

HUMAN RESOURCE DEVELOPMENT STRATEGY
NATIONAL NUCLEAR ENERGY AGENCY
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TRAINING TECHNOLOGY DEVELOPMENT

Manpower development is one of the prerequisite for the safety of nuclear facilities in the country. Recruitment of competent staff is difficult in the country, especially facing the economic and social barriers. Replacement of retiring staff and the ageing of the existing research reactors and existing work force, require great efforts from the management for establishing proper qualification and programs. From the external environment point of view, the consequential lack of interest of new professionals to engage in the nuclear fields consider to be the major national concern. The situation is compounded by the great reduction in higher education opportunities in the field of nuclear engineering and the elimination of nuclear engineering department in many universities.

To respond to the above situation, several major policies need to be established to provide support for the country in establishing its current nuclear implementation program and launching and embark its nuclear power programs. The objective of developing training technology is required to ensure and maintain proper and adequate levels of competencies. The training technology should ensure that staffs are aware of technological developments and new safety principles and concepts. Development of training technology in Indonesia cover several major concern which are:

Modules and References

Modules and references prepared for training participants plays important role in training implementation. Most nuclear safety related references are published in English. Young scientist's graduates from domestic university most likely prefer training in local language. Therefore, development of modules and references in local language require significant effort by management.

Education and Training Center make provisions for continues upgrading and renewal of the courses and instructions by assigned expert to examine course and instruction. Instructional materials usually were developed and revised by an expert assigned to lecture in related area during training preparation. With regard to information exchange, international co-operations very important in the development of better training modules and references.

Knowledge-based Information System

The ageing of qualified manpower and declining of public educational interest in nuclear

science and technology is the major cause of how important to accelerate the development of knowledge preservation and knowledge dissemination system.

Trainer

The needs of trainer for training in nuclear technology in Indonesia have been adequately fulfilled by domestic scientists and experts. Trainers mostly completed their higher education and training experience abroad. Only a few courses need to be delivered by foreign experts, such as course cover current development. The qualification of trainer is measures based on their curriculum vitae and recommendation from his/her supervisor. Most of trainer in nuclear-related subject has nuclear-related academic degree and several domestic and international training experiences.

NATIONAL HRD STRATEGY

Human resource development in the national level should carefully consider the nuclear technology application in the industry and how education and training system can support the technology demand. If later element does not perform well, then this situation may have a significant impact upon the strategy. Current status of nuclear technology application explains that there are about 400 industrial applications and nearly 1600 medical application of nuclear technology in the country. Therefore, concerning the effectiveness of the education and training system, HRD strategy should consider the science and technology demand and the safety requirement needed and recommended by regulation. From the E and T point of view, HRD strategy should consider the adequacy of the system to conduct effective program, such as the availability of training management, training facility, training material, training aid and equipment, etc. It can be concluded that a comprehensive human resource development strategy is required beginning in the planning phase, construction phase until the implementation of nuclear program. To achieve that goal, careful observation should be aimed to the development of the government infrastructure, the science and technology infrastructure and the education and training infrastructure.

1. Government Infrastructure Development
2. Science and Technology Infrastructure
3. Education and Training Infrastructure

Current Status of National Program (Strategic Planning and Implementation)

Nuclear technology was officially recognized in 1954 through the founding of Dewan Tenaga Atom Nasional (National Atomic Energy Board). The application of nuclear technology in research was started in 1963. A few year before the first reactor (TRIGA) was operated in Bandung. While, the application of nuclear in medical and industrial sectors was come later on. In addition to the application of nuclear technology in research, there are two major sectors in the utilization of nuclear technology in Indonesia. One is the application of nuclear technology in industries, and the other is the utilization of

radiation and radioisotopes in medical therapy and diagnostic. The second reactor was operated in around 1970s and the third reactor was operated 1984. The following Table 1 is the application of nuclear technology in Indonesia based on the mode of application and Table 2 is the list of government nuclear administrative agencies..

Table 1.
List of Nuclear Application Distribution in Indonesia

Sectors	Number of Institution	Number of Permit
Medical	1674	2170
Industrial	425	803
Research	9	26
Total	2108	2999

Table 2.
List of Nuclear National Administrative Agencies

Agency	Total Manpower
BATAN (Promoting Body)	3818
BAPETEN (Regulatory Body)	200

Objective of the Strategy

The Human Resource Development (HRD) Strategy concept is adopted to support a holistic approach to human resource training and development in the framework of peaceful utilisation of nuclear science and technology. To enable it to actualise its constitutional mandate of creating a sustainable economic growth, BATAN envisages the application of nuclear science and technology that is guided by professionalism, ethos of service and innovation, and commitment to the provision of high quality product and service. In the era of globalisation, BATAN is faced with the challenge of transforming its nuclear human resource in a manner that will not only benefit government in its quest for excellent promotion of nuclear science and technology, but will empower the individual to achieve a better life. With the inherited national policy problems, there are enormous challenges facing human resource development in nuclear field. Therefore, the purpose of the strategy is to ensure that education, training and skills development happens in a coherent and strategic manner and, that the government is fully geared towards better human resource role in the transformation and development of peaceful utilization of nuclear science and technology.

Mission Statement

To maximise nuclear manpower development, management and empowerment through education and training to accelerate implementation of nuclear science and technology that will benefit the people in the region

Strategic Objective

The Strategy is one of the cornerstones for giving practical effect to the Human Resource Development Strategy in Indonesia. The strategic objective can be described as the following:

- To develop qualified nuclear human resources for nuclear energy program, industrial and medical purposes within the framework of peaceful utilization of nuclear science and technology,
- To ensure better public acceptance and public appreciation toward nuclear science and technology application in the region,
- To ensure sustainable nuclear human resource development in the field of peaceful utilization of nuclear science and technology.

The strategic objective will be achieved by delivery of the following key results:

Strategic Objective 1:	Effective strategic and operational nuclear HRD planning framework established within the educational and training institutions
Strategic Objective 2:	Effective management and co-ordination of the implementation of the nuclear HRD Strategy for the educational and training institutions
Strategic Objective 3:	Full commitment to promote and implement the nuclear HRD Strategy in all educational and training institutions and organisations

Implementation Framework

In order to establish effective human resource development program, all the issues concerning governmental, science and technology, and education and training infrastructures must be considered. The implementation framework for HRD program then should be builds on the establishment of these infrastructures. Further to be able to strengthening the national infrastructures it has become important that we define strategic activities for every strategic objectives should be careful in such a way that alignment with its key result is imperative. Available data to portray current national infrastructures is limited and much effort is required to complete this project. Therefore, strategic activities in this program should be designed with the limitation in mind.

Governmental Infrastructure

In order to carry out its responsibilities, and adequate governmental infrastructure is required consisting of three component:

- Legal framework
- Organisational structures
- Qualified manpower

The establishment of a legal framework is needed before the start of the implementation phase of any nuclear program and the formation governmental organisation. Then, the staff of the governmental infrastructure to carry out governmental responsibilities and function should be composed mostly of high-level experienced professional with both general and specific knowledge of nuclear science and technology.

Strategic Activities

- Separation of Regulatory Body from the Promoting Body as the implementation on the Act No. 10 / 1997 followed by organization restructuring.
- Manpower development program through education and training program conduct independently or jointly by the agencies within the framework of domestic, bi-lateral and international cooperation.

Science and Technology Infrastructure

Science and technology infrastructure mainly contained in the following organisation:

- Government and private research and development institutes
- Education and training centers
- Professional association
- National Industry

It is the government's role to take the lead in establishing a viable scientific and technological infrastructure for national nuclear program and the effectiveness of this infrastructure mainly depends on the quality of the staff, in addition to the funding and available facilities.

In countries where the level of scientific and technological development is low, it is the government responsibilities to take the lead in establishing a viable scientific and technological infrastructure through promotion and establishment of nuclear technology. Cooperation with other government institution in educational areas would be beneficial.

Strategic Activities

- Initiative on the empowerment of domestic professional association (Radiation Protection Officer Association, Indonesian Association for NDT).
- Provide training for industry by request.
- Development of knowledge-based management system, knowledge preservation and dissemination through e-learning.
- Cooperation with international organization (Japan and IAEA) to develop nuclear science and technology website.

Education and Training Infrastructure

The demand for qualified manpower is crucial nuclear technology implementation. To obtain highly specialized experts from abroad can only be applied in a very limited way and it does not constitute a long-term solution. The development of an adequate national education and training infrastructure is the solution to solve the demand for qualified professionals to meet the national requirements of any nuclear program. None of the government institutions (BATAN and BAPETEN) at this time operate formal educational programs in the area of nuclear science and technology. Supplies of junior scientists and engineers are coming from public and private universities. Education and Training Centre of BATAN, therefore, play an important role in the contribution of manpower development in the area of nuclear science and technology, because this centre is the only institution in the country possessing the nuclear science and technology training facilities.

Strategic Activities

- Cooperation with international cooperation (JAERI, IAEA, etc) to develop training material and to conduct joint training.
- Cooperation with international cooperation (JAERI) to provide training for training instructors and to improve experimental (laboratories) facilities.
- Continues improvement on training management.
- Implement systematic approach to training to develop training program.

Careful formulation of HRD strategy in the organizational level is vital. Participation in strategy formulation by supervisors is particularly essential because they are often more familiar with the specific areas in which problems arise. Furthermore, their cooperation is required for policy enforcement. Though, HRD strategy initiation and formulation issues by top management, proposal and drafting of HRD strategy should ensure conformity with established practices.