & Zakah Fund for the Poverty Alleviation Programs

It can be concluded from the system that the larger the amount of cash waqf collected, the larger the amount of fund can be invested in highly costeffective profit sharing-based portfolios, and the larger the amount of return can be distributed to poor people. The more fund allocated to finance microbusiness, the sooner poverty in Indonesia can be alleviated. (see Figure 12).

According to the result of some researches, the potency of zakah fund in Indonesia is approximately Rp 19,3 trillion/year⁷. In this model the potency of zakah fund, combined with the profit of cash waqf investment, will become the sources of fund for the poverty alleviation programs in Indonesia.

⁷ CSCR Research (2006), "Islamic Philanthropy and Social Development in Contemporary Indonesia", University Islam Negeri (UIN) Syarif Hidayatullah, Jakarta



Figure 12. Flow Diagram of The Potency of Cash Waqf & Zakah Fund for The Poverty Alleviation

9. The Simulation Result

In a system dynamics modeling process, the initial value and unit variables/parameter are the most important components to build the mathematical equations for the level, rate and auxiliary equation. In this research, the initial value and unit variables/parameter for the flow diagram shown in table 1 are as follows:

Variables	Initial Value and Parameter	Measurement	Estimation Methods ⁸
Growth_rate of cash waqf	0.0007	/day	Q
Cash_Waqf	50.000.000	Rupiah/ray	Q
Cash_Waqf_Mgt	0	Rupiah	Q
Collecting_period (cash waqf)	30	Days	Q
Potency of Zakah Fund	40 billion – 50 billion	rupiah/day	
Current_price_of_gold	90.000.000	rupiah/kg	S
Population_growth	0.000041944444	/day	S
the_rich	49.405.842	Person	S

Tabel 1 Initial Value and Main Variable Parameter

 $^{^{8}}$ note : P = derived from primary data S = derived from secondary data

Q = derived from qualitatif information C = predicted by researcher based on another parameter

the poor	37 027 472	Person	S
Pra welfare people	128.842.686	Person	S
Average period to become welfare	1800	Dav	0
lifetime expectancy	23881.95	Day	S
Inflation	7.32%-12%/year (graph)	/day	S
Adjust to Social Projects	10%-40%/year (graph)	/day	0
Company rate of return	15%-18% year (graph)	/day	S
Min Reg Return	5%-8%/ year (graph)	/day	0
Rental Price (waof land)	200.000 - 1.000.000	Rp/hectare/day	0
Return Islamic Mutual Fund	-8% - 30%/year (graph)	/day	S
Return of Agricitr	25% - 32%/year (graph)	/day	0
Return of Deposito	4%-18% /year (graph)	/dav	S
Return of Global Fund	7%-33% /year (graph)	/dav	S
Return of Islamic Bonds	12%-17% /vear (graph)	/dav	S
Return of Islamic Stocks	-8% - 45%/year (graph)	/day	S
Return of Microfinancing	0%- 15% /vear (graph)	/day	S
Return of Waaf Building	10%-30% /vear (graph)	/day	0
Return Real Estate	25%-31%/vear(graph)	/day	0
Rtrn Commercial Pricts	36% / year	/day	0
minimum ROI	25%/year	/day	0
Age of Wagf Prodctvtv	7200	/day	0
Investment periode (Islamic Finance)	360	/day	0
Time to Direct inv (company)	1080	/day	0
Microcredit for a poor	5,000,000	runiah/nerson	0
Microfinace Period	360	Dav	Q 0
Multiplier_effect (pra welfare)	45	person/family	S
Multiplier Effects (the poor)	5.8	person/family	S
Min Rtrn MK	3% / year	/day	S
Comcl Projets inv Periode	10800	Day	S
Waaf Land Availability	50000	Hectare	0
Education cost	2000	Rp/person/day	S
Family Rehbilitation Cost	2000	Rp/person/day	S
Healthy cost	1000	Rp/person/day	S
Infstructure Cost	1000	Rp/person/day	S.
Living cost	7496.733333	Rp/person/day	S.
Natural Disaster Cost	1000	Rp/person/day	0
Build New Waaf Assets	0	Rupiah	0
Needs ratio 1 (living cost)	0.513	-	0
Needs ratio 2 (healthy)	0.4143	-	0
Needs ratio 3 (education)	0.513	-	0
Needs ratio 4 (rehabilitation)	0.33	-	0
Needs ratio 5 (disasters)	0.10	-	0
Needs ratio 6 (infrastructure)	1	-	0
allocation ratio 1 (living cost)	0.15	-	0
allocation ratio 2 (healthy)	0.2	-	0
allocation ratio 3 (education)	0.3	-	0
allocation ratio 4 (rehabilitasi)	0.2	-	0 0
allocation ratio 5 (disaster)	0.1	-	0
allocation_ratio_6 (infrastruktur)	0.05	-	Ò

Since there has been no similar study preceding the research, some assumption were applied. The ability of five national TV corporations (RCTI, SCTV, Indosiar, MetroTV and Lativi) to collect donation amounting IDR 3

billions in two nights in 2003 was used as an assumption basis of amount of fund could be gathered by cash waqf management institution. Another assumption came from the research which was conducted by PIRAC about Philanthropy in Indonesia.

It was then assumed that the cash waqf institution could obtain IDR 50 millions a day in form of cash waqf from various components of Indonesian people. The study also assumed that the gathered fund would grow 25% annually and it would be invested in Islamic financial products with profit sharing- based various rate of return.(see figure 13).



Figure 13. Rate of return of Cash Waqf Investment Portfolio

Using the above assumption and data supplied by Biro Pusat Statistik (*National Beaurau for Statistics*), BKKBN (*National Coordinating Agency for Family Planning*) and syariah financial institution in Indonesia, the computer-based data process resulted in approximation of cash waqf investment return 25% annum. Such an amount of fund is expected to be available for the poverty alleviation efforts in Indonesia, especially through microfinance distribution program. If this plan can be implemented smoothly and if those assisted micro enterprises can get well run maximum of 5 years after being financed, it will take approximately 55 years to eliminate poverty. Based on the study result above and various scenarios proposed, if the gathered fund through cash waqf certificate increase i.e. IDR 100 million in a day , it will take approximately 48 years to eliminate poverty with the assumption the others parameter constant (see figure 14a). Poor people, in this study, are those with very low quality of life. In other words, poor people are not only those who cannot feed once a day, but also those who cannot afford proper health and education services.



Figure 14a. The Simulation Result (based on IDR 50 million a day for line 1-3-5 and IDR 100 million a day for line 2-4-6)

Based on various scenarios, if the cash waqf fund combined zakat fund simultantly are used for poverty alleviation program, it will able to make the great significant impact to the poor. It will consume less time to alleviate poverty. (see figure 14b)



Figure 14b.The Simulation Result (based on the combination of cash waqf and zakah fund simultantly)

10. Closing

Based on the above study result and various scenarios proposed, zakaf fund as a buffer against poverty and cash waqf fund as a motor of economy must jointly implemented for poverty alleviation program in Indonesia. Some microfinance management strategies were then carefully formulated to ensure the achievement of poverty alleviation goals on the other side.

Most of funds collected through cash waqf certificate issues will be allocated as loan for microenterprises. This microfinance program should particularly be aimed at helping poor people initiate their business and enhance their quality of life, accordingly. At the same time zakaf fund will protect them from the poverty trap. Nevertheless, merely supplying them with capital is not sufficient, since most of them do not have adequate knowledge and skill to choose and to run a business that is suitable to their condition. Consequently, relevant business technical assistance and spiritual treatment are needed to help them survive. Hence, the integration and strong commitment among Board of Indonesian Waqf (BWI), BAZNAS, Microfinance Institutions, Business Technical Assistance Provider, government and citizens for the poverty alleviation program are the most important agenda.

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