POLICY APPROACHES AND SUPPORT MECHANISMS TO PROMOTE INNOVATION IN SMEs IN INDONESIA[1]

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Abstract

The role of innovation has been recognized as one of the key drivers of an industry competitiveness and in turn a national competitiveness. Increasingly many countries, including developing countries, make systematic endeavors to strengthen innovation capacity of their industry. The fact that industry structure in all countries is dominated by Small and Medium Enterprises (SMEs), make many governments create appropriate policies to strengthen this particular industry segment. The paper highlights some Indonesian government policies aimed at strengthening its national innovation capacity of local industry, including SMEs; describe some past, current, and future programs that might enhance linkages amongst the elements of national innovation system; review LIPI's Iptekda Program and its role in promoting innovation and technology from R&D centers and universities to SMEs, briefly review revolving fund management (RFM) aspect of the Iptekda Program and suggest alternative RFM integrated to the corporate (LIPI), and describe some key success factor of the program.

Keywords: Innovation, incentive program, Iptekda, SMEs, transfer of technology, competitiveness

Policy Approaches

Studies on national innovation system of Indonesia conclude that interconnection amongst the element of national innovation system is very weak. The studies further claim that there are at least two factors contribute to this condition, namely, (1) the absence of a national innovation policy and (2) institution responsible to 'lead' the process of its development and its implementation has not been clear (Aiman and Simamora, 2004 and Aminullah, 2006). Somehow, in the last few three years there has been an increasing attention from key stakeholders to make stronger efforts in accelerating its development and implementation. The national innovation system of Indonesia has become one of national development agenda. As such, the following highlight will focus more on science and technology policy and programs that directed to enhance innovation capacity of industry and to encourage promotion of innovation to industry, including SMEs..

Indonesia recognizes the role of innovation in strengthening competitiveness of national economy and making it as one of top priorities of national development agenda. Mid-Term National Development Plan (RPJM), 2004-200[3] states that enhancement of science and technology capacity is directed to: (1) enhance the focus and S&T capacity of R&D institution, (2) accelerate diffusion and utilization process of S&T results, (3) strengthen S&T institutional aspects, and (4) create conducive climate for innovation in the forms of appropriate incentives schemes in attempts to strengthen industry competitiveness.

Those four policy directions will eventually contribute to support innovation capacity of national industry. SMEs, despite resources constraints, can take advantage from the latter three S&T policy direction to improve its innovation capacity, especially through participation in various relevant programs launched by the government—some of the program, e.g. incentive programs, will be highlighted briefly later. It is expected that this can improve and strengthen linkages between SMEs and R&D institution and universities. The objectives and main activities of three policy direction are as follows:

Diffusion and Utilization Program of S&T is aimed at supporting dissemination process of R&D results and its utilization by business community, industry, and society. Main activities in this program will include:

(1) Dissemination of R&D result to business community, industi, and society through provision of information on S&T dan commercialization of technology;
(2) Provision of consultancy services and technical assistance[4] through development of liaison officer to assist provide technological solution needed by industry and local government.
(3) Development of communication system, coordination, and partnership schemes amongst S&T institution (in R&D institution, universities, industry, and supporting institution) both in Indonesia and overseas.
(4) Enhancement of local government participation and development S&T partnership schemes between central and local government, and amongst local goverements themselves.
(5) Development of infrastructure in supporting implementation of standard and conformance assessment of product quality of businesses.
(6) Recognition and appropriate appreciation of society participation in the promotion of S&T through development of techno-education, techno-exhibition, techno-entertainment, and technopreneurship as well as development of innovation and S&T creativity of society.
(7) Development and utilization of S&T traditional knowledge-based and other local resources;
(8) Utilization of map and spatial information in determining country borders and borders amongst the region.

Strengthening of S&T Institution is aimed at enhancing capacity and capability of S&T institution to support national economy growth. Main activities to be supported in this program include:

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[3] Presidential Regulation (Perpres) No. 7/2005 on Mid-Tem National Development Plan
[4] Executing units of Iptekda program in many provinces, in some respects, plays this role

(1) Revitalization and optimalization of S&T institution include accreditation of R&D personnel;

(2) Development of science centers and actualization of incubator role and technical implementation units in intermediary function;

(3) Optimalization of Local Research Council (DRD) in determining specific priority local product and formulation of development of S&T based on local content;

(4) Development and implementation of supervision of research activities, development and application of high risk technology, law enforcement, prevention and alertness on nuclear;

(5) Enhancement of integrated S&T management system, include regulation improvement that supporting R&D result commercialization, intellectual property management, quality standard, safety, and environment;

(6) Improvement of incentive system and S&T funding scheme;

(7) Enhancement of involvement of scientific profession organization involvement, universities and society in strengthening ethical foundation in S&T policy formulation;

(8) Provision of national S&T indicator and statistics;

(9) Improvement of quality and quantity as well as optimalization and mobilization of S&T human resources through national and international collaboration.

Program on Enhancement of S&T Capacity and Production System is aimed at supporting technological capacity improvement and production system of businesses, raise synergy amongst various elements of innovation system. Activities to be focused in this program include:

(1) Acceleration of transformation process of local-based and high-tech industry;

(2) Development of supporting regulation infrastructure and conducive policy in the form of tax incentives, technology insurance for SMEs and Cooperatives;

(3) Development of financial institution venture capital and start-up capital, provision of compatible research contracts;

(4) Technopreneur development, such as through development of new venture based on research results through technology incubator;

(5) Promotion and implementation of technology audit/assessment;

(6) Enhancement the role of metrology and testing personnel in formulating development of Indonesian National Standard (SNI);

(7) Capacity enhancement of technology-based SMIs (small and medium industry) and cooperatives through utilization of technology information system and technical assistance, training, encourage partnerships with large industry, and develop various incentive schemes.

Implementation of the policy direction focuses on improving national competitiveness in selected areas. For the next five years, the government has determined six priority areas. Elements of the national innovation system (R&D institution, universities, industry, and other supporting institutions) needs to align their program into this priorities in attempts to build up national innovation capacity.

(1) food security;

(2) new and renewable energy sources;

(3) transportation technology and management;
(4) information technology communication (ITC);
(5) defense technology; and
(6) medicine and health technology.

Currently the government is developing white paper for the six priority areas above. The white papers elaborate specific quantitative target for each priorities for short-term (2005-2010), mid-term (2011-2015), and long-term (2016-2025). It also elaborates expected role of the government (including R&D institutes and universities) and that of industry in the roadmap. Somehow, the document does not indicate the necessary public fund or the size of investment that needed to achieve the target.

A clear commitment reflected in the form of resource allocation for each priority, will attract or stimulate all elements of the national innovation system to direct their efforts to strengthen national innovation capacity in those priority areas. Given the trend of government R&D expenditure as depicted in Table 1, it seems that in the mid-term the government does not seem to have the capability to significantly increase its R&D expenditure for those priority areas. Somehow, it is possible to redirect current R&D budget distribution and allocate significant portion for the six priority areas[5].

Incentive program stimulating linkages
In 2006, the Ministry of Science and Technology (MOST) launched five incentive programs to implement the policy direction. These are: (1) Incentive for basic research, (2) Incentive for applied research, (3) incentive for enhancement of S&T capacity production system, (4) Incentive for acceleration of diffusion and utilization of S&T, and (5) Incentive for National Strategic Priority Researches (RUSNAS). The programs have four objectives, namely: (1) to accelerate technology and innovation growth; (2) to stimulate research to produce innovation with high commercial value; (3) to encourage acceleration and widespread utilization of innovative products, and/or (4) to strengthen local industry competitiveness level.

It is a fact that, researches program in R&D institutions, universities, and industry still have weak linkages (Aiman and Simamora, 2004 and Gammeltoft and Aminullah, 2004) and therefore diffusion of research results from the so-called technology provider is still low[6]. Introduction of the S&T incentive program is, therefore, aimed among other, to mitigate this problem by attracting the elements of the innovation system to collaborate and interact so as to increase the linkages amongst them. This can be seen from two of the characteristics of this program, i.e., (1) optimize S&T resources in an integral and a

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[5] Attacking six areas simultaneously does not seem to deliver significant result in the short- and medium-term. This can make the players of the innovation system lose their interest and focus on the priority areas. As Prof. Nawaz Sharif stated on a National Seminar on National Innovation System in Jakarta on 19 July 2006 "there is a need to focus in a very specific area first, when it succeeded then expand to other areas. See example of Korea, now electronic, when they got the resources (money) they can enter into new sector such as automotive. But at the beginning they focused very narrowly until they succeeded."

[6] Though in the last ten years, there has been increasing efforts to strengthen linkages amongst the elements of the national innovation system, despite the fact that national innovation policy has yet to be developed.

clear define manner—its activities, outcome, and time frame; and (2) harness S&T resources in public research institutes, universities, industry, and society directed to achieve the objectives states in the Mid-Term National Development Plan (RPJM).

Before introduction of the incentive programs, Indonesia through the MOST, have launched similar program, such as Partnership Competitive Research Grant (RUK), Catalyst Program, Start Up Capital Program (SUCP), S&T Fund for Region (Iptekda)[7], Incentive system for strengthening management and technology of MSMEs (Siptekman [8]), Optimalization of Regional S&T (PRIDA) [9], and establishment of Intellectual Property Office (Sentra HaKI) in R&D institutes and universities across the country. Some of these program had been in existence for more than ten years. The existence of these program seemed to indicate a strong commitment from the government to build innovation capacity.

Data on Table 1 and Exhibit 1 show that the ratio government expenditure of GDP is consistently decreasing. This might indicates that conceptually sound policy and programs would only be effective if supported by necessary resources. Take for example, Start Up Capital Program[10]. In 2003, the amount of fund allocated for this program was around Rp. 5 billions (US$ 526,315). This seed money is allocated to fund 10 the so-called New Technology-Based Firm (NTBF) across the country, i.e., every NTBF obtained Rp. 500,000,000.- (Approx US$ 52,631). The impact of the program to attract national wide participation become very limited[11].

Table 1. Indonesia's Gov't Expenditure on S&T, R&D, and S&T Infrastructure of GDP, 1994-2004							
	GDP (Rp.T)	S&T (Rp.B)	S&T of GDP (%)	R&D (Rp.B)	R&D of GDP (%)	S&T Infrast (Rp. B)	S&T Infrast of GDP (%)
1994	382.20	837.00	0.20	378.00	0.10	382.00	0.10
1995	454.50	760.00	0.21	420.00	0.09	551.00	0.12
1996	532.60	971.00	0.21	385.00	0.07	728.00	0.14
1997	627.70	1,113.00	0.20	608.00	0.10	625.00	0.10
1998	955.80	1,233.00	0.16	648.00	0.07	885.00	0.09
1999	1,099.90	1,533.00	0.13	659.00	0.06	728.00	0.07
2000	1,264.90	1,387.00	0.11	868.00	0.07	576.00	0.05
2001	1,467.70	1,444.00	0.09	966.00	0.07	337.00	0.02
2002	1,610.60	1,303.00	0.09	1,084.00	0.07	342.00	0.02
2003	1,786.70	1,426.00	0.11	1,270.00	0.07	631.00	0.04
2004	2,303.00	1,901.00	0.08	1,242.00	0.05	705.00	0.03

Source: Pappiptek LIPI and Bureau of Statistics in LIPI, 2006

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[7] Iptekda will be further discussed in later section, since seeing from the perspective of stakeholder participation and geographical spread, this program seems to have a positive impact.

[8] Siptekman stand for Sistem Insentif Penguatan Teknologi dan Manajemen UMKM

[9] PRIDA stand for Pendayagunaan Riset Iptek Daerah

[10] In 2003, the writer participated in this program

[11] Participant of this program at that time was based on invitation rather than competition, to avoid costly promotion and selection process. In the following years, invitation to this program was publicized through internet.

Exhibit 1. Trend of Gov't Expenditure on S&T, R&D, and S&T Infrastructure of GDP, 1994 - 2004 (%)
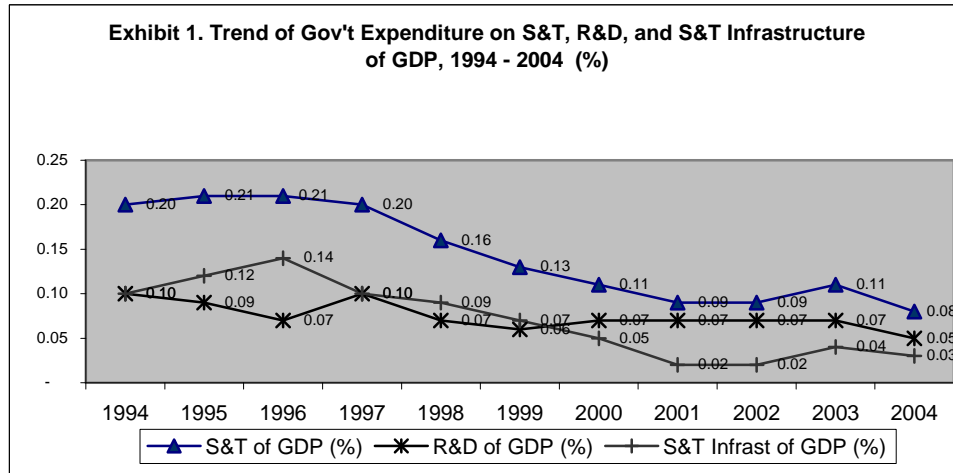
Given the trend as depicted in Exhibit 1, Indonesian government needs to increase its commitment by a consistent increase in R&D budget allocation to implement the policy and programs so as to encourage stronger linkages amongst the national innovation system[12]. The introduction of the new incentives program in 2006 (merging all the previous incentive schemes) need to be supported with appropriate fiscal instrument.

Erman Aminullah (2006) asserts that in order to materialize interconnection amongst the elements of the system, competitive economy in the future can be achieved by working together in parallel what he calls the four of technology investment players so as to create alignment and synergy. They are: *Firstly*, efficient and innovative businesses community due to support: (i) knowledge and invention from productive R&D institutions, (ii) expert from quality university, and (iii) Effective government policy that drive businesses to become world class players. *Secondly*, respected R&D institution for its productive invention and innovation with support: (i) experts from high quality university, (ii) demand from business for research collaboration, and (iii) effective government policy that encourage research center to become world class quality. *Thirdly*, respected university because of its quality expertise it produces due to support: (i) demand by business world on experts from university, (i) knowledge creation from R&D institution productivity, (iii) effective government policy drives to become center of excellence. Fourthly, government succeeds due to policy alignment amongst the sectors that push the achievement of: (i) world class and innovative business, (ii) world class research center, and world class center of expertise.

Increase in investment for future technology can take place by mutual enforcing interconnection amongst the four technology investment players. The government can influence the acceleration of this strategic goal achievement by producing and enforcing appropriate policies including policies on investment for future technology.

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[12] This can be reflected on the existence of a national innovation policy which can become a reference for all the elements of the system. Simply increasing the R&D expenditure would not automatically produce desired impact.

Regulatory/Administrative Policies

Seeing from the size of R&D expenditure, it is estimated that more than 70% research activities in Indonesia are conducted by public research institutions (this includes researches done by R&D Institution/LPND, research agencies at various departments, universities, and R&D agencies at local government/Balitbangda (LIPI, 2006). It is also found that transfer of technology from public research institutes to industry has not been encouraging, partly due to mismatch the research results with industry needs and partly due to local industry climate that still prefer to adopt technology that already past the test of the market. It is also found that lack of incentive both for the research institutions and industry in commercializing or adopting local technology contributed to this condition.

Since 1997, the governments has made serious efforts to position R&D institution as an important technology provider to industry[13]. Since then, the government launched various policies in attempts to strengthen national innovation capacity. These include Law No. 28/2002 on National System of Research, Development, and Application of Science and Technology; Government Regulation No. 20/2005 on Transfer of Technology, Law on Patent, and Government Regulation No. 23/2005 on Financial Management of Public Service Unit (Badan Layanan Umum/BLU) where one of its scope of activities includes transfer technology management with which it can manage its activities in a business like manner and utilize its revenue according to its business plan. Example of some policies related to promotion of innovation to industry can be seen as in Table 2.

Table 2. Some Policies Related to Technology Development in Indonesia, 1988-Present

Fiscal Incentive:
Import duty exemption (in attempts to support the so-called national car program/mobnas *Tax deduction*:
Income from training and development of human resources for R&D institutes, income from procurement of goods and services for R&D institutes
Financial Incentives:
Grants on various schemes from MOST involving public research institutes, universities, and private sectors
Venture Capital (PNM, Artha Bahana Ventura)
Administrative Instruments:
Law on anti trust
Law on research, dev't, and application S&T
Laws on Intellectual Property Rights (Trade secret, Patent, Trade Mark, Copyright, Design Integrated Circuit Layout, Industry Design)
Gov't Regulation on Transfer of Technology
Gov't Regulation on Financial Management of Public Service Unit (Badan Layanan Umum/BLU)

Source: Adapted from Aminullah, 2006

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[13] In 1997, the government launched a large project called Industrial Technology Development Project funded. Pilot projects are conducted in three institutions (LIPI, BPPT, and Department of Industry), and some results of the project has been institutionalized especially in enhancing interaction between R&D institutes and industry. For example, Center for Innovation in LIPI, Technical Service Center and Business technology Center in BPPT have main function in 'bridging the gap.'

The above description suggests that the Government of Indonesia has introduced various types of policies and programs aimed at enhancing national economy competitiveness by strength improving innovation capacity. Table 2., for example, lists some of the related policies taken by the government since 1980. Somehow, many of this policies and the programs seem to be more S&T oriented. The S&T policies needs to be developed in line with other component of national innovation policies, such as industry policy, education policy, and finance policy[14].

SMEs and Innovation Promotion Mechanism

In Indonesia, a tiny number of large firms tend to dominate the private sector at one extreme, with an abundance of informal micro- and small- businesses (99.9%) at the other(IFC PENSA, 2006 and Djamhari, 2005). On the other hand, in terms of the number of establishment, the Micro and Small segment are the largest in the structure as can be seen in Table 3. The private sector has few businesses in the middle—the formal, stable enterprises averaging 20-100 employees. This group has the stability and the flexibility to adjust to the nation's volatile economic, political, and business climate. However, they are not well-served by existing markets and institutions. A study conducted by ADB and the Asia Foundation in 2005 found that is this segment of the industry, which they called as the missing middle, that is often missing from many of government program in empowering SMEs.

Table 3. Structure of Indonesia's Industry

Scale / Year	Large	Medium	Micro and Small	Total
1999	1,885 (0.005 %)	52,214 (0.1377 %)	37,859,509 (99.85 %)	37,913,608
2000	2,005 (0.0051 %)	55,437 (0.14 %)	39.121.350 (99.85 %)	39,178,792
2001	2,095 (0.0052 %)	57,743 (0.14 %)	40.137.773 (99.85 %)	40,197,611

Source : Ministry for Cooperative and SME, 2005

Many programs in attempts to empower this SMEs in Indonesia have been undertaken. For example, in the 1980s, the Ministry of Industry executed a nation-wide program on SMEs cluster development. The program was called BIPIK [15] (Promotion and Development of Small Industry). Since then, various department and institutions implemented many other programs with the main objective to enhance SMEs competitiveness.

In August 2005, ADB reported that "Regarding SMEs policies and programs, there appears to be a significant difference in views between two of major Ministries interested in SMEs, the Ministry of Industry and the Ministry of Cooperative and SMEs. The Ministry of Industry appears to have economic development as its basic priority for

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[14] Two major findings from research conducted by LIPI in 2003 and 2004 were, firstly, Indonesia does not have yet the so called national innovation policy. Policies and programs related to strengthening national innovation capacity are based on sectoral approach. Secondly, there is no single institution in charge of developing national innovation policies and oversee its implementation.

[15] BIPIK stands for *Bimbingan dan Pengembangan Industri Kecil*.

SMEs, while the Ministry of Cooperative appears much more concerned with welfare support for SMEs[16] (ADB, 2005). Despite economic development eventually is aimed at enhancing the welfare of the people (incl. SMEs), promotion of innovation to SMEs seems to be much concerned with the former—economic development through increase competitiveness. Promotion of innovation has to be directed to those selected ones which have growth potential and other required characteristics.

Since there seems to be difficult to make generalization of innovation mechanism from many SMEs policies and programs in Indonesia[17], the following case on promotion mechanism of innovation through Iptekda Program (S&T support to SMEs in regions) might provide some lessons and reveal policy implication.

Iptekda Program and SMEs

Since 1998 Indonesian was hit by the impact of monetary crisis (commonly knows as *Krismon*) which then led to economic crisis—bankruptcy, large number of employees out of job, poverty level increase, etc. In order to mitigate the impact, the government felt a need to launch a type of crash program by introducing Social Safety Network program (locally knows as *Jaring Pengaman Social*—JPS). One of the main objectives of JPS is to provide income generating activities for the poor.

In 1998, the government instructed R&D institutions to carry out IPTEKDA[18] Program to assist poor people by providing income generating activities. The focus, then, was to help society and/or MSMEs by providing support in such areas as management, technology, and funding; not so much concerned with economic and business feasibility of individual activity. This condition underwent for two years (1998-1999). Since 2000, however, tougher selection process introduced so only MSMEs and/or individual that passed the selection criteria can get the assistance. One significant character of this program is fund obtained by the MSMEs from this program is treated as a loan—has to be repaid as schedule; and the activities (individual project) has to include transfer of technology from research institutes (later in 2000 also universities) to the MSMEs. In other words, there has to be introduction technological aspect from researcher in R&D institutes and or faculty to the MSMEs and/or individual (recipient of the fund and technical assistance). Table 4 depicts a portrait of LIPI's Iptekda program since 1998-2004 and Exhibit 2 describes the trend of the fund allocated for this program[19].

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[16] MAP (Modal Awal Padanan/Initial Matching Fund) program launched by the Ministry of Cooperative and SMEs might describe this condition. With this program, member of the so-called 'cluster' (sentra) might get financial assistance prorata regardless of the specific needs of individual entrepreneur. Somehow, management support offered by this Ministry can also lead to enhancement of competitiveness of the businesses or ventures

[17] ADB found that Indonesian SME policy for the most part has been diffuse, uncoordinated, and unconnected to overall private sector economic policies (ADB, 2005:35).

[18] Besides LIPI, National Atomic Energy Agency (BATAN) and Agency for Assessment and Application of Technology (BPPT) also run IPTEKDA Program.

[19] Up to know, this program is still under way.

Table 4. Description of LIPI's Iptekda Program, 1998 - 2004

Year	No. of Program	No. of Activities	No. of SMEs Involved	Location/Spread (Provinces)	Budget allocated (Rp. Million)
1998	12	50	730	9	2,381.00
1999	58	68	950	15	8,959.65
2000	47	54	750	14	8,593.35
2001	46	51	710	11	8,807.00
2002	52	60	840	15	8,474.00
2003	53	55	770	11	7,722.65
2004	49	51	450	12	6,521.45
Total	317	389	5200	28	51,459.10

Source: Adapted from Brodjonegoro and Darwin (2006)

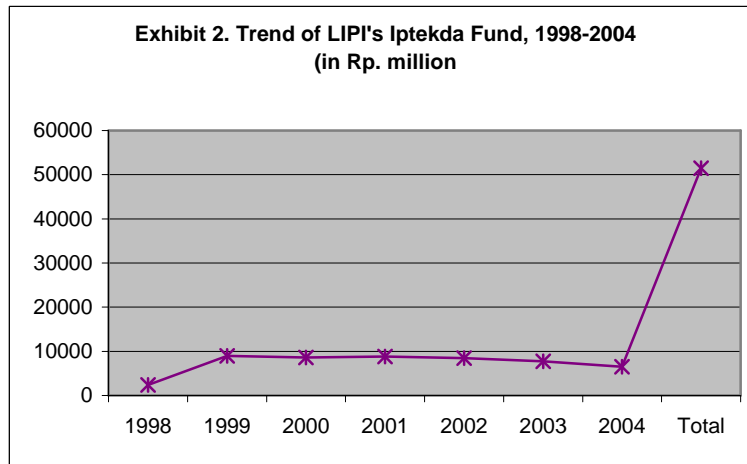Exhibit 2. Trend of LIPI's Iptekda Fund, 1998-2004 (in Rp. million

Table 4 shows that during the last seven years, investment of LIPI's IPTEKDA program has reached the total of Rp. 51.45 billion or equivalent to US$ 5.41 million; the total number activities are 317; the number MSMEs involved was 5,200[20]; and the activities were spread in 28 provinces across the country.

Table 5. Survival Rate of Selected MSMEs, 1998 - 2004

Year	Operating/Running		cease		Total	
	Number of Unit	%	Unumber of Unit	%	Number of Unit	%
1998	3	75.0	1	25.0	4	100
1999	7	26.9	19	73.1	26	100
2000	17	58.6	12	41.4	29	100
2001	13	52.0	12	48.0	25	100
2002	19	61.3	12	38.7	31	100
2003	30	88.2	4	11.8	34	100
2004*)	34	100.0	0	-	34	100
Total	123	60.3	60	39.67	183	100

Source: Adapted from Brodjonegoro and Darwin (2006), *)year of survey conducted

It is interesting to note that average survival rate of the business[21] assisted through this program is quite high, that is, 60.3% [22] (excluded data 2004). One of the factors

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[20] Include indirect involvement of MSMEs in the value chain

[21] Many of the partners assisted through Iptekda Program are newly established entities.

contributes to this condition is close technical supervision by researchers/experts from R&D institutes and faculties.

At the first three to five to six years, the type of activities as mainly in the resources-based sector such as agriculture, aquaculture, food and feed, and handicraft. Later on, the programs include other more advanced sector such as electric car (transportation), magnetic-based instruments, defense, and ITC.

As mentioned above, executing units of this LIPI's Iptekda program involve LIPI's R&D centers and faculty and/or research centers in universities. From 317 Iptekda program 68.1% are carried out by LIPI's R&D Centers and the remain 31.9% are carried out by universities from various provinces (Brojonegoro and Darwin, 2006:22). This type of participation has been useful in disseminating innovation and technology from those R&D centers and universities. Participation from universities from local universities in 28 provinces might also contribute to the high survival rate of the program[23] as presented in Table 5.

**Revolving Fund Management of Iptekda Program**
A closer observation suggest that the owner of the program (LIPI) does not have direct management control over the investment made fund so as to accumulate capital to fund other research results. This might be due to current management mechanisms of the program as described in Exhibit 3. below.

Exh. 3. Current LIPI's Iptekda Management

Exh. 4. Proposed Simplified LIPI's Iptekda Management
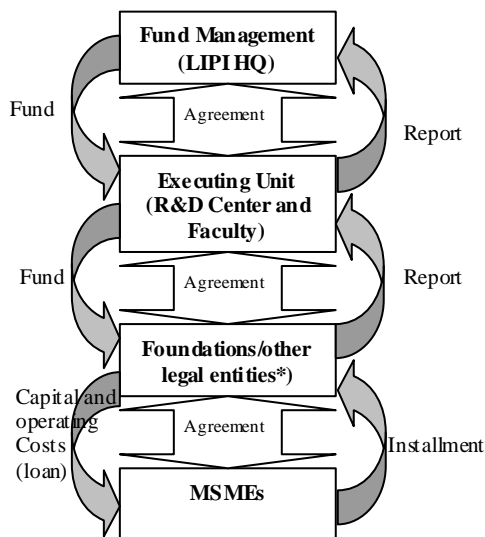
Source: Kusnowo, et.al., 2006

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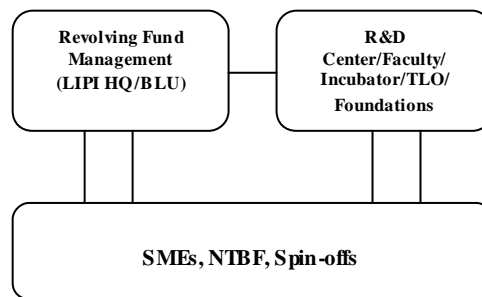
[22] This only applies to selected respondents, not representing all MSMEs involved in the program.

[23] Although there is no survey to justify this statement, from various informal contacts with LIPI's officers and participant from universities, there is an indication that LIPI's Iptekda program implemented by universities have a high success and survival rate. Proximity with the MSMEs might be one of the factors. It is important to conduct a study on this so as to draw some important lessons.

With the current management practice as described in Exhibit 3, program owner (LIPI) does not have direct access to the MSMEs. Further observation reveals that LIPI has function as a 'cost center' as such LIPI executive does not have authority to reinvest the revolving fund to further support funding commercialization of research results from LIPI. Instead foundations and the like which are separate legal entity has the authority to manage the revolving fund. This foundation normally consists of trusted local people and individual researcher(s)—but not representing its institution. In brief, current management practice might suffer from major weaknesses, among others, the possibility of the existence of conflict of interest and incapability of LIPI to accumulate fund (part of the revolving fund) in order to support its research activities and provide incentives for S&T players in the organization to increase motivation[24].

A simplified management model of the Iptekda as depicted in Exhibit 4 may overcome those two possible major drawbacks of the current management. This model discharge the two layers (middle ones) as in Exhibit 3. Instead, these two elements can enter into a direct cooperation with Revolving Fund Management (LIPI HQ/BLU[25]?). There are two types of cooperation that can be developed: (1) technical cooperation, especially with R&D centers and universities and (2) revolving fund management cooperation, esp. with local foundation and other legal entities.

With technical cooperation, there is a clear relationship between Revolving Fund Management (RFM) and its partner. The part of the partner in the cooperation will be on its availability to provide technical assistance and to mentor the transfer of technology to SMEs and the funding of the activities will be directly made by RFM. Benefits obtained from this activities can be negotiate by the both parties (e.g, royalty, profit sharing, and/or fee-based). The second type of cooperation focus on the management of the revolving fund with the SMEs in various provinces where the RFM partner acts on behalf of RFM. In some cases, without the support of those groups, RFM can directly deal with SMEs as it has also access to its own internal resources in LIPI.

This simplified model enables the program to build up LIPI's capacity through RFM (with a special status like BLU) in managing and developing the innovation fund (could be Iptekda program fund or other sources). The management of the RFM can consist of combination of civil servant and practitioners/professionals.

The above review suggests that Iptekda program has become on of an effective mechanism to promote innovation and technology result to MSMEs in many provinces in Indonesia. Some key success factors for this results:

- availability of technology/technical solution/experts related to local condition/problems (introduction of appropriate technology)

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[24] Despite with the current regulation (Non Tax Revenue /PNBP mechanism), the organization does not have flexibility to utilize income it generates, all has to go to state. This might be one of the reasons why revolving fund is managed by the Foundation, not directly by LIPI.

[25] Government Regulation (PP) No. 23/2005 specifies explicitly that management of revolving fund (pengelolaan dana bergulir) as one of activities a BLU (Public Service Unit/Badan Layanan Umum) can undertake.

- to some extent, proximity of the executing unit (universities) to MSMEs—this create close interaction with the SMEs. Technology transfer very often take place on a tacit-to-tacit process-based/people to people.
- Consistent fund allocation over time—learning curve, provide accumulation of capacity so there is a chance to make improvement.

Conclusions

Indonesia has launched many policies in attempts to enhance national innovation capacity. In particular, incentive program launched by the government can attract elements of the national innovation system to jointly strengthen the six priority areas through increasingly intensive collaboration. It is, therefore, required a strong commitment from all key stakeholders to provide necessary resources to get the programs implemented.

There has been many programs on empowering SMEs in Indonesia since 1980s coordinated by different department and institutions. Many of the SMEs policies and programs still need to be more connected to overall private sector economic policies so as to avoid unnecessary duplication of roles and programs. It is also important to recognize the targeting the right SMEs that have potential to grow would deliver a better return. So far, most of the SMEs empowerment program has been directed to help the Micro and Small segment. Contrary to many common practices, there is a need to target and assist the so-called 'the middle missing.'

LIPI's Iptekda program (Revolving Fund Management-RFM managed by LIPI) deliver an impact to quite a number of Micro and Small Enterprises (MSEs). MSEs obtained assistance under this program have a low mortality rate. In the first five years, the segment of activities are mostly on the resources-based business, later on it enter a more advanced technology segment such as electric car, medical equipment, etc. This program has become an effective mechanism in promoting innovation to SMEs. It is time, however, to review the management of the program. This become timely since the regulation (e.g., with BLU status) would allow the program and the investment to be managed in a more businesslike manner. The proposed simplified model of the RFM would allow LIPI, as a corporate, to better manage the fund and treat it as integrated part of the corporate business. Some key success factors of the program reconfirm the importance of close interaction amongst the element of the system, since transfer of technology cannot be based by simply 'reading the book.'.

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