

THE 12th INTERNATIONAL CONFERENCE On QiR (QUALITY in RESEARCH)

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WELCOME FROM THE RECTOR OF UNIVERSITAS INDONESIA



I am honoured to have the opportunity to officially welcome you to the 12th International Conference on QIR (Quality in Research) 2011. As we are all aware that the impact of globalization has resulted in a very competitive business environment; a condition that makes the fulfillment of the needs of customer/clients' ever-sophisticated project, product, or service most challenging. Without any doubt, a sustainable design and technology is the key factors in assisting our industries to enhance their contributions to the future development of humanity. Therefore, it is our hope that this conference will be able to provide an international forum for exchanging knowledge and research expertise as well as creating a prospective collaboration and networking on various fields of sustainable engineering and architecture.

In order to achieve business objectives and benefits, engineering products or projects require various resources, skills, and technology. Accordingly, we need an application of knowledge, tools, and techniques necessary to develop sustainable products or projects, which are environmentally friendly, produced through efficient processes, and adapted to local conditions. And this may be achieved by eco-technology. Eco-technology is a technology that will give consumers what they want; lower cost, convenience, save money and deliver what people everywhere needs: less waste, less pollution, and green environment. Eco-technology practices can facilitate to conserve and restore the environment through the integration of engineering and ecological principles. However, eco-technology requires multidisciplinary synthesis of knowledge and skills; and the development and application of this technology in the sector of industry and services is therefore a crucial requirement for sustainable development process. For this reason, we urgently need new technologies and practical applications to be further developed based on the current knowledge.

Accordingly, I hope this conference can be a kick-off for the strengthened action and partnerships on creating a platform for us; national and international thinkers, academics, government officials, business executives and practitioners, to present and discuss the pivotal role of engineers in creating sustainable development.

I would like to thank the Faculty of Engineering of Universitas Indonesia for organizing this meaningful and timely event, and supporting organizations for their participation and contributions. I am sure that you will all find this conference stimulating and rewarding and with this, I wish you all a fruitful conference.

Prof. Dr. der. Soz. Gumilar Rusliwa Somantri
Rector
Universitas Indonesia

WELCOME FROM THE DEAN OF FACULTY OF ENGINEERING UNIVERSITAS INDONESIA



On behalf of the Faculty of Engineering, University of Indonesia, it is my greatest pleasure to extend our warmest welcome to all of you to the 12th International Conference on QiR (Quality in Research) 2011. As we know that this conference is conducted to cover a wide range of sustainable design and technology issues, I hope this two days-conference will be spent in interesting discussions and exchange of ideas. I also hope that this conference will be able to provide a state-of-the-art information and knowledge in this challenging world of sustainable design and technology. The growing success of our institutions and expertise should urge us to develop our competitive capabilities, especially when we face certain challenges which should be overcome with hard work, cooperation, and working together hand in hand. We will work together to develop a common path and develop collaboration opportunities for future action and research on multi-disciplinary engineering areas for quality of life and humanity.

I am delighted that you have accepted our invitation to this conference in such a large numbers as indicated and that we will have many international speakers and papers from various countries to be presented and discussed in these two days. We will explore various issues on sustainable development and we must widen the scope of sustainability from a product-, system-, or an individual building-scale to the whole community-scale. At the same time, we have to widen the focus from ecological aspects to social and economic aspects. This means that environmental solutions should always be considered from the aspects of human health and well-being, safety, and economic point of view. This conference provides an excellent forum for engineering professionals, business executives, industry practitioners, and academicians to exchange ideas and to share their experience, knowledge and expertise to each other.

I would like to thank our sponsors, supported bodies, and various contributors for their generous support of this conference. I would also like to thank our distinguished speakers for agreeing to share their insights with us. To our friends from overseas and other provinces of Indonesia, I would also like to extend a warm welcome to you and wish you an enjoyable stay in Bali. Last but not least, I would invite you to join me in thanking the committed staff that made this conference happen and to make it success.

I wish us much success in the deliberations, discussions, and exchange of ideas which we will have within this conference and I wish you a very pleasant and enjoyable stay here in Bali.

Prof. Dr. Ir. Bambang Sugiarto, M.Eng
Dean Faculty of Engineering
Universitas Indonesia

WELCOME FROM THE QIR 2011 ORGANIZING COMMITTEE

On behalf of the Organizing Committee, it is my greatest pleasure to extend our warmest welcome to all of you to the 12th International Conference on QIR (Quality in Research) 2011. The selected theme for this year's conference is "Integrated Design in Urban Eco-Technology for Quality of Life and Humanity". With this theme, the conference focuses on the scientific analysis and design of the key factors explaining the success applications of integrated design in urban eco-technology, their market perspectives, and their contributions to the existing and future development of humanity. In line with this theme, it is our utmost pleasure to hold the QIR 2011 in conjunction with the 2nd International Conference on Saving Energy in Refrigeration and Air Conditioning (ICSERA 2011).



With its continuous presence for 12 years, QIR has become an icon for Faculty of Engineering Universitas Indonesia in serving the objectives to provide engineering excellence for both national and international in all aspects of engineering, design, and architecture. For the first time, the QIR 2011 is held in a famous beautiful island of Indonesia - Bali. The QIR 2011 is supported by Universitas Udayana, in the spirit of strengthening of cooperation and mutual growth to be world class institution. I am delighted to inform you that we have such a large number of participants today, as indicated, that we will have 21 invited speaker presentation and more than 520 papers from more than 20 countries to be presented and discussed during these two days-conference. We are fortunate to have a lot of good quality papers belong to:

32 papers on ICSERA

39 papers on Chemical Engineering

115 papers on Electrical Engineering

37 papers on Mechanical and Naval Architecture Engineering

101 papers on Materials Engineering

54 papers on Architecture & Planning

75 papers on Industrial Engineering

72 papers on Civil Engineering

I would like to thank all contributors, speakers and participants for your generous support to this conference. It is my pleasant duty to thank all the members of Organizing Committee and the International Board of Reviewers for their advices and help. We are grateful to all Sponsors, Supporters, Exhibitors, Partner Universities and Professional Associations, for their spontaneous response and encouragement through committing funds and extending help in kind. I would like to sincerely thank the Rector of Universitas Indonesia and the Dean of Faculty of Engineering, for fully supporting the Committee and providing all supports to make this conference happen and to make it a success.

I wish you a very pleasant stay here in Bali; and finally, let me wish all of you a meaningful and fruitful conference. Thank you and we hope to see you again at the QIR 2013.

Prof. Dr. Ir. Bondan T. Sofyan, M.Si.
Chairman of QIR 2011 Organizing Committee

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The Role of Art, Spiritual, Science, Engineering & Technology (ASSET) for Improving Quality in Research of the Indonesian Human Resources (IQRIHR)

Olga Pattipawaej^a, Rohani Jahja Widodo^b

^aFaculty of Civil Engineering Department, Maranatha Christian University, Bandung 40164
 E-mail: olga.pattipawaej@eng.maranatha.edu, olga.pattipawaej@gmail.com

^bPresident of the Indonesian Control Systems Society(ICSS/MASDALI)
 Professor of Electrical Engineering, Maranatha Christian University, Bandung 40164
 E-mail : rohanijahja@yahoo.com, rohani.jw@eng.maranatha.edu, masdaliwidodo@yahoo.co.id

ABSTRACT

This paper presents the role of Art, Spiritual, Science, Engineering & Technology (ASSET) for Improving the Quality in Research of the Indonesian Human Resources (IQRIHR). There are four universe aspects, i.e., Physical, Intellectual, Emotional and Spiritual (PIES) related to IQRIHR. There are three basic requirements for improving PIES aspects: Material, Energy and Information (MEI). Those aspects are important inputs for Education & Training (E&T) and Research & Development (R&D) activities for development of ASSET. IQRIHR is desired output that must be attained from activities of E&T and R&D based on ASSET.

Keywords

ASSET, IQRIHR, PIES, MEI, E&T, R&D

1. INTRODUCTION

The development of ASSET represents forces that strongly affect man, life, and civilization. ASSET are ethically neutral. It means that ASSET can be good and can also be evil. The goodness or evil is determined by the purpose and utilization. The purpose of ASSET is to support the development efforts, thus they constitute parts of the development while they also constitute the driving force for speeding up development.

The objectives of ASSET will aim at increasing the quality of human life. The skills of research staffs hopefully bring their bright ideas in designing clear vision for human and national development. Sustainable development must be supported by health economics. In an expose on healthy economics, the healthy industries are highly labor-intensive. Therefore healthy development is tied closely with the redistribution of income seen from two different aspects, namely with regard to equitable distribution the results of development, and with regard to expansion of employment opportunities. The expansion of job opportunities cannot be separated from ASSET and particularly from appropriate ASSET in the rural area. In this connection, one should keep in mind that in developing appropriate ASSET, one must pay heed to the local condition, such as tradition, customs and usages, standard of education, availability of infrastructure.

It is now generally accepted that the principle of appropriate ASSET comprises:

1. Low-cost, in proportion with the income level of the local population
2. Providing job opportunities
3. The tools and equipment used must be required only a few and simple maintenance
4. The equipment and material should be locally available or only small quantities need to be imported
5. In harmony with the local socio-cultural conditions
6. Not needing any intricate infrastructure
7. A high added value compared with ASSET being applied.

The increase of added value shall be achieved through applications of ASSET in that word's widest sense. The ASSET developed must be adapted to social conditions, natural resources and the environment. A scientist graduate of high standard, when he/she is employed in developing countries, must adapt his/her technical skills to the natural condition in such countries, which will be quite different from what he/she would apply in developed countries. The main constraint of ASSET development in developing countries is the fund, material and manpower. In this connection, it will be necessary to adapt the existing ASSET and bring them into harmony with the rural conditions in the countries. That is why it is necessary to emphasize the main managerial aspect that must cover the research of existing tradition, customs, and desires of community with regard to the local skills.

2. ASSET DEVELOPMENT

There are two approaches that must be considered in ASSET development, i.e., prosperity approach and security approach. The prosperity approach will be mainly discussed in this paper. There are four aspects that must be accounted for: Physical, Intellectual, Emotional and Spiritual (PIES) aspects. The physical and intellectual aspects must be supported by Three Basic Needs (TBN) such as Material, Energy and Information (MEI). Furthermore, the subsystems of Indonesian national system are:

1. Demography (human resources)
2. Natural Resources
3. ASSET
4. Law and order
5. Infrastructure.

The activities and development are listed in:

1. Human resources development E&T and R&D
2. Research and development for ASSET
3. Industry and manufacturing
4. Implementations and applications of ASSET
5. Repair, maintenance and rehabilitation.

E&T and R&D in developed countries is for development new ASSET, but in developing countries E&T and R&D is mostly only for importation and utilization of ASSET.

3. BASIC REQUIREMENTS AND ACTIVITIES FOR E&T AND R&D BASED ON ASSET

The second large area for further investment in ASSET infrastructure is energy and natural resources. In Indonesia we are therefore paying attention to possibilities in developing petroleum and natural gas based industries, which use oil and natural gas for feedstock and raw material, fertilizer, plastics, and fiber. The third area for expansion of ASSET facilities, efforts are being made to make industrial. ASSET provide practical solutions to the various problems.

The needs for communication and transportation infrastructure which includes sea transportation, air transportation, land transportation, and postal and telecommunication services and a network of radio and television are also important to be concerned. The transfer of ASSET relevant to the establishment of manufacturing plants to meet nations requirements for industrial products like the ones previously mentioned can only made effective through the consistent execution of realistic and integrated production plans progressively moving to more and more sophisticated ASSET involved in the manufacture of a particular industrial product.

To implementation of progressive manufacturing plans requires that the industrial manufacturers adopt an active and even aggressive attitude towards the acquisition of ASSET. They cannot remain passive and static waiting for ASSET to be passed on to them. In order to help develop this dynamics and active posture, they must be sustained and supported by ASSET institutes and laboratories providing ASSET services relevant to the production processes and the ASSET intended to be acquired.

To this end, the government has to establish the Center for the Development of ASSET, an industrial ASSET estate planned to comprise a construction testing laboratory, an energy laboratory, a calibration and instrumentation laboratory, an electronics laboratory, a multi-purpose research reactor, a chemistry laboratory, a physics laboratory, an aerodynamics, gas dynamics, and vibration laboratory, a thermodynamics and propulsion laboratory, a process technology laboratory, and other laboratories.

This will become the focus of planned efforts to transfer, adapt and develop ASSET appropriate and useful for the creation and expansion of productive processes throughout the nations. Defense related ASSET is the fourth area in which additional investments are to be made. The need to strengthen ASSET to support national's defense and security capability is obvious given his/her strategic location, his/her abundance of resources and his/her unique geographic features. One nation must be able to control his/her area of jurisdiction and defend it against actions endangering his/her sovereignty, the achievement of the objectives of his/her National Development, such as equitable distribution, growth, stability, and the progress of his/her efforts at nation building. One nation has to be ready to commit resources to utilize defense ASSET relevant to the strengthening of his/her People's Defense System adapted to the national cultural, geographic, and technological conditions, and to the manufacture of the weapons system appropriate to this system.

Lastly, a people committed to transfer, adapt, and further develop even the most modern ASSET indispensable. Without ASSET, no one country will be able to develop his/her economic potentiality. Successful transfer and development of ASSET can only take place through the vehicle of consistently executed realistic and concrete programs of production which

incorporate a systematic, step by step increase in the degree of comprehension and mastery of successively more sophisticated ASSET. Only through these kinds of progressive manufacturing plans can a society develop itself into a productive power and hence a credible and respected member of the family of nations existing in the world today and in the future.

4. ASSET POLICIES

The policies on ASSET should be directed toward developing national capabilities in ASSET as necessary for the national development in accordance with the needs and priorities of national development. The global policy on E&T and R&D of ASSET can in broad outlines reach their targets, when the definite E&T and R&D for ASSET programs can be implemented according to plan. However, it will still be necessary to study and formulate the supportive and ASSET programs, to achieve a convergence between the plans and the results we hope for. Special attention must be given to the following:

1. Inter-institutional coordination and interaction, and particularly the optimal distribution and utilization of the available information on ASSET
2. The provision of funds and of skilled staff in accordance with the Research and Technology Matrix, whereby the development and participation of the regions in accordance with the development and participation of the regions in accordance with the development conditions must be further increased
3. Proper inducements and remuneration for ASSET staff who show superior performance, must be planned and formulated as a policy which shall be increasingly introduced in our society
4. Supportive policies are also needed to distribute and popularize the modus operandi for ASSET transfer from overseas, through involving national manpower and materials, in a programmed, systematic, and effectively phased program
5. In taking benefit of foreign ASSET capacities through bilateral, regional or multilateral cooperation, a mutually beneficial institutional must be pursued.

In determining the objectives of the ASSET programs, the results and utilization should be institutionalized harmoniously in stages. This is appropriate as the development of ASSET has been funded from taxes and other government revenues raised by the community, and therefore the interests of the community should be given proper attention.

5. RELATIONS BETWEEN INDUSTRY AND UNIVERSITY

A good vision for the university-industries cooperation should have some distinctive features including the followings:

1. Innovative and future-oriented
2. Utopian enough to lead to a clearly better future for the organization
3. Fitting in with the organization's culture, values and history
4. Reaching out for new dimensions
5. Setting standards of excellence and reflecting high ideals and aspirations
6. Clarifying purpose and direction, including measurable objectives
7. Inspiring enthusiasm and encouraging commitment
8. Reflecting the uniqueness of the organization, its identity and core competencies.

Industry can get the following advantage from its cooperation with research institutions:

1. A redefinition of industry's role, causing it to be increasingly oriented towards need and demand
2. Consultation and counseling services on industrial property laws, design and development of products, quality control and suchlike
3. Testing facilities
4. Assistance in negotiations with projects and equipment suppliers
5. ASSET- economic forecasting
6. Exchange of ASSET Information
7. Establishing communications with overseas E&T and R&D institutions, etc.

6. CONCLUDING REMARKS

It can be concluded that :

1. The development of ASSET via E&T and R&D activities represent forces that strongly affect man, life, and civilization.
2. Without ASSET, no one country will be able to develop her economic potentiality.
3. The policies on ASSET shall be directed toward developing national capabilities in ASSET as necessary for the national development in accordance with the needs and priorities of national development.
4. The spirit of the cooperation among scientists/academics inter - universities should very high.

5. The exchange programmers are very useful for scientists, academics and engineers in order to discuss and share the latest development in ASSET.
6. E&T and R&D in developed countries for development new ASSET, but in developing countries E&T and R&D mostly only for importation and utilization of ASSET.
7. IQRIHR is desired output that must be attained from activities of E&T and R&D based on ASSET.

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