

AN OVERVIEW

MR. CHAIRMAN,
FELLOW PARTICIPANTS,
LADIES AND GENTLEMEN:

I am overwhelmed by the great honour of being invited to present to you my perception of an overview of the topics of this Symposium. I sincerely hope that my humble efforts will be of some use in helping the participants to find their way through the rich mixture of papers that have been prepared by our learned colleagues. Perhaps with all due modesty, I would do better to call this an underview rather than an overview.

As we proceed, I hope the specific themes of technology, culture and development will emerge like stalagmites and stalactites as we traverse the caverns of our journey through the next ten sessions of this Symposium.

✓ KEYNOTE ADDRESS

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Harmony Between Rigorous Empiricism And
Creative Insight Leads To Excellence In
Research For Development

by

Royal Professor Ungku A. Aziz

To grasp the nature of a problem in such a situation in the real world, we could compare it to the human brain with its billions of inter-connected neurons; all of which if you accept it, also combine to help the human mind emerge. Such problems are composed of masses of interacting influences that are not only interacting but cumulative and are interacting at different speeds with differing intensities. Therefore, to have even the slightest reflection of the real world, our Symposium has to be given certain perceptible

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Actually, the problems of the modern world are not neatly packaged into separate boxes which conveniently allow scientists to burrough diligently into every corner of their cloisters. The problems of the real world especially in so far as technology, culture and development are concerned are unholy conglomerates of intermeshed spirals which shade off into one another in fine tints of grey.

To grasp even the simplest idea of the nature of a problem in such a situation in the real world, we could compare it to the human brain with its billions of inter-connected neurons, all of which if you accept it, also combine to help the human mind emerge. Such problems are composed of masses of interacting influences that are not only interacting but cumulative and are interacting at different speeds with differing intensities. Therefore, to have even the slenderest reflection of the real world, our Symposium has to be given certain perceptible

In a good discussion, the voices should swing in a kind of contrapuntal harmony from 'Yin' to 'Yang', from the general to the particular, from the abstract to the concrete, from the pure to the applied, from the realm of the mind to the realm of the senses, and so on.

In the light of this dualistic grand design, my two swings will consist of one small abstract leap into multidisciplinary in academia followed by a somewhat aggressive thrust into the need for vigorous empiricism in research and study for development, especially in third world countries. Thus we swing between conceptual and theoretical approaches such as ~~Tsurumi~~ in Session 1 and Oka in Session 2 on one side to empirical descriptive approaches in such papers as Ariff on Iron and Steel in Session 1 or The Planning of Singapore Changi Airport by Mr. Peng Giok Beng in Session 4. There are 'how-to-do-it' or more correctly 'how-it-is-done' studies like "Urban Planning and Transportation" by Ota in Session 8 or the Development of a Pharmaceutical Industry in the ASEAN Region by Ho also in Session 8.

Such an important subject as education is covered, for example, by the Development of Ingenuity in Engineering Education by Terano in Session 7 while Shimizu considers Dynamism in Technology Education in Japan in Session 9.

Kamal Salih talks about Computer Applications at his University in Session 2 while Ozay and my co-slave in the preparation of this Symposium, Professor Yip Yat Hoong,

talk about Technical, Scientific and High-Level Manpower Development in the Malaysian University System in Session 9. If we change our viewpoints and move from the analytical mode to the synthetical mode, a subject can be studied from a variety of points of view. For example, women workers in the electronics industry are examined from the points of view of epidemiology, employment, accommodation and even language.

Basically, we Malaysians have agreed to present slightly unfashionably empirical papers. We are describing objective work in progress.

With due modesty we are also describing research work that we believe is of national significance in the sense that it will ultimately contribute, we hope, to our national development.

Naturally, there are many Malaysian scientists who prefer the way of the non-empirical approach. Indeed judging by a number of seminars held earlier this year, our capacity of speaking our minds or should I say our hearts, seems to be rather greater than our readiness to publish conclusions that are based on rigorous research supported by impeccable reasoning. It is this observation that has partly influenced me to seek out scientific research workers and to invite them to display their wares at this Symposium so that the balance may be corrected and harmony restored.

I also have two other important objectives.

Firstly, I want to promote not only the idea of empirical research but more specifically, excellent research that is oriented towards the goal of national development. I hope this international exposure of my colleagues will inspire and motivate large numbers of our friends in the sciences and the social sciences to think bigger and to be more pragmatic. I hope our decision-makers will take note of this objective.

Secondly, I hope to show the world that we do have a few scholars and researchers who are capable of achieving results that are comparable to international standards of excellent scholarship.

In the presence of friends from such venerable countries as Japan and Italy, I sincerely and modestly feel that I do not need to apologise for being somewhat nationalistic or proud of my nation: Malaysia.

How have we approached problems in a multi-disciplinary way? I shall now refer to papers that arise from two major research projects that are currently being carried out under the aegis of the Institute of Advanced Studies, University of Malaya. They concern girls and goats.

Let me begin with the girls. You may have noticed the three papers in Session 5 and the one at the end of the day in Session 6. These

219 deal with the HAWA Project which I will come to in a moment and concerns the factory workers in the electronics manufacturing industry. Then in session ten, Dr. Mukherjee discusses the crossbreeding of goats and he is backed up by Dr. Ravooof and Sutanto's paper on the Utilization of Dried Palm Oil Mill Effluent in Session 8.

Let me go back to the girls. Some five years ago, we decided that one of the changes most likely to affect Malay society in the near future would be the new trends in the work roles of Malay women.

In Malaysia, women have always worked. However, with the recent growth of manufacturing industries, especially electronics, specifically the preparation of integrated circuits, a relatively large demand has been created for female labour. It has been Government's policy to disperse these electronics factories throughout the country. Many are located in the free trade zones of Penang, Kuala Lumpur and Malacca.

During the last five years, it has been estimated that over one hundred thousand young Malay girls of rural origin have left unpaid family farm work for regular employment in the electronics industry. Some have commuted to work from their rural homes located ten to fifteen kilometres away. Some have obtained accommodation in nearby hostels provided by their employers, but many have flooded the shanty towns that seem to occupy substantial parts of our burgeoning cities and larger towns.

To know what has really taken place: How they are living, their problems of adjustment and what links they maintain with their families etc., we have initiated a multi-disciplinary study of their total living and working conditions. We have used the research tools of economics, sociology, medicine and law not only for carrying out a study for the sake of just having a study but more importantly to collect reliable and valid data and to influence policy and planning. We intend to advise the Government, Womens' Leaders, Workers' Organizations, Political Bodies, etc as to how the women workers can be better cared for. We feel that such an approach is imperative because the women workers have no adequate protection, legally, economically, socially and morally. For example,

they seem to have inadequate protection regarding hiring and firing. They have virtually no recreation nor education facilities. There are no facilities for counselling. These are some of the more poignant examples of their current problems. Advanced countries have institutions like the YWCA or Toyota's Iko No Ie in Nagoya. Malaysian girls have nothing like such institutions.

Our study is backed by over one thousand pages of discussion papers which are derived from hundreds of pages of computer printouts. We have interviewed about two thousand individual workers who have provided detailed answers to sixteen page questionnaires. We have carried out detailed in-depth studies of 100 workers. We have collected pictorial evidence of their living conditions, part of which is shown in Susan Lee's exhibition. Co-operating in this study Gregory Thong discusses wages in Session 6. ^{In Session 5} Dr. Rokiah reports on the health of workers based on blood and other bio samples obtained from one hundred girls. Incidentally, this is the first time such an epidemiological study of industrial workers has been done in our country. In Session 6 Nuwairi who is under the academic supervision of Dr. Nik Safiah tells us some interesting information about the kind of common spoken language that is evolving among these girls who come from various parts of the country where different dialects of the Malay language are spoken.

At this point I would like to acknowledge the generosity of the Toyoto Foundation which has provided research grants totalling 260,000 ringgit and one of our prominent graduates who is now a leading industrialist, Tan Sri Ibrahim Abdullah of Promet who kindly donated 100,000 ringgit to make the continuance of this study possible.

These handsome donations over a period of four years have enabled us to carry out a variety of studies in a large number of areas. When we began, it was not clear where all the electronics factories were located in Malaysia or even how many persons were employed in this industry. Now we have good data. This can be related to studies made by other scholars about specific aspects of the electronics industry.

In brief, our multi-disciplinary approach will ultimately provide a kind of holographic picture of the case of farm girls now working

in electronic factories. Indeed, in due course, we should be able to be more certain about projecting their conditions into the nineteen-nineties through to the year two-thousand. We would like to feel that we will be more confident than our colleagues who indulge in the pseudo science of futurology by peering ahead through cloudy crystal balls unfounded on hard facts or, perhaps, I should say gracefully reclining on a bed of soft facts.

May I now turn from the girls to the goats and refer to Mukherjee's paper entitled "Crossbreeding for Improvement of Local Goats using a Multidisciplinary Approach" in Session 10 and the related paper by Ravooof and Sutanto on the "Utilization of Dried Palm-Oil Mill Effluent: Present Status and Future Potentials" in Session 8.

The IAS has a breeding programme in goats that will ultimately result in the establishment of a new genetic strain of Malaysian goats which will be considerably larger, grow faster, be resistant to tropical diseases and able to exist on grass grown locally and concentrate, prepared from palm oil sludge and brewer's waste. In this multi-disciplinary programme incidentally, frozen semen imported from Germany and now produced locally are used for insemination. If you are interested, the breeding cycle of females are regulated by hormone injections.

I would like to tell you about Ravooof's programme which uses Palm-Oil Effluent Waste and Rubber Waste that would otherwise be polluting our rivers, for the regeneration of infertile soils. We are growing napier grass which with other legumes forms the feed stock for these goats. This is another practical example of the multi-disciplinary approach adopted by Malaysian scientists and their colleagues.

Thus, you can see it is neither unacademical nor unreasonable for me to introduce such topics as girls and goats into my discussion in this Symposium.

To insert a few more pieces into our Malaysian mosaic of empirical studies, I should like to refer briefly to our two vital national

export commodities, rubber and tin and to water which determines the quality of life, if not life itself.

As the world's number one producer of Natural Rubber (NR) with a direct interest in consumer technology, it is only right for us to be the world's number one natural rubber researcher. This involvement should embrace all branches of science and technology. Indeed, as an economist, it is my private dream that one day Malaysia should be the number one producer of high-quality tyres as well as the most extensive exporter of popular tyres now used in such countries as Iran or Iraq who are supplied by countries like Korea or Japan which do not grow a single rubber tree. We should be able to find markets for our tyres all over the world because they would be as good as the best while our ordinary tyres would be among the cheapest and the most reliable.

In tin, if we can find better ways to identify and extract the organotins, we will be serving mankind by helping to make herbicides less toxic and also helping to lower production costs in the plastic manufacturing industry.

Regarding water, our efforts at innovating a handpump design have already led to arrangements for the production of several thousands of new model water pumps that will be cheaper, more efficient, more long lasting and easier to maintain than anything that exists at present. These water pumps would find a demand throughout the third world countries. All this is well described in Goh Sing Yau's paper in Session 10.

All the presenters are talking about scientific research work that they are actually doing. They are not as we say in Malaysian, "omong kosong" or speaking without substance. They are not speculating a priori or fantasizing without facts.

To those of you who come from the advanced countries with several hundred years of the inductive tradition there is little need to establish the legitimacy of scientific research. However, in the third world because of the lack of support, especially the lack of funds, researchers are frequently driven to think small, because we are apparently

more ready to spend millions on palaces and ostentatious celebrations rather than on research for development. So, it is not surprising that frequently, large research projects are rarely initiated because of financial constraints. We tend to be parsimonious about scientific research but profligate on so-called prestige projects or what some people think are image building ceremonies.

Many researchers have to depend on grants from foreign foundations for the financing of their projects. Even if they have the money for the research operations they are often faced with inadequate manpower support or obsolete equipment and of course they suffer from lack of time because they must bear heavy burdens of teaching and administrative work. Sometimes they must moonlight or even sunlight to supplement their **relatively** lowly emoluments.

Often they do not seem to be accorded sufficient respect by their own Governments. Foreign consultants are preferred to home grown experts. Hence, the sayings "No man can be a prophet in his own country" or, "Other grasses appear greener" etc.

The up-shot is that useful research of any substantial scale is seldom done and even less evident are research projects of an interdisciplinary or multi-disciplinary nature. This situation is exacerbated by the typical weltanschauung of those of our less industrious academic colleagues who when they are criticising others, become carmine radicals, yet when they themselves are the object of change they metamorphosize into the staidest of conservatives. In brief, multi-disciplinary collaboration tends to be anathema to certain academics, young or old.

So akin to a breadth of fresh air, we Malaysians now present you with a cross-section of our empirical efforts to show you that with the cooperation of our colleagues from neighbouring Singapore there do exist some people who are dedicated to the search for empirical solutions to our national problems.

We must overcome these constraints in order to achieve a satisfactory level of national development. We must endeavour to find

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better methods of producing natural rubber and its products or new methods of extracting organotin compounds. We must design a water pump that is cheaper to make, easier to install and simpler to maintain in the rural areas where potable water pump equals life or death. We need to find a genetic strain of goats able to survive in the tropics that will be an economical source of protein. In allied projects, we must develop methods of avoiding the pollution of our rivers while we are fertilising neglected barren soils.

If we want to know about the living conditions and everyday problems of newly employed factory girls, we must descend from our ivory tower and interview several hundreds of women selected from various locations. We should not generate pages of lurid gossip from a few casual forays into the living areas of these workers as it is quite a common practice in Malaysia today.

All these efforts need to be done by patient, rigorous, scientific collaborative research and not by magic.

The motto on the Coat of Arms of this University is, "Ilmu Puncu Kemajuan" or "Knowledge is the Source of Progress". In both senses of the word, knowledge implies knowledge that is based on hard facts and on sound reasoning. That is why the Malaysian contributions to this Symposium are empirically oriented.

This is not to gainsay some papers for being inadequate because they are not empirical. ^{Perhaps} Some are and perhaps some are not. Some are philosophical or theoretical statements of great merit. As I said at the beginning, we are in a dilectical situation where there is a "Yin" and there is a "Yang". There should be a deductive approach and there should be an inductive approach. There are facts and there are pure thoughts.

By fulfilling both swings we gain a complete picture.

Thank you.