

APPRAISAL OF INFORMATION NEEDS OF ENGINEERS IN INDONESIA *

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Abstract

This paper discusses reports of the surveys on information needs of engineers which have been conducted in Indonesia in the last ten years. It also covers technological transformation in Indonesia, such as micro level technology indicator within 10 strategic industries. Various data centers/information centres of different subjects are included in this paper. Based on the above mention surveys, it is concluded that: 1. Communication among information providers and engineers, especially those who are dealing with research and development is still weak. 2. Most engineers in Indonesia are lacking of information about the availability of S&T information sources in the country. 3. Information/data centers are scattered diverse in various subjects and they haven't been linked each other yet. 4. So far, the quality of S&T data/information provided has not met with the industrial development needs in the country. 5) Promotion on information sources haven't reached all engineers especially those who are dealing with R&D activities.

I. INTRODUCTION

Today Indonesia's income from non-oil and gas exports is US\$ 2 billion per month. In 1981/1982 non oil and gas exports were still fairly low, accounting for only 18,1% of total export earnings, whereas by 1993/1994 the share had risen to 75,8%. The rise of non-oil and gas exports has been accompanied by diversification into new commodities and the opening up of new markets.

The increasing strength and sophistication of the economy is also evident in the growing network of basic infrastructure services, such as, electricity, roads/transport, and telecommunications.

Mean while science and technology (S&T) development is directed toward the improvement of the intellectual level and capacity of the nation. S&T development also aims to accelerate the process of change, improve productivity and industrial efficiency, expand employment opportunities, raise the dignity of the nation and improve the people's welfare. Additional targets of S&T development are to create a more conducive business climate, to increase creativity, and to enhance production standards.

At present, deregulation and trade liberalization policies of the Government of Indonesia, are addressed to improve their productivity (that into produce more outputs with less inputs) and to produce higher value added outputs for international market competition. The philosophy being that national technology capability will be most effectively strengthened through a process of progressive learning: 1). utilization of existing technologies acquired through technology transfer; 2). adaptation of existing technologies for development of new product; 3). developing and utilization of innovative and new technologies for new products and; 4) basic research for development of new innovation.

In keeping with the rapid development, and accurate and reliable information system is necessary to administer and monitor development. During this Repelita VI the (6th Five Development Plant, 1994-1999) will improve efficiency and productivity in all sectors and to develop a multi sector information system network which is linked both to regional centers and to the rest of the world. This will contribute to the long term goal of national self reliance in the field of S&T information.

Information services provided by libraries and/or documentation centres should meet the need of end users, especially engineers, research and devel-

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opment staff. Therefore, it is essential for libraries and information centres to find out the users. For this reason some surveys on information needs and seeking behaviour have been conducted in Indonesia in the last ten years. Some of the surveys are the following.

II. SURVEY ON INFORMATION NEEDS OF ENGINEERS

1. A survey on "Information Needs of Engineers" was conducted by the Committee of Engineering Information, Indonesian Institute of Engineers in 1985/1986.

A number of 673 questionnaires were sent to engineers working in the fields of irrigations, fertilizer and pesticide, machinery and equipment, and production.

The survey came out with the following information needs.

- a. In the fields of irrigation, engineers need information on regulation, testing and laboratory facilities and raw materials.
- b. In the fields of fertilizers and pesticides, engineers need information on marketing data, production processes, regulation and raw materials.
- c. In the fields of machinery and equipment, engineers need information on machinery and equipment, research testing and laboratory facilities and raw materials.
- d. In the fields of productions, engineers need information on production processes, marketing data, research testing, laboratory facilities and raw materials.

2. A survey on Information Needs of Engineers in East/South Asia and Oceania in 1986. This survey analyzed 261 questionnaires from 10 countries (i.e. Australia; Hongkong, Indonesia, Korea, Malaysia, New Zealand, Papua New Guinea, Philippines, Singapore and Thailand).

The survey results suggest that:

- a. Improvement of information services includes selected dissemination of information; specialized information; on-line services; faster supply of documents, especially foreign sources.
- b. Promotion of information services in order to make the engineers aware of the various ex-

isting information networks and information services.

- c. Improvement of collection building includes increase of budget or financial support for acquisitions; more technical journals, books and patents. Union catalogs are also suggested, and exhibitions of new books are required.
- d. Information processing is also suggested to be improved. It covers abstracting & indexing systems; better pre-selection of information and the building-up of data banks and data bases.
- e. Other publications such as state-of-the art reports, critiques, technicals journals and R&D news, are also suggested.
- f. The use of television and more use of mass media is suggested for improving information services.
- g. Training & advice is suggested for special libraries and interested users.

3. A Survey on "Information needs in the Province of East Kalimantan" was carried out by PDII-LIPI team in 1993-1994.

The results of the survey would be used as the basis for developing information services by Center for Information and documentation in the Province of East Kalimantan. The finding of the survey indicates among others:

- Respondents from industrial sectors need information about global impact on industries and investment, forestry engineering, fire and safety, and legal issues.
- Respondents from provincial government institutions require wide range of information on science and technology, economy and development, geography, remote sensing, anthropology, Ethnography, legal aspects of land, pollution control, sociology, demography, informal sector, agriculture, forestry, and government management and administration.
- Respondents from university need information on politics, management, agriculture, forestry, and languages.

At the same time Similar Surveys have been conducted by PDII-LIPI in Bengkulu Province in Sumatra and in Wamena-Irian Jaya. The results are almost the same with the above survey.

4. A "country survey" has been conducted by CAB International in 1992.

Since the priority needs of the country in the field of research and in information dissemination as indentified by the mission can be summarised which are related with the information follows:

- enhancement of library services with a strong training component and special repackaging of information for policy maker and planners.
- establishment of a biodiversity data base for natural resources planning.
- expanded capability in CD-ROM information archiving and retrieval.

The CABI mission briefly reviewed the information sector in Indonesia, which is diverse and complicated. The sector is based on a number of key national and regional centers. The mission indicated that there are 4 key centers a dealing with Agricultural, forestry and Biological Information. The key centers are: 1). The Center for Agricultural Library and Research Information (PUSTAKA) in Bogor; 2). Forestry Research and Development Center (FRDC) in Bogor; 3). Center for Scientific Documentation and Information (PDII-LIPI) in Jakarta and; 4). Agricultural Products Research Institute in the Ministry of Industry.

5. Information needs and information seeking behaviour among R & D staff of Ten State Owned - Strategic Industries. The survey was conducted in ten state-owned industries under the Agency for Strategic Industry Management. The respondents consisted of 171 staff members (10% of the population) who dealt with research and development activities. Twenty senior staff representing the respondents and officials were interviewed. In addition, field observation was also conducted. It was found out that information needed by respondents were not merely published documents. Most information was used for solving day-to-day activities. The information needed was about tools/equipment, theories/methodology, processes and products. Respondents did not use much information for supporting their research activities. Standards and specifications were mostly used information followed by information about new technology. Hand books, guide books, and manuals were mostly used information sources. Secondary literature such as indexes, bibliographies, and

abstracts was rarely used, however, current and foreign information was regarded as the most important information. Respondents were seeking information through various ways, using both oral and written information sources. In seeking information, firstly respondents contacted their colleagues within the industry who they thought had better knowledge/information. Only 5.12% respondents obtained all information they needed from the colleagues. Respondents tended to look for information from their own collections, then they searched through working unit library, company's library and colleagues' collection. Respondents rarely used other libraries out side the companies. Only 9.94% respondents stated that they obtained all information they needed from literature. They stated that the opportunities to communicate especially with librarians outside the companies, to study literature, participate in the seminar, and to visit the exhibition needed to be increased. Most respondents (68.42%) came in person to the libraries searching for the information they needed. However, they actually wanted more sophisticated document ordering systems, such as electronic mail. They expected that the required information could be available as soon as possible, for example, at the same day. Funding spent for information was still very limited. Current information services provided by libraries were hardly used. Most respondents indicated that they obtained current information from seminars/meeting dan new periodicals. They suggested that the researchers needed to be informed about information sources and information retrieval. Communication among experts of the same interests/fields needed to be intensified. The librarians within the state owned industries under the Agency for Strategic Industry Management should develop their capabilities and services and cooperate with other institutions in order to meet the information needs of the staff. The dissemination of current and foreign information should be given more attention.

III. TECHNOLOGICAL TRANSFORMATION

A three year project (1990-1993) on "Science and Technology Management Information Systems (STMIS)" has just been completed by the Center of Analysis of Science and Technology Development

(PAPIPTEK) of the Indonesian Institute of Science (LIPI). United Nations Development Program (UNDP) and the Government of Indonesia provided funding for this project. The objective of this project is preparing a comprehensive Indonesian S&T Management Information System and its network.

This project published: *Guide for Technology Management Information System*, which covers: Rationale and Frame work for Technology Management and Ilustrative Case of Using Technology Indicators and STMS Design and Manuals.

Micro level technology indicators were studied among 10 "Strategic Industries" to assess the performance and also to help plan for future development of the strategic industries. These studies used "Technology Atlas" method which covered technology components namely; 1). technoware; 2). humanware; 3). infoware and; 4). orgaware. Detailed illustration INFOWARE for some industries of are the following:

1. In PT. IPTN (Aircraft industry), the level of infoware sophistications is only up to the degree of sophistications of utilizing facts. Infoware is only available to operate and maintain machine. Even here the knowledge is not complete.
2. PT. Krakatau Steel appears to have serious problems. It doesn't have infoware at the degrees of sophistication of comprehending, generalizing and assesing facts. This is the weakness that needs to be rectified. The recruitment of high level humanware for internalizing the know how should be a priority for this industry.
3. In diesel engine production, PT. Boma Bisma Indra (PT. BBI), A Dentz, Daihatsu, Mitsubishi, Stark Weekspoor and Cuminious, consequently capability of PT. BBI has good capability in design and innovation. Details of Data for such units should be collected in the future.
4. In PT. PINDAD (Light Weapon & Amunition Industry) in Bandung seems to be still much dependent upon foreign sources in terms of its licence products.
5. PT. Inti (Telecommunication Industry) has a serious problem by not having infoware for major maintenance. This weakness need to be rectified so recruitment of high level humanware for internalizing the know now should be a priority for PT. INTI in order to be the center of Excellence in the telecommunication industry.
6. In general, the degree of infoware sophistication at PT. LEN (Electronic Industry) is still dependent on foreign expert for maintenance of major equipments. It means that it will distrub the production unit. The requitment of high level humanware for internalizing the know now should be a priority for PT. LEN.
7. From the product range of PT. Barata Indonesia (Construction & Harvey Machinery Industry), it may be said that infoware level is still far from the state of the art. Nationally however PT. Barata has the advantage to be the first which introduces new sugar factory machinery that is competetive in the world market.
8. In PT. PAL, to define the status of infoware, the type of information is grouped into 4 types e.i: opening information, for chasing information, in planing information. The degree of PT. PAL infoware is above the level of utilizing facts, but not at the state of the art.
9. The status of infoware in PT. INKA (railway industry) is still far from the state of the art. Most infoware in this industry is not recognize/clear with their specialization, either the local or foreign manpower.
10. In PT. Dahana (explosive industry), the status of infoware is still dependent upon foreign sources.

IV. INFORMATION AND DATA CENTERS FOR VARIOUS FIELD

Access to relevant, timely information should be recognised as prerequisite for success in any sphere. In engineering and technology information, it is critical at all levels from policy making and planning, through industry, R & D and down to technician. Lack of information is a major constraint to progress by including adequate provision for information service. *The Directory of Special Libraries and Information Sources in Indonesia*, updated every 5 years briefly reviewed the information sector in Indonesia. This fiscal year 1994-1995, the newly updated version will be published. Some of the important ones are listed in the following table.

V. CONCLUSION & RECOMMENDATION

Through the above report, it is clear that :

- 1) Communication among information providers and potential users in within industries is very weak.

Table 1 : Data/Information Centers for various fields

CENTER	FIELD	N F P
Indonesian Centre for Scientific Documentation and Information - Indonesian Institute of Sciences (PDII-LIPI), Jakarta	Science and technology; Environmental	ASTINFO, INFO- TERA, ISDS, ENISCNET
National Library for Agricultural	Agriculture Sciences, Bogor	AGRIS, CARIS
Bosscha Observatory, Dept. of Astronomy, Bandung Institut of Technology, Bandung.	Astronomi	
Geological Research and Development Center, Bandung	Geology	
Marine Geological Institute, Bandung	Marine Geology	
Aerospace Research Center, Aeronautics and Space, National Institute of Bandung	Aerospace Indonesian	
National Coordinating Agency for Survey and Mapping, Cibinong-Bogor	Geography	
Center for Soil Research, Bogor	Soil science	
Central Bureau of Statistics, Jakarta	National statistics	
Institute of Standardization - Indonesian Institute of Sciences, Jakarta	National standards	
National Atomic Energy Agency, Serpong- Jakarta	Isotopes radiation Nuclear energy	INIS
Centre for Analysis of Science and Techno- logy Development, Indonesian Institute of Science, Jakarta	Science & Technology	
Research and Development Center for Oil and Gas technology (LEMIGAS), Jakarta	Oil and natural gas	
The Agency for the Assessment and Appli- Application of Tehnology (BPPT), Jakarta	Technology	

- 2) Most engineers in Indonesia are with the lack of information about the availability of the S & T information in the country
- 3) Information / data centers are scattered/diverse in various subjects and not yet linked each other.
- 4) the quality of S & T information/data needs major improvement in order to meet with the industrial development in the country.
 - a) Recommendation countries in Asia pacific should for review the existing data/Information center and link them together.
 - b) Indonesia needs supports for developing the information specialist capability of in various so that they will know.
 - c) how various sources of the above fields/subjects.
 - d) how to develop database bibliographic, numeric, and full text to manage the Data/Information center and how to link them.
5. Promotion in information sources haven't reached all engineers especially those who are dealing with R & D activities.

- a) International and regional agencies dealing information such as, ESCAP, INFOTERRA, FID should support collection and manpower development.
- b) Indepth survey on information needs should be planed and implemented periodically copying more specific subjects.

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