The Impact of Micro Credit on MSME (Micro, Small, and Medium Enterprise) Optimization to Support the Economic Growth

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Abstract

MSME empowerment is an effort to strengthen Indonesia Economy and to catalyze domestic economic growth. It has been proven by the importance of the MSME sector as an economic safety net especially in the time of a persistent crisis. In 2003, MSME has reached 30, 4% of PDB and increase by 53, and 3% of PDB to Rp 1.778 trillion in 2007, such significant value to economic growth. One of the constraints faced by MSME is limited capital funding accessibility. Business credit's difficult to gain because the complexity of terms and condition. Based on this condition, in 2007 Indonesian government provide micro credit, type of credit/funding that applicable to MSME in the form of business capital and investment supported by guarantee facility for productive enterprise. This paper aimed to analyze the impact of Micro credit on MSME optimization during 2007-2009.

Keywords: micro credit, economic growth

1. Introduction

MSME empowerment is an effort to strengthen Indonesia Economy and to catalyze domestic economic growth. It has been proven by the importance of the MSME sector as an economic safety net especially in the time of a persistent crisis. In 2003, MSME has reached 30, 4% of PDB and increase by 53, and 3% of PDB to Rp 1.778 trillion in 2007 (BPS data), such significant value to economic growth.

To the end of 2006, total unit of MSME in Indonesia reach 48,8 million. However, from that total amount, only 39,06% or 19,1 million unit obtain banking credit. The remaining, 29,7 million unit have not been obtain banking credit. In fact, 90% of 48,8 million unit consist of Micro Business in the form of household business, street vendor, and others type of any informal business which mostly absurb labour and capable for amelioration of public welfare (pro poor).

One of the biggest problem facing by MSME is capital limitation. If the capital must gain from bank, MSME not have credit guarantee. Since MSME already feasible but had not been bankable, Government's effort needed to solve banking difficulties in deliver credit to MSME. Indonesian Banks were force to apply risk management based on international best practice which uncompatible with MSME condition especially macro economic condition in Indonesia.

Considering those condition, in 2007 Indonesian Government issued act no.6 of 2007 concerning policy of acceleration and development of real sector and MSME empowerment followed by MoU among technical department, banks, and guarantee companies which signed on October 9, 2007 marked by launching of MSME credit guarantee/funding. Finally, on september 5, 2007, the president of the republic of Indonesia, Susilo Bambang Yudhoyono declared credit for MSME with those guarantee design called Micro Credit (Kredit Usaha Rakyat = KUR). These policy of credit guarantee is expected to serve wider access for MSME. The end-all of micro credit is economic development, Poverty alleviation, and labor absorption.

This research is aimed to describe micro credit implementation within 2007 to 2009 and its impact to economic growth especially related to absurb employment.

2. Micro Credit (MC)/Kredit Usaha Rakyat

Micro Credit is credit/funding for MSME in form of work capital dan investment supported by guarantee facilities for productive business.

Micro Credit is declared program from the government but fully funding supported by bank. Government serve guarantee for micro credit risk amounted to 70% and the remaining, 30% is responsible by bank. Micro credit guarantee serve in order to enhance MSME access to source of funding to galvanize national economic growth. Micro credit distributed by 6 banks namely Mandiri, BRI, BNI, Bukopin, BTN, and Mandiri Sharia (BSM).

2.1 Micro Credit (MC) Scheme

Micro credit is credit of work capital or investment credit with credit caps reach until 500 million rupiahs, delivered for productive MSME that would gain guarantee from guarantee company. In order to gain micro credit, MSME must be productive and feasible but had not been bankable. Micro credit require funding projects as the principal collateral of credit. However, since the additional collateral owned by MSME is less, then guarantee program handed over some of those collateral. Guarantee coverage maximum amounted to 70% from collateral credit. Source of Micro Credit funding fully owned from comercial bank.

At the beginning of its launching on November 5, 2007, micro credit scheme have one type of collateral credit which only reach until 500 million rupiahs. However, in the middle of its implementation, the President of the Republic of Indonesia steer the micro credit to led to micro consumer with collateral maximum to 5 million rupiahs. Finally, on may 7, 2008 in coordination meeting lead by economic minister, a MoU concerning micro credit and micro credit linkage program successfully signed. The three type of those micro credit translated by one of the bank that provided micro credit as follows:

Table 1. MC Rules until Rp. 500 Million

Explanation	Rules
Debitor Applicant	Individu (an Individual/corporation body), Group. Cooperation what've proper productive enterprises
Work Duration	Minimum 6 month
Credit Platform	Maximum Rp 500 million
Credit Form	Working Capital Credit go down Max 3 years Investment Credit go down Max 5 year
Rate of Interest	Effective Max 16% pa
Licensing	Until Rp 100 million : SIUP, TDP & SITU or Statement letter from village chief ➢ Rp 100 million : must SIUP or in conformity with the regulations.
Legality	Individual : Identity Card (KTP) and Family Card (KK) Group : statement letter from related instance or village chief Cooperation/another corporation body : in conformity with the regulation
Explanation	Rules
Guarantee	Principal: both of capital working and investment credit are the enterprises fund. Addition: not have to do

Table 2. MC Rules until Rp. 5 Million

Explanation	Rules
Debtor Applicant	Individual what've proper productive enterprises.
Work Duration	Minimum 6 month
Credit Platform	Maximum Rp. 5 million
Credit Form	Working Capital Credit or Investment Credit go down Max 3 years
Rate of Interest	Effective Max 1,125% flat rate/month
Provision and Administration	Not charged
Legality	Identity Card (KTP) and Family Card (KK)
Guarantee	Principal: Both of MC Working capital or MC Investment is a formation cost. Project defrayal that's proper cash flow. Addition: not have to do

Table 3. MC Linkage Program

Explanation	Rules
Debtor Applicant	BKD, KSP/USP, BMT & LKM and not in arrears.
Work Duration	Minimum 6 month
Credit Platform	- Maximum Rp. 500 million - Debt to end user maximal Rp. 5 million
Credit Form	Working Capital Credit go down Max 3 years
Rate of Interest	Effective Max 16% pa
Explanation	**Rules**
Provision and Administration	Not charged
Legality	- Statutes/post-secondary law - Business admittance Certificate - Active board
Guarantee	Principal: Both of MC Working capital or MC Investment is a formation cost. Project defrayal that's proper cash flow Addition: not have to do

2.2 Guarantee Scheme of MSME's Credit

Micro credit as a model of assurance credit that have allocated by government capital enclosing left to Assurance Company. Indonesian government as the carrying out of technical program department (agriculture, commerce, cooperation and MSME, forestry, naval and fishery) that channeled micro credit to MSME pass through BRI, BNI, Mandiri, Bukopin, BSM, BTN bank. The assurance companies are Perum Jamkrindo and PT. Askrindo.

Credit guarantee's automatically conditional (risk sharing: Bank 30%, Government 70% through assurance company). Assurance claim consist of: - 70% x outstanding debt x interest x penalty to 3 months after the credit. – Max 70% x credit platform.

2.3 Micro Credit Progress

The realization of micro credit channelization from December 2007 to December 2009 based on creditor can be seen at the following table:

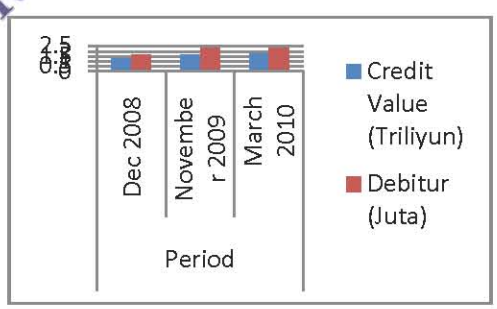
Table 4. The Realization of Micro Credit Channelization

NO.	BANK	CREDIT VALUE (Million Rp)	%
1	BRI	12.841.108	74,70%
2	MANDIRI	1.505.677	8,76%
3	BNI	1.527.861	8,89%
4	BTN	263.341	1,53%
5	BSM	381.979	2,22%
6	BUKOPIN	669.348	3,89%
	TOTAL:	17.189.314	100,00%

Source: Economic coordinator minister, data proceeded.

From Table 4, we can see that micro credit realization period December 2007 to December 2009 as Rp 17.2T with government contributed capital as 2T. A percentage majority of micro credit channelization as 74,70 % have been made by BRI bank. As the greatest bank of micro credit channelization, give evidence that BRI constant giving the services to small society which focused micro credit channelization to MSME.

Based on the data from ministry of coordinator economy, micro credit Realization in December 2007 to December 2009 can be seen at the following graph:



Graphic 1. The Micro Credit Realization (December 2008 to March 2010)

The realization of micro credit period December 2008 as Rp 12624.1M for 1,671,630 debtor whereas period November 2009 as Rp 16450.3M for 2,301,575 debtor that increase as Rp 3826.2 M (30,3%) and 629,945 debitor (37,7%). The Last data in March 2010, the realization micro credit channelization's Rp 17818.3 M for 2,345,478 debitor. The micro credit's enhancement from November 2009 to

March 2010 as Rp 1368 M (8,3%) and Debitor's enhancement as 43,903 (1,9%).

The mc's channelization period December 2007 to March 2010 based on province can be seen at following table :

Table 5. Total Debtor and Credit Value Based on Province (December 2007 to March 2010)

NO.	PROVINCE	DEBITUR (UNIT)	CREDIT VALUE (MILYAR)	CONTRIBUTION (%)
1	DI Aceh	53.880	575,00	3,23
2	Sumatera Utara	100.611	1.035,08	5,81
3	Sumatera Barat	45.527	400,85	2,25
4	Riau	34.861	612,52	3,44
5	Jambi	38.255	346,54	1,94
6	Sumatera Selatan	56.722	717,13	4,02
7	Bengkulu	19.026	175,01	0,98
8	Lampung	49.229	486,27	2,73
9	DKI Jakarta	54.171	862,17	4,84
10	Jawa Barat	334.036	2.033,87	11,41
11	Jawa Tengah	498.817	2.555,02	14,34
12	DI. Yogyakarta	50.962	275,93	1,55
13	Jawa Timur	423.662	2.469,51	13,86
14	Kalimantan Barat	26.999	412,14	2,31
15	Kalimantan Tengah	21.866	185,12	1,04
16	Kalimantan Selatan	52.404	604,77	[illegible]
17	Kalimantan Timur	40.003	342,72	[illegible]
18	Sulawesi Utara	38.070	314,68	[illegible]
19	Sulawesi Tengah	41.660	288,07	1,62
20	Sulawesi Selatan	132.686	1.053,22	[illegible]
21	Sulawesi Tenggara	11.638	131,71	[illegible]
22	Bali	64.086	429,03	[illegible]
23	Nusa Tenggara Barat	36.535	230,56	[illegible]
24	Nusa Tenggara Timur	25.976	208,69	[illegible]
25	Maluku	11.505	159,97	[illegible]
26	Papua	14.994	246,85	[illegible]
27	Kepulauan Riau	[illegible]	92,28	[illegible]
28	Bangka Belitung	2.450	[illegible]8,04	[illegible]
29	Maluku Utara	[illegible]1.448	[illegible]3,29	0,05
30	Banten	[illegible]37	[illegible]42,85	1,92
31	Gorontalo	6.830	[illegible]7,60	0,27
32	Sulawesi Barat	9.046	[illegible]0,70	0,45
33	Papua Barat	[illegible]	[illegible]50,17	0,28
	TOTAL:	[illegible]15.478	17.818,33	100,00

Sources: PT. Askrindo & Perum Jamkrindo.

Table 5 describes mc channelization in each province at Indonesia. The majority mc absorption still resides in Java. The largest mc in middle java as 14,34%. MC realization in March 2010 attained Rp 17.818,33 M with total debitor 2.345.478 unit or the average mc/debitor as Rp. 7.60 million.

3. Research Design

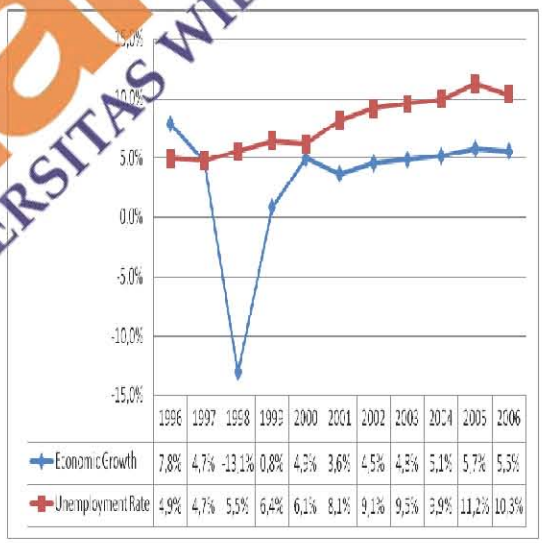
3.1 Research Methodology

Researcher used descriptive method in this paper. According to Jalaludin Rakhmat (2004:24) Descriptive method only describes the situation or phenomenon not looking or explaining the correlation, the hypothesis testing, or making prediction.

For collecting data, the researcher used: literature research: find the literature and theory about micro credit and Field research through interview and observation with the relevant parties in micro credit realization.

3.2 Relationship Economic Growth, Unemployment, Micro Credit

From The Center of Statistic Bureau (BPS), Economic growth and unemployment data for period 1996 until 2006 can be seen as Graph follow:



Graphic 2. Economic Growth Fluctuation

The graph shows fluctuation in economic growth in the period 1996-2006, notably before 2001. It does very fluctuate. From data in 2001 until 2006, the tendency of economic growth's increase.Open unemployment rate from 1996 to 2006 shows on the rise tendency.

The relationship between economic growth and unemployment rate in the graph above indicate that the progression tendency of

economic growth's followed on the rise of unemployment rate. That's mean, the hypotheses which is says the increase of economic growth causes unemployment rate to go down doesn't proven to be. One of causal presumptive is the work equipments based on capital intense technology's used by economic sectors tended to increase. Consequently it's not support the labor absorption beside the effect of work disconnection's caused by monetary crisis in 1998.

Micro Credit channelization could help Micro, Small, and Medium Enterprise to get fund in their business. Since MSME already feasible but had not been bankable, Government's effort needed to solve banking difficulties in deliver credit to MSME. With this facility, it'll be increasing total MSME. The increase of total MSME means the work opportunity extension and economic growth/gross domestic product tended to increase.

4. Implication/Result

4.1 The Contribution of Micro Credit Channelization Concerning Labor Absorption Based on Province

Micro Credit channelization's the impact to labor absorption. We can see that contribution in the following table:

Table 6. The Contribution of Micro Credit Realization toward Labor Absorption by Province (Dec 2007 to March 2010)

No.	Province	Credit Value (MILYAR)	Labor Absorption	Contribution (%)
1	D.I Aceh	575,0	129858	2,4
2	Sumatera Utara	1035,1	290275	5,3
3	Sumatera Barat	400,8	115411	2,1
4	Riau	612,5	90769	1,7
5	Jambi	346,5	131933	2,4
6	Sumatera Selatan	717,1	210537	3,9
7	Bengkulu	175,0	68506	1,3
8	Lampung	486,3	194543	3,6
9	DKI Jakarta	862,3	91563	1,7
10	Jawa Barat	2023,9	613018	11,3
11	Jawa Tengah	2555,0	1168365	21,5
12	D.I. Yogyakarta	275,9	106616	2,0
13	Jawa Timur	2469,5	1067859	19,6
14	Kalimantan Barat	412,1	37312	0,7
15	Kalimantan Tengah	185,1	32183	0,6
16	Kalimantan Selatan	604,8	73059	1,3
17	Kalimantan Timur	342,7	57923	1,1
18	Sulawesi Utara	314,7	75245	1,4
19	Sulawesi Tengah	288,1	122703	2,3
20	Sulawesi Selatan	1053,2	234885	4,3
21	Sulawesi Tenggara	131,7	29451	0,5
22	Bali	429,0	167798	3,1
23	Nusa Tenggara Barat	236,6	80110	1,5
24	Nusa Tenggara Timur	208,7	64344	1,2
25	Maluku	160,0	23276	0,4
26	Papua	246,8	36904	0,7
27	Kepulauan Riau	92,3	15638	0,3
28	Bangka Belitung	38,0	9287	0,2
29	Maluku Utara	8,3	2792	0,1
30	Banten	342,9	57895	1,1
31	Gorontalo	47,6	11392	0,2
32	Sulawesi Barat	80,7	16941	0,3
33	Papua Barat	50,2	10904	0,2
	Total	17818,3	5439295	100,0

Source: Ministry of Coordinator Economy, data Proceeded.

From the table above, we can see the role of micro credit channelization towards the labor absorption. The micro credit realization as 17, 82 T could absorb 5.4 million people. Its means each Rp3.2 million micro credit channelization could absorb 1 labor.

4.2 Contribution of Realization Micro Credit toward Labor Absorption to MSME

The First time micro Credit channelization have bean done at 5 November 2007. How big contribution micro credit channelization toward labor absorption can be seen at Table 7:

Table 7.Contribution of Realizations Micro Credit toward Labor Absorption (Nov 2007 to March 2010)

Period	Labor Absorption	Contribution (%)
Nov-Dec 2007	10469	0,19
2008	2012847	37,01
2009	2518215	46,30
Jan-Mar 2010	897.764	16,51
Total	**5.439.295**	**100,00**

Source: Perum Jamkrido, data pProceeded.

Based on that table, we can see a labor enhancement significantly. Contribution of labor absorption in 2008 as 37.01% rise in 2009 as 46.30 %. Total labor absorption from that period as big as 5.4 million.

From BPS Data, in 2008, MSME afford the labor absorption as 90.896.270 labors or as 97.04% from the totality of labor absorption aught. This number increase as 2.43% or as 2,156,526 labors than that of 2007. It means the labor absorption at 2008 as 2,156,526 labors as a consequence micro credit channelization that absorbs the labor as 2,012,847 labors (93.3%)

5. Conclusion

The micro credit realization in period December 2007 until March 2010 considered exceed at first business plan. Because It already extend to 2.35 million total MSME and labor absorb until 5.44 million people or capable to give a life to 30.4 million Indonesian people. (Assumed: 2.3 million totals MSME and 5.3 million labors have 1 wife/husband and 2 children)

Micro credit's non-performing loan (NPL) in August 2009 according to ministry of cooperation and MSME as 5,82%. If NPL's prediction got up to 10% and subscribed capital in guarantee company used up, so this program considered success, because the fail's only 10%, 90% MSME success which is able to improve their business capacity and directly or indirectly can be able to increase economic growth.

There's something important to watch in table 5 that the dissemination of micro credit is still concentrated in Java. In this case has to be noticed, so it's even distribution in the other region/province. In such a way that labor absorption's increase in the poor region.

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Cooperative Decision on a Small Business Product Development

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Abstract

Decisions for multi person on product development are very complicated since many parties involved. Where a number of stakeholders are involved in choosing a single alternative from a set of solution alternatives, there are different concern caused by differing preferences, experiences, and background. Therefore, a support system is required to enable each stakeholder to evaluate and rank the solution alternatives before engaging into negotiation with the other stakeholders. Function and cost as value criteria is one of the most important key success factors. Value will be an important competitive advantage for small business. Coalition formation was presented in a logical manner and in the form of a mathematical model. It consists of the process of identifying agreement options, analysis and coalition formation. The objective was attained by model of satisfying game as a basis for two main preferences of value which are function and cost and provide a set of analysis on cooperative game theory to get an algorithm of coalition for agreement option The results demonstrate a process to select priorities of product development in the business process.

Keywords: cooperative, decision, small business, product, value.

1. Introduction

In the context of strategic management, competitive advantage of a business depends on the value of product business. For a small business, low price by cutting cost is not the best strategy. The survival of the fittest for this business is value. How product will be designed, produced, and marketed is based on how business can identify unnecessary cost and basic function of the product. This concept is called Value Management (VM). It is a structured and analytical process that seeks to achieve value by identifying all necessary functions at the lowest cost, while maintaining with the required levels of quality and performance (SAVE International, 2001). VM will also drive business strategy in two ways which are resource based view by target costing and competition by lower cost in appropriate function of product. It also means that VM identifies and eliminates unnecessary cost based on function analysis (Mukhopadhyaya, 2003). Unnecessary cost is the nature in a product development. VM has been widely adopted in many countries over several decades as a very effective tool to meet the increasing demands for value enhancement by clients (Shen and Liu, 2004). Value-based decision is an effort of VM process. It improves the value of a product through identifying opportunities to remove unnecessary costs.

As a process involving multi disciplines and teamwork, negotiation becomes an important role in the value-based decision process of a component or an element of a product. Many researchers suggested applying Game Theory in negotiation support system (NSS) (Morge and Beaune, 2004; Matsatsinis, et al., 2005). However, NSS model for VM processes has not been developed. The characteristic of value criteria cannot be applied to previous research and practice. This research applies the satisfying game method where function and cost of solution techniques as value criteria can be formulated on coalition algorithms for cooperative decision.

Small business display an increasing awareness of sustainability but invariability assumed a level of technical sustainability and concentrate on economic and social sustainability. The decision can more effectively align the operation and performance evaluation with user expectations and economic imperatives. Therefore value should be the main consideration when choosing a solution

2. Theoretical Background

2.1 Value-based Decision

Kirk, Turk and Hobbs (2007) describe value based as a new approach involves using a multidisciplinary team. Real-time decisions are reached using value-based methods in a team setting: function analysis, quality modeling, group creativity/innovation techniques, life-cycle costing, design/cost simulation modeling, and choosing by advantages (Kirk and Garreett, 2007). Crow (2007) argued that the meaning of value may be open to interpretation but generally the value of product will judged on some factor such as a high level of performance, capability, emotional appeal, style, etc. relative to its cost. This can be expressed as: Value= Function/Cost.

Many researcher (Kelly, Male and Graham, 2004) believe that value analysis is a powerful problem solving tool that can reduce cost while maintaining or improving performance requirements. Value analysis is not concerned with simply minimizing cost. It is possible to increase the value of a product by increasing its function even when this results in greater cost, provided that the added function increases more than the additional cost. This leads to the concept of functional worth, which is defined as the lowest cost to provide a given function (Kaufman, 2001). Value-based decision allows an understanding of the relationship between functions of a product and purpose of their existence to be developed. This analysis will also take as parameters items such as the estimated costs, estimated complexity of the solution, and assessments of the risks involved in developing and producing the product solution.

2.2 Cooperative Game

Cooperative game theory concepts have been used, but they were suited to decentralized multitask environment (Klusch and Shehory, 1996). Cooperative games are often defined in terms of a characteristic function which specifies the outcomes that each coalition can achieve for itself. Total utility that a coalition can divide specify outcomes of some games (transferable utility).

A cooperative game consists of two elements which are first, a set of player N = {1,2,…, *n*}. Members of *N* run from 1 to *n*. The second is a characteristic function specifying the value created by different subsets of the player in a game. The characteristic function is a function denoted *v* that associates with every subset *S* of *N*, denoted *v*(*S*). In a cooperative game, it is a pair (*N*,*v*), where *N* is a finite set and v is a function that maps subsets of *N* to members.

2.3 Coalition and Characteristic Function

Decision makers may choose to cooperate by forming coalitions. Coalition is formed in order to benefit every member of the coalition so that all might receive more than they could individually on their own. Coalition has been used in many researches in negotiation (Kraus, 2001) and cooperative games such as Contreras (1997) for transmission planning in power system, Zarour and Bouzidi (2006) for cooperative information agent-based systems, Wanyama (2006) for COTS selection, and Soh and Tsatsoulis (2002) who proposed a coalition approach that identifies and builds sub optimal yet satisfying coalitions.

Since there are 2^n possible subsets of *N*, there are 2^n possible coalitions. If *N*={1,2} or coalitions with two members, the possible coalition are 2^n = {0,1,2,1-2}. In every coalition there is empty coalition that is a coalition made up of no members (the null set ϕ) and a grand coalition *N* consisting of all the players (Kelly, 2003). The benefit of a coalition can be quantified by characteristic function. The characteristic function of a coalition $C \subset N$ is the largest guaranteed payoff to the coalition. A coalition structure is a means of describing how the players divide themselves into mutually exclusive coalitions. It can be described by a set $S = \{S1, S2, ..., S_m\}$ of the m coalition that is formed.

3. Support for Cooperative Multi Person Decision.

Li, Woodhead and Ball (2003) say that "In many of the areas to which value analysis has previously been applied the evaluation of alternative solutions has been relatively straightforward". Therefore, in addition to each process that may offer an alternative solution, there are also several possible implementations for each of these modeling and evaluating (Clemen, 1996). Potential in the number of possible realizable solutions for each function, a hierarchical approach to evaluation is needed, and it is important to eliminate unsuitable solutions at the highest level of abstraction as possible. Some functions it may decided that a set of generic process are needed to perform the function, each of which will give rise to an associated set of possible specific processes. A number of processes may be identified as being probable candidates for performing the function. The solution to how a particular function will be performed will generally take the form of some process (or procedure).

Many study in value-based design decision using decision tools (Sanchez, et al. (2005). A paired comparison is held to determine the weighing to be given to each attribute. Weighting and scoring technique are relevant in value-based decision analysis exercise (Cariaga, El-Diraby, and Osman (2007) where a decision needs to be made in selecting an option from a number of competing options and the best option is not immediately identifiable.

3.1 Negotiation Support

Since every stakeholder has his own priority, and the project need a single alternative, negotiation becomes an important to this role. Negotiation is the interactive communication among parties to facilitate a distributed search process. Kraus et al. (1995) wrote that two approaches use to the development of theorems relating to the negotiation process. The first is informal theory, which attempt to identify possible strategies for a negotiator and to assist a negotiator in achieving optimal results. The other approach is the formal theory of bargaining originating with the work of John Nash, who attempted to construct formal models of negotiation environments. Morge and Beaune (2004) wrote that a NSS provides three kinds of functionality. Firstly, it facilitates the exchange of information among users. Secondly, it provides decision modeling or group-decision techniques to reduce the noise and uncertainty that occur in the process. Finally, it provides negotiation support. The field of Artificial Intelligence in particular multi-agent methods can be useful for negotiation support (Wanyama and Far, 2007).

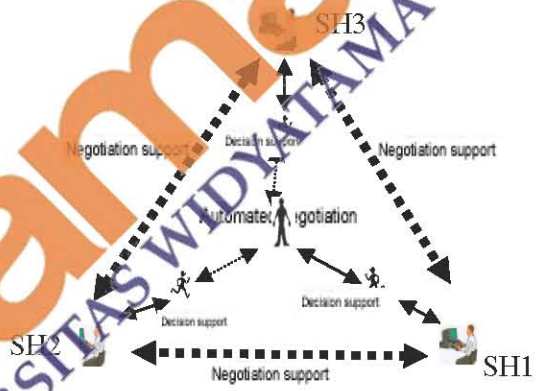

Figure 1. System Architecture Negotiation (Adapted from Morge and Beaune, 2004)

In this system, negotiation consists in an exchange of proposals between stakeholders (see Figure 2). The agent *i* propose its alternative to agent *j*. This alternative should be the most preferred alternative for agent *j* (with the highest priorities with respect to the goal) to be immediately accepted. If not, agent *j* tries to change the preference order of alternatives by adjusting judgments in pairwise comparison matrixes. If the proposal is not accepted, it will send a counter-proposal. The negotiation will be stopped, when an alternative is approved unanimously.

3.2 Satisfying

Stirling (2003) has written and demonstrated satisfying games on multi-criteria decision making. He writes that 'a natural procedure of satisfying options is to separate

the attributes into two categories, one to involve the attribute that represents functions of an option and the other to involve attributes that represents losses'. To compare function and cost representing the value of a product solution, they must be represented on the same scale. This may be done creating selectability (Ps) and rejectability (Pr) functions and normalizing the problem (Saaty, 2004) so that the decision-maker has a unit of function utility and a unit of cost utility to apportion among the options. Figure 3 show the decision hierarchy based on satisfying and Table 1 and 2 presents the calculation of 'cost' and 'function'.

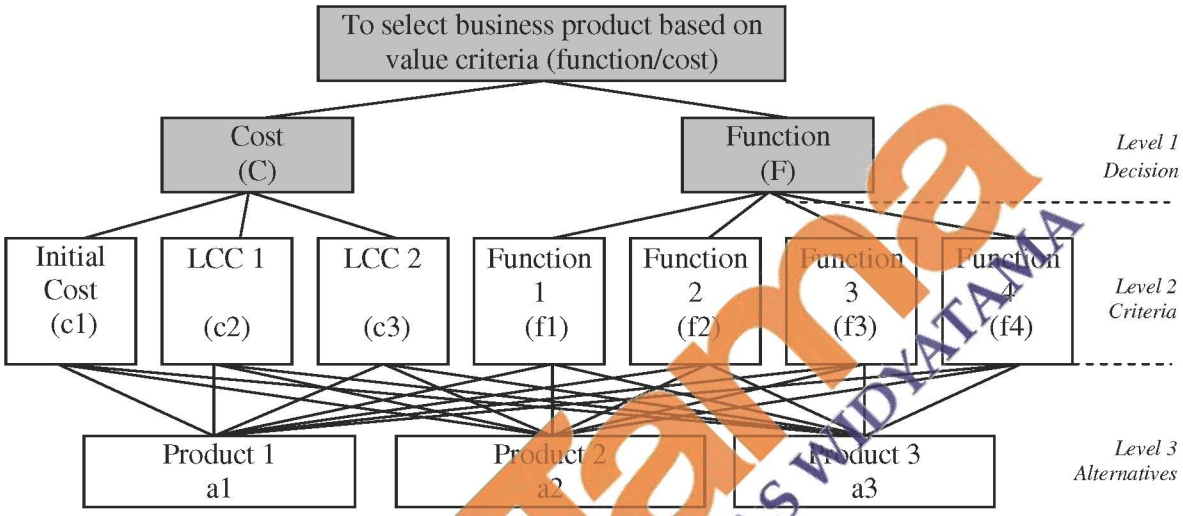

Figure 2. Decision Hierarchy Based on Satisfying

Table 1. Process of Satisfying Analysis

	Cost					Function				
	c1	c2	c3	COST	Cost	f1	f2	f3	f4	F
a1	0.002	0.029	0.064	0.095	0.026	0.250	0.014	0.050	0.034	0.347
a2	0.016	0.005	0.005	0.026	0.095	0.047	0.050	0.020	0.014	0.132
a3	0.009	0.015	0.019	0.043	0.078	0.089	0.022	0.121	0.126	0.356
					0.200					0.835

Table 2. Normalization and Rank

Alternatives	NORMALIZATION			Ranking
	Loss (Pr)	Gain (Ps)	F/C	
a1	0.132621	0.415064	3.129694	1st
a2	0.475651	0.15827	0.332744	3rd
a3	0.391728	0.426667	1.089191	2nd

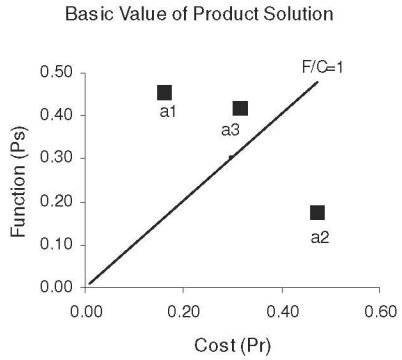

Figure 3. Cross-plot of Function and Cost

Table 3. Best-Fit Options for Each Alternative in Each Coalition

	χ_{ij} (+)				χ_{ij} (-)			
a1	SH1	SH2	SH3	ψ_j^+	SH1	SH2	SH3	ψ_j^-
SH1+2+3	0.00	0.00	0.00	0.00	0.00	0.00	0.01	5.20
SH1+2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SH1+3	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	32.53
SH2+3	0.00	0.00	0.00	0.00	0.00	0.00	-0.02	14.85
a2	SH1	SH2	SH3	ψ_j^+	SH1	SH2	SH3	ψ_j^-
SH1+2+3	0.00	0.00	0.01	8.08	-0.08	-0.13	0.00	87.91
SH1+2	0.00	0.00	0.00	0.00	-0.08	-0.13	0.00	107.67
SH1+3	0.00	0.00	0.00	0.00	-0.08	0.00	-0.02	61.58
SH2+3	0.00	0.00	0.00	0.71	0.00	-0.13	0.00	89.80
a3	SH1	SH2	SH3	ψ_j^+	SH1	SH2	SH3	ψ_j^-
SH1+2+3	0.00	0.00	0.00	0.00	0.00	-0.55	-0.01	319.91
SH1+2	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	5.10
SH1+3	0.00	0.00	0.00	0.00	0.00	0.00	-0.05	32.65
SH2+3	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	16.12

The two columns on Table 1 show the utility of cost and function for each product. Based on the results presented in Table 2, Figure 4 provides a cross plot of function and cost, with *Pr* (rejectability) the abscissa and *Ps* (selectability) the ordinate. The caution index *F/C=1* is taken as unity where the alternatives will be "select" or "reject" if the value (*F/C*) is >1 or <1 respectively. Observe that a2 has the lowest function, it also has the highest cost, and a rational decision maker can legitimately come to conclusion that this is eliminated. Options a1 is easily selected by the cost-function test. Options a3 here gives high benefit but also have higher cost comparing to a1.

3.3 Negotiation Strategy

The rationality of negotiating agents is implemented with a utility function given by Analytical Hierarchy Process (AHP) (Saaty, 2004). Within the limits of the uncertainty of this decision, the enumeration of alternatives and the development of decision hierarchy help the group to debate the problem (Morge and Beaune, 2004). Computer-mediated work

increases the comprehension, the readability and, the objectivity of the decision-making. All stakeholders share the same goal (G = c0) but each of them has its own set of alternatives (A*i*) or criteria (C*i*). Wanyama and Far (2007) wrote that sets of activities could move, expand and, retract during negotiation. When a user takes into account a new alternative, she/he proposes this alternative to all users. When a user takes into account a new criterion, this criterion is proposed to the corresponding group. Table 3 and 4 present the process and result from coalition among stakeholder to rank the alternatives. In this case, product 1 is the best alternative to be developed.

Table 4. Alternative Ranking from Possibility of Coalition

Alternatives ranking for each stakeholder and coalition	Alternatives		
	a1	a2	a3
SH1	1st	3rd	2nd
SH2	1st	3rd	2nd
SH3	1st	2nd	3rd
Coalition SH1 and SH2	1st	3rd	2nd
Coalition SH1 and SH3	2nd	3rd	1st
Coalition SH2 and SH3	2nd	3rd	1st
Grand Coalition (SH1, SH2, SH3)	1st	3rd	2nd
Conclusion	1st	3rd	2nd

4. Conclusion

The implementation results demonstrate a process to select priorities of product. It further emphasizes the importance of performance evaluation in business process, and provides a focus for future research into performance evaluation techniques. Using a protocol based on a cooperative environment, a NSS can be developed. Different result according to analysis are proper, because both analysis is going concern where optimization not even consider function of cost overall but also consider preference weight each product.

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