

SHARING KNOWLEDGE: A KEY TO LIFT UP PEOPLE LIFE THROUGH SCIENCE
Experience of the Indonesian Institute of Sciences (LIPI)
Rosa Widyawan & Tjempaka Sari Hartomo*

Indonesian Institute of Sciences
Jl. Gatot Subroto no. 10
Jakarta 12190
Indonesia
Ph. (62-21) 5276023; Fax. (62-21) 5276024
rosa@pdii.lipi.go.id & sari@mss.lipi.go.id

Biography

Rosa Widyawan is a professional librarian graduated from Monash University in 1991. He is working for The Center for Documentation and Information. His research interest is preservation of library material and electronic journals.

Tjempaka Sari Hartomo is a professional librarian graduated from University of New South Wales in 1991. She develops activities on science communication in LIPI and she is the founder of Science Briefing of the Parliament of the Republic of Indonesia. In LIPI the area she is responsible is commercial cooperation and external communication of the Center for Innovation which is in line with her interest namely utilization of information; processed, repackaged and communicated for the benefit of mankind.

Knowledge is power (*nam et ipse scientia potestas est*) as introduced by philosopher Francis Bacon in the 16th century has proved widely through the period in history. The rates of human development such as our capacity to improve the health and welfare and to overcome poverty as to achieve sustainable world are examples of the power of knowledge. Hence, the rapid development of knowledge will be meaningless unless it is shared.

Indonesia Institute of Sciences (LIPI) has been a referred centre for science and technology in Indonesia. This Institute has a scientific capability to produce numerous scientific discovery and services. Some of its products have been utilized by stakeholders, namely industries, and government institutes for the benefit of the people. However this system should be strengthened and improved by efficient and effective science communication programmes: such as science briefing, industry relation, public advocacy, press release, etc.

Knowledge based resource management plays important role in this endeavour. The Centre for Scientific Documentation and Information, The Centre for Innovation, Bureau for Cooperation and Popularising Science and Technology work together to bring science to the people for their better life.

INTRODUCTION

Nowadays knowledge is growing more rapidly over period of history since the early hood of human being. If we look back through the history of man, since the first time man coming to the world, knowledge is close to them and it accompanies them day by day through their life. In a simple world, knowledge serves them as a tool to survive in a vicious surrounding of the world where the condition applies that the strongest is the winner and the least or the weakest is the loser. It is not an exact tool though, as their real tool are very simple and it is often made of stone, then made of wood. Knowledge also assists and equips them with courage to conquer the world and build sustainable world from one generation to another

generation through their ability to do reproduction. They live in groups, pairs and even individuals. They look for food and protect themselves from the wild nature and threats from outside as well as they defeat their enemies. Knowledge lies in a stage of assisting human being for survival in the world. It proves that knowledge is useful, necessary and important for them. At that time knowledge is shared among them naturally and spontaneously.

Then early civilization of man comes until the time where we are here where discoveries and finding come out and make human life is more sophisticated. The 20th century is noted with the greatest flowering boom of advanced knowledge over the million years period of story of humanity is coming where both discoveries and innovations spreads out in many fields such as in medicine, biology, modern chemistry, rocketry, outer-space, electronic, computer, telecommunication, communication, automobile, military equipment and weapon and many others. It is perceived that knowledge brings big and various impact for human life. It changes the structure and the condition of human life. People do things tend in an instant way and very efficiently. The way people count is no longer by minute but by second. Admire, praise and astonishment follows all the advancement of knowledge for human life. Then, boundaries between people and interests lies behind all the glamorous modern innovation comes naturally and unintentionally. A question then arises whether knowledge is still shared ?

Then now we are in the 21st century which is characterized by the deficiency in human basic need, resources and knowledge as said by Cribb and Hartomo. Another unfavorable impact left in this century is the born of what so called "the have and the have not" and "the informed society and the uninformed society". Nevertheless that the readiness and the capacity of each society influences their ability to absorb and adopt the application of more technology in their life. However, if knowledge is shared equitably and equally among them, at least people can avoid the wideness of gap between them. Therefore, it is expected that librarians, information workers, communicators who work closely and deal with information and knowledge in their daily life have a favorable understanding about the ideas of sharing knowledge and support it. Actually sharing knowledge is such an extended service of the utilization of information.

Overview of LIPI

The Indonesian Institute of Sciences which is in Indonesian is called as Lembaga Ilmu Pengetahuan Indonesian, abbreviated by LIPI is a research institution which is owned by the Government of the Republic of Indonesia. It carries a main task to assist the President of the Republic of Indonesia in developing science policy in Indonesia. The coverage of LIPI task are organizing research and development, providing guidance and services to scientific and technological enterprises and conducting strategic and fundamental research in science and technology.

LIPI has 19 research centers ranging from hard sciences to social sciences, 3 supported centers, 4 bureaus which are responsible for any administrative matters, 20 technical implementation units and a number of research stations. The location of those units are scattered in the Indonesia archipelago, from Sumatera island until Irian Jaya island. LIPI is chaired by a Chairman who is assisted by vice chairman, 4 deputies and 1 corporate executive secretary. Operationally Chairman of LIPI is responsible directly to the President of the Republic of Indonesia.

Its mission are to master science and technology in the incessant efforts of strengthening national unity and of vitalizing the competitiveness of the nation; to participate in the endeavor to develop the national community through the program sustained development; to

promote a code ethics for scientists. In providing its service to the nation, LIPI has commitments, namely responsibility to the world of learning, responsibility to the society and responsibility to stakeholders and users.

IPTEKDA: a new task in the years of economic crisis

When economic crisis started in medio 1997 which was followed by multi dimensional crisis, early 1998 LIPI got an additional duty, namely to assist Indonesian small and medium enterprises (SME) in particular micro enterprises which were directly suffered from the economic crisis and needed assistance.

The dragging of economical crisis drives many enterprises limit their production and even close their business. This situation creates a mounting unemployment in industrial area because of mass dismissal. A lot of this unfortunate people trying to find their income in informal and Small Medium Enterprises (SME). It is reflected by the increasing request of information on appropriate simple technology to support SME. LIPI then established a program which is called IPTEKDA (In Indonesian: Ilmu Pengetahuan dan Teknologi untuk Daerah) means Science and Technology for the Region which is aim at assisting and facilitating economic recovery using scientific researches in particular those of LIPI. The activities of IPTEKDA follows the concept of sustainable business systems. It means that the activities and the capital of the project is growing, moving and revolving to get a number of beneficiaries from the project as much as possible. So instead of having 20 beneficiaries in the first year of the project, the project will keep on moving to get greater number than 20 beneficiaries in the following year.

Another characteristic of IPTEKDA is prioritizing on income generation, creating opportunities for employment, empowering women, developing potential of the regions and providing problem solving as well as total solution. Since 1998 IPTEKDA is developing and now is the 5th year with a total number of projects or activities is 107, locates in Sumatera, Java, Madura and Bali. Most of the activities are conducted in the remote area of the outer island and brings benefit to Indonesian grass root.

A success story of IPTEKDA's project

A success story of three IPTEKDA activities are interesting to be exposed. The first activity is Cricket Breeding of in the slum of industrial area of Surabaya, East Java which started in 1999. LIPI in cooperation with Airlangga University using simple appropriate technology, trained fifty (50) household in the Rungkut neighborhood complex to do cricket breeding as a part time job. Cricket in Surabaya is needed for feeding animals and birds. Cricket in East Java is also consumed by people there and it is cooked as crispy snacks, ingredient for cooking which called "terasi" which looks like "vegemite". As well cricket is used as ingredient for cosmetics. LIPI provided both capital and scientific guidance for this activity. With the capital about Rp. 40.000.000,- (A \$ 8.000) for the whole activity, after three month the capital can be returned back as they already paid their debt in three months time. In 2003 each household is earning an extra income for Rp. 250.000,- (A \$ 50) per month and the number of household who work for this activity becomes 80. The success story of Cricket Breeding shows how LIPI share simple knowledge for the benefit of the people.

Another good example of IPTEKDA result is the assistance given to a factory which produces a metal component for heavy equipment. The products of the factory is exported to Japan to fulfill the order from SANWA and Mitsubitshi. The factory which locates in Sukabumi, West Java, was not in operation in 2000. Then, after assisted by LIPI through the Center for Metallurgy in the following year the factory was able to gain profit for Rp.

30.000.000,- (A \$ 6.000) and employed 100 personnel. Meanwhile the profit is double, becoming Rp. 60.000.000,- (A \$ 12.000) and it can send its employees for training in Japan.

Cultivating fresh water shrimp is done in Bogor, West Java also proves that sharing knowledge with farmers there results in an improvement of people welfare through income generating. Their product reaches 2 to 5 tons per hectare in one planting season and this amount is profitable for them. This activity also inspires LIPI researchers team to create cages with water circulation so that the shrimp are kept fresh during delivery which means it has higher value. The living shrimps cost Rp. 90.000,- (A \$ 18) per kilo whilst the frozen one only Rp. 40.000,- (A \$ 8) per kilo. They also develop raceway pond design, shrimp shelter design and shrimps sex ratio control to improve the productivity.

Warintek (Literally means Café for Science and Technology)

In the field of information sector, LIPI conducts Warintek Programme in IPTEKDA scheme during the fiscal year of 1998-1999. The pilot project is located at Palembang, South Sumatera. Later, the first Warintek was established in Palembang and it was derived from the phenomena of that the improving intense remote communication amongst society in the field of production, trade, research, education and cultural aspects. The aim of establishing Warintek are to support society understanding on the importance of information, to encourage Warintek users having ability to seek information when they need and to locate, evaluate information and to use information effectively. Warintek Pilot Project in Palembang provides catalogue on selected database and internet lines.

The existence of Warintek is critically important in the situation where technology changes very fast and the availability of information in different formats exists. If people have no information access point, their condition probably could be worsen.

Warintek tries to facilitate its users such as teachers, local Research and Development Unit and units SME to access information with affordable price. Furthermore, LIPI can share its knowledge more effective because Warintek will be able to support its local stakeholders. So far, Warintek Programme which is a kind of Cyber Café, is considered successful.

Because this programme is considered successful, the Ministry of Coordinating Science and Technology is offering small Warintek program to be a national scaled programme. The argument is the program is inline with the National Strategic Policy on Science and Technology Development 2000-2004: strengthening national information infrastructure to support the science and technology information accessibility and utilizing the advance of global information infrastructure. Then, Warintek is launched by the Ministry of Coordinating Science and Technology.

In the development of Warintek, there is a need to launch Warintek 9000. The 9000 indicates the amount of Warintek will be in the year of 2004. This ambitious programme is aimed at supporting the better quality of bureaucrats, administration services, improving local government integrated management information systems, improving human resources development, etc..

Trough the above examples, it is indicated that information access in Indonesia leans on the availability of infrastructure supported by information (content), information resources, policy and legal aspects.

Other sharing activities for the people

Another program which brings good impact at the national level that is a research that was conducted by LIPI through the Center for Chemistry. That is the production of Tempe inoculum (yeast). Tempe is nutritious soybean cake that is made of soybean through a fermented technology. It is very popular food consumed by ordinary Indonesian, in particular grass roots in Java island as it is nutritious, healthy, nice and cheap so that ordinary people can afford to consume tempe. A successful research conducted by the Research Center for Chemistry produces healthy and cheap Tempe inoculum and at present the business of Tempe inoculum is managed by PT AVI, a spin off company of LIPI. In addition to this production, LIPI also trains handcraft man from SME or even home industry to produce tempe in their homes. It is not just tempe that they produce, they also produced tempe based food, such as crispy snacks, paste and any other kind of food. This activity shows that LIPI is able to share its knowledge to people and through that knowledge people can leverage their income and improve their life.

An activity of LIPI through the Center for Scientific Documentation and Information in 1999 initiated to distribute brief business guide for SME in the form of leaflet. The content of the guide is information on simple appropriate post harvest technology. It is about 305 kinds of business guide has been produced. Among them are Cultivating cricket, Producing arrowroot, Producing cassava flour, Cultivating silk worm, Producing coconut husk tile, Producing papain, Producing aloe vera fresh drink, Active carbon made of coconut shell etc. In addition to the production of business guide in 2000, LIPI in co-operation with the Office of Coordinating Ministry for Research and Technology produced CD-ROM on appropriate technology in particular in the field of food, clothing, shelter and traditional medicine.

New paradigm: outward looking and research for industry

Recently LIPI is in a transition period which is characterised by the New Presidential Decree concerning the new task and functions, while its daily operation is still in the old structure and mechanism. Each center in LIPI is still working separately.

The fast changing situation in Indonesia drives LIPI to rethink about the form and function of their research. It is necessary to change from conducting research on identifying natural and social phenomena to research which has utility dimensions through understanding natural and social phenomena. This changing paradigm need a change of thinking orientation from inward looking to outward one.

Actually the changing paradigm has begun since 2001, especially the bureaucrat-isation of some structural units such as technical service units and information units to facilitate LIPI relationship with industries. Hopefully, this endeavour will become the vehicle of commercialization of research and mobilizing people funds to support LIPI functions.

The RI Government realizes the importance of additional budget through commercialization of LIPI services. In 1990 LIPI research categorised into: (1) New Frontiers Research (2) Development Concept (3) Services, and (4) applied research, pilot scale research (goods). While then it is identified that LIPI has done many good researches in laboratory scale. To bring the researches to the market and to be used by people, LIPI needs to extend the researches to pilot scale. This fact drives LIPI trying to commercialise its research through working together with industry, establishing foundations, cooperatives and even enterprise as well as establishing spin of companies.

Before this process happened and it was regarded as such a preparation to the process, LIPI had a project called Management Systems Strengthening (MSS LIPI Project) which was a twinning project between LIPI and the Commonwealth of Scientific Industrial Research Organization (CSIRO), Australia as a consultant in improving its R and D management. The

Project began in March 1997 and terminated in mid 2001. The area which is strengthened are R & D planning, commercialization and communication. In addition, other support components that are also strengthened are management of information systems and management of resources.

This program has “drastically” effects especially in the aspect of communication amongst units and LIPI's communication to the outside world. There is awareness amongst staff who work interdisciplinary, awareness and willingness to work in the spirit of LIPI corporate, awareness to improve their work performance, realize the importance of bibliometrics and science mapping to assess their own work performance.

Sharing knowledge effectively

Many input that LIPI got from working in partnership with CSIRO. A lesson that is learned from CSIRO is **no matter how good the researches LIPI does, it becomes less meaningful if it is not share**. An important advice from CSIRO is that LIPI needs to strengthen its science communication activities. An effective marketing communication strategy in every year must be developed and evaluated at the end of the year. LIPI has to address its work to various audiences through the appropriate means or channels. Among the audiences are stakeholder, personnel, government, industry, media and public.

To respond to the advise, LIPI have to look at its strengths, weaknesses and what it had been done in the past. This Institute has a scientific capability to produce numerous scientific discovery and services. Some of its products have been utilized by stakeholders, namely industries, and government institutes for the benefit of the people. Good work of the public relation office contributed to its success. However that work is not enough. Therefore this system should be strengthened and improved by efficient and effective science communication programmes: such as science briefing, industry relation, public advocacy, press release, etc. to respond to the development of every aspects in the world as a whole.

Sharing knowledge through science briefing had been conducted in the year of 2000 to Indonesian Senate in the Parliament house. This was the first Science Briefing in Indonesia and it was also the first science briefing that was conducted in the House of Parliament. The reason is that the parliament has a strategic position in supporting the development of science and technology policy including its budget in Indonesia. This board has authority to make legislation and regulation. It has also an initiative right to control the executives in relation to science and technology policy and implementation. It is expected that science briefing can build the understanding of members of Parliament about science (the content and message carried) so that it helps them to produce the right and appropriate policy from the Parliament to the related science. The audience of Science Briefing is not just for Member of Parliament but it also invites representatives from government and private institutions related to the topic, media and public. Therefore science briefing enables to bring a dialog between the audiences.

With a spirit of Indonesia incorporated, LIPI requested the Coordinating Minister for Science and technology to launch the first science briefing on the topic: earthquake and its disaster planning in July 18, 2000. The briefing lasted for 30 minutes for 3 speakers and it was followed by 30 minutes refreshment. It was about three hundred audiences turned up. This may be supported by the popularity of earthquake that often happens in Indonesia and even it happened one day before the briefing was on the air. The second Science Briefing was conducted in 2001 on the tropic transgenic product. It was a very sensational since the issues of transgenic product is still controversial at that time. The two science briefings where LIPI was involved in managing the performance was very successful. It may be the

impact and the contribution of the second science briefing, then the Parliament and the government work well together in launching the regulation on transgenic product.

Beside providing assistance for Small and Medium Scale Industry, LIPI also builds relations to Large Scale Industries. Working with industry means using industry to be the mediator between the research and the people who get the benefits from the research. Industry will facilitate to change the research to become a product used by the people. Communication to the industries is maintained through Informal personal approach between LIPI's executives and top executives of industries, industry briefing, regular meetings between LIPI and industries, meeting with industry associations, industry visit, forum industry and information to industry. So far, LIPI starts to develop co-operation in the field of research and development activities with Engineering Industry for preparing a pilot plan for oleo chemical industry and National Food Industries, Pharmaceutical industries, Cosmetics industries, Herbal Medicine Industries in the field of product development. LIPI also provides services for industries which need services on measurement, standard, and testing quality.

Industry briefings, forums and meetings are the most popular channel of communication between LIPI and industries. LIPI conducts such meetings and forum 4 to 6 times in a year through the Centre for Innovation which is such a commercial arm of LIPI. The benefit from these events is enabling both industry and LIPI to build a fruitful dialog to decrease the gap and to maintain mutual understanding between them. Naturally there is always a difference between them in seeing something as they see it from a different angle. However they have to work together to produce goods in a good quality that is seen from the view of industry and research institution. Often it happens that goods produced from a research is not suit for people need in the market. For this reason also, LIPI need input from industries and involves them in LIPI's planning.

LIPI's approach to printed and electronic media is getting better from time to time. Releases, press conference, LIPI's news coverage in radio and television are continuing and it get better in term of quality. This is because LIPI is always ready to learn from the mistakes and willing to put more energy for improvement. LIPI realise that sharing its knowledge using media means sharing the knowledge to people as a whole as media can reach people even in a remote distance.

Discussion

It does not mean that above programmes are carried out smoothly, the Cricket Breeding in Rungkut, Surabaya is predicted that it can not survive for more than three years effectively because of over production and the people will find difficulty to market it. Then, it is feasible to introduce post harvest technology such as making caterpillar flour, crispy snack, etc. Facing the coming situation, the Rungkut people should seek a solution to make another business ornamental fish hatchery which can be carried out in aquarium.

The shrimps breeding program has better result than the other IPTEKDA programmes because this commodity occupies a good market, they supply supermarkets and restaurants in big cities. The good market of this business force them to make a strict quality control and drive them to make a tight business lines. Comparing to other IPTEKDA programmes, farmers who participate in Shrimps breeding programme are more resistance to money lender who buy their commodity before harvesting in a lower price. We assume that they have a better understanding on the importance of business lines.

It needs time to convince rural people about the importance of not selling their commodity to money lender. They are facing economic difficulties in their daily life and they badly need

money. Generally they demand fresh money immediately. The system to go to money lender has been part of their habit from one generation to another generation. In this situation, LIPI need to use spokesperson who are credible to rural audiences rather than to scientists. They are usually community leaders (big men).

IPTEKDA programmes using simple appropriate technology are more welcomed by people rather than modern Warintek, because it needs an affordable capital and has a direct impact to their economic improvement. To run a Warintek, a corporate body should provide Science and Technology information services, fully operated two units computer for Warintek activities, space, telephone lines for internet and facsimile, employ fulltime staff and develop local database.

Warinteks of IPTEKDA which was adopted by The Ministry of Coordinating Research on Science and Technology in Warintek 2000 facilitate ordinary Cyber Café with soft loan ranging from Rp. 25.000.000,- to Rp. 150.000.000,- (A \$ 5000 to A \$ 30.000). This situation accelerates the development rate of Warintek spreading all over the archipelago. Recently the amount of Warintek mounted to 120 units.

This number is still far from the ideal. The reason is that the business is not profitable, unless there are many Warintek users who use the service. The targeted in the year of 2004 the number which is 9000 is still questionable.

To run a Warintek, the above requirements are considerably difficult even for a public library in a small town, because computer is still a luxurious asset and there are still many of computer illiterate “librarians” in small towns.

There are only few Warinteks that actively doing its functions as integrated information service centers that develop a local database. There also hardly found a Warintek prepares a computer network with some information resources.

In some extents some LIPI programmes mentioned above are relatively successful in generating income and support people who are trying to make a better life, nevertheless it seem not effectively carried out because they are not well design in accordance with the existing market. The case of Cricket breeding which is not resistance to the fluctuating market will never happen if LIPI conduct an independent research on public needs and priorities, and carefully analysis the market segmentation for various products and process.

The case of inoculum and shrimp breeding are different from the case of cricket breeding because the two kinds of commodities are highly demanded and have a good market. LIPI has successfully shared its knowledge to make a better tempe with a better taste and price. It will be better if LIPI is trying to introduce a better quality local soybean, raw material of tempe. The large amount of soybean is still imported from other countries.

Other communication programmes as advised by CSIRO such as science briefing, industry briefing, press briefing etc. are demanded to continue regularly from time to time. It seems the partners of LIPI or the audiences of the communication programmes have already found the benefits from the programmes. The request to LIPI is that LIPI keep on searching, identifying and picking the right topic for the right time so that the impact can be distributed in the national coverage and it addresses to the national issues. There will always be a room for making things better from time to time.

Although nearly all LIPI scientists are not trained to communicate with external audiences, the new organizational structure makes them work with other disciplines or profession as a team. However, they also still concentrate on their own core competence, especially when they work with external parties. In the case of IPTEKDA, they never worry about their work may get into the wrong hands nor restricted confidential arrangement. The reason is that the

technology they introduced has already been a public domain. Moreover, the projects offer a chance of their professional career, because they can improve the existing technology through new innovations.

CONCLUSION

The changing paradigm has begun since the bureaucratization of some structural units such as technical service units and information units to facilitate LIPI relationship with industries. It becomes the vehicle of commercialization of research and mobilizing people funds to support LIPI functions.

As an impact of the changing paradigm, in internal organization there is a mobilization of resources to meet high efficiency and effectiveness in every aspect. The spirit of working in an umbrella of corporate LIPI among staff is directed from the ideas and thought of LIPI as a corporate.

Sharing knowledge from research institution to the outside world is a must and important in order that outside world know what the institution does and the fact that they are one entity, that is the unity between the supplier (producer) and the user. In a simple way, it can indirectly be transmitted in the form of marketing communication of the institution.

Sharing knowledge in the case of LIPI is in various forms and audiences.

There is program that has direct effect and there is program that brings indirect impact and even there is program that just serves as clearing information from LIPI to audiences. It covers from programs that make people to generate income and program in which the people just use the knowledge to enrich their life.

There is always an excellent co-operation inside an organisation to perform a great task, that is the contribution of the related units responsible to perform the task. Within LIPI, the Centre for Scientific Documentation and Information (PDII) is responsible for providing information, Bureau for Co-operation and Popularising is in charge of distributing information in particular to media and public while the Centre for Innovation shoulder task for industry relations.

REFERENCES

Cribb, Julian and Hartomo, Tjempaka Sari. Sharing knowledge: a guide to effective science communication. CSIRO Publishing, Melbourne, 2002.

Hardono, A.P. Potensi teknologi komunikasi dan informasi dalam mendukung penyelenggaraan pendidikan jarak jauh di Indonesia (The Potential of information communication technology in supporting distance education in Indonesia. Available at <http://www.bogor.net/idkf/idkf/aplikasi/pendidikan/pemanfaatan.doc>.

Setiarso, Bambang (2000) Science and technology information services in Indonesia: a case PDII-LIPI.

Sumarlin, Widyantoko. Upgrading SME technical capabilities: a need for policy shift in the era of decentralization in Indonesia. Available at <http://www.capstrans.edu.au/confpapers/widy.pdf>.

Widyawan, Rosa (2003) Membuat ilmuwan kita lebih seksi (Making our scientists sexier. Ilmu and Teknologi, Koran Tempo, Kamis 19 Juni, 2003.