

Penyampai : TAN SRI DATO SERI AHMAD SARJI BIN ABDUL HAMID  
Tajuk : PERASMIAN SEMINAR KEBANGSAAN "ISSUES IN SCIENCE AND TECHNOLOGY  
POLICY DEVELOPMENT"  
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Tarikh : 11-06-1996

1. Saya merasa terhormat kerana menerima jemputan daripada Universiti Teknologi Malaysia untuk memberi ucapan mengenai isu-isu dalam pembangunan sains dan teknologi di negara ini. Pada pagi ini, saya akan cuba menggariskan usaha-usaha Kerajaan dalam bidang pembangunan sains dan teknologi, dan juga menyentuh 'operating principles' bagi mengawasi pelaksanaan program sains dan teknologi kita.

2. Science and Technology (S&T), and in particular technology, are no longer considered just as inputs to other economic activities.

Neither are they just a variable factor of production like land, labour, capital and entrepreneurship. In recent years, 'science and technology' has become a vital ingredient in development, especially so with the advent of the information age.

3. The high growth of 8.5 per cent attained in the last 8 years has been supported by significant increases in labour and capital as well as total factor productivity (TFP). The TFP measures the residual contribution to growth, apart from contribution of labour and capital, and includes technical progress, management expertise, skills and entrepreneurship. Thus, the TFP contains significant elements of technology absorption and utilisation. However, the acquisition and diffusion of new technologies was mainly a result of increases in investment, particularly in direct foreign investment. The development and use of locally generated technologies in the production process still lag behind, indicating the country's need to accelerate indigenous capability in developing new and improved technologies for industry. In particular, the advancement into technology-intensive and higher value-added activities implies that we need to find more effective ways to upgrade our indigenous R&D and technology development capability. Thus, the Government is committed to giving more importance to S&T developments by setting the following major objectives and targets for the 90's and beyond: firstly, to double national R&D expenditure by the year 2000, from the current low level of 0.5 per cent of GNP; secondly, to increase scientific R&D manpower to population ratio from 400 per one million to 1,000 per one million in the year 2000; thirdly, to refocus R&D in the public sector with a view to undertaking market-oriented R&D, as well as commercialising potential research findings; and fourthly, to accelerate the acquisition and transfer of, as well as the development and use, of new technologies particularly biotechnology, advanced materials, automated manufacturing systems, micro-electronics and IT as well as energy and environment-related technologies.

4. R&D is a critical component in our efforts to accelerate technology development. The Malaysian R&D system, particularly that of the public sector excels in making technical discoveries and inventing new products. However, related downstream activities such as product design and improved manufacturing processes have not received adequate attention. Thus, attention must be given not only to current and future R&D and technological development needs, but also prospects on commercialisation of research findings and the transfer of technology to industry. The situation gives rise to issues as to how best and how fast can the commercialisation of technology from laboratory to the market take place. On the other hand, the local private sector is not undertaking sufficient product and process reengineering and innovation. Some Malaysian firms tend to regard R&D expenditure as a cost rather than as an integral part of total investment. The preference is for tested and tried technologies through various means such as licensing and joint-ventures with foreign entities, rather than develop original or own brands of products and processes. In addition, there is the need to increase the take-up rate of the various fiscal and financial incentives aimed at increasing local R&D. In the medium term, the country can depend on imported technology; for the longer term, industry leaders must view technology as one of the key foundations of the next generation economy. They must take bold initiatives in technology advancement.

5. Many research organisations are in the process of restructuring and reorienting their research programmes to ensure that the R&D undertaken is relevant to market needs. The Government is

considering the creation of schemes that provide matching grants or concessional loans to local corporations that undertake R&D in collaboration with public sector research agencies and universities, especially in new and emerging technologies.

6. The issue of shortage of skilled S&T-based manpower is well recognised. The Government will increase investments in scientific and technological education and training with the aim of developing a critical mass of scientists, engineers and researchers required by the nation.

In addition, measures are being mooted to foster creativity and innovativeness in the young and raising the general S&T interest and awareness levels. These efforts are all the more imperative, especially in current times when a career in business and economics is the preferred choice among students. This seminar may wish to deliberate on this at length, and come up with novel ways of promoting S&T-related careers among the young.

7. How do we ensure effective technology transfer to local industry, not just from foreign sources but also from own domestic sources? The transfer of technical know-how and expertise play a key role in strategic technology management for firms and nations alike. As you are aware, technology may be transferred as data and information; commercialisation of R&D output; embodied technology; rights to make, use, and/or sell; or technical knowledge and expertise. Transfer mechanisms include publications, and databases; meetings and communications; demonstrations and pilots; equipment and software acquisition, licensing agreements, alliances, partnerships and joint-ventures as well as technical assistance.

Despite these various methods, most technology transfer efforts within the country have not always had the desired effect. This seminar need to deliberate on this. What we need is to ensure that whatever means used, the providers and users or receivers of the technology in question must be involved as full and active participants in the process of developing and transferring technology.

8. This seminar may want to pay attention to the demand side as well - with a view to promote technology initiatives on the part of the private sector. An appropriate action plan could also be considered. Critical questions that need to be addressed may include: how best to create the enabling environment for increasing innovation, and accelerating the processes of discovery, development and deployment of technologies, especially in the industrial sector. This seminar may also wish to discuss the current approaches for the acquisition, dissemination and transfer of technology with a view to strengthening these approaches, thereby fostering the development of higher technology and value-added activities.

9. Industrial research collaborations between industry and many of our public research institutions and universities have not been extensive, although in recent years, initiatives designed to enhance such linkages have yielded promising results. More such linkages are needed since ultimately the fruits of our S&T enterprise must be the translation of the knowledge generated from our research institutes and universities into productive uses. Already, some of our research institutes, particularly those funded by cess, have close ties with industry. SIRIM has recently embarked on a number of initiatives to foster closer collaboration with industry. The Government endorses this trend towards greater collaboration in the context of Malaysia Inc., which would benefit all the participating parties in the research partnership. MPKSN has already initiated several measures to foster partnerships between public research institutions, universities and industry. Under the revamped IRPA Programme, priority for industrial research funding is accorded to projects that have specific industry focus or participation. Such an emphasis will ensure that our researchers in the public sector are infused with an user-oriented mentality.

During the Seventh Malaysia Plan, the Government will undertake increased efforts to strengthen and institutionalise the currently informal R&D collaboration among universities, research institutions and industry. The gradual institutionalisation of the contract research system within research institutes and universities as well as the partial or total corporatisation of selected research institutes will engender the development of linkages with industry. It is hoped that these initiatives will help to create synergies that increase the effectiveness of our S&T system by capitalising on the special strengths and expertise that each partner brings to the research effort. Moreover, such partnerships will also help to ensure that our S&T resources are focused to advance the technological skills and innovative capacity of our SMIs.

10. Some degree of control in research, however, is needed since a high degree of uncertainty is associated with this activity. But, the issue remains: 'how much control is needed'. Attaining this balance, places a premium on management. The Government has recognised that research organisations cannot be operated on rigid regulations designed for more routine activities.

In recent years, the governing Acts of some of our research organisations, for example, MARDI and SIRIM have been amended to enable them to establish joint venture companies with the objective of facilitating the exploitation of their research findings. The University and University Colleges Act has also been suitably amended to enable our universities to do likewise. Additionally, SIRIM, MIMOS and the Malaysian Technology Park will be corporatised in order to ensure that they are able to operate more flexibly and swiftly. Such attributes are crucial in order to facilitate the translation of research findings for utilisation by the end-users.

11. Leadership, at the national, institutional and project levels, is vital to ensure that systems and procedures are designed and effectively implemented in order to nurture a research project from the stage of ideation through to implementation and finally to development and diffusion to the end-user. Managing research is about managing people since it is people and not machines that do the actual research. People must be guided, motivated and inspired to deliver their best. Success in R&D, more than in any other aspect of industrial management, is largely dependent on people. As William Beveridge reminds us in his book, *The Art of Scientific Investigation*: "Elaborate apparatus plays an important part in the science of today, but I sometimes wonder if we are not inclined to forget that the most important instrument in research must always be the mind of man". Under the Seventh Malaysia Plan, allocations amounting to more than RM 1.6 billion will be made to universities and institutes of higher learning to produce the type of high level S&T manpower required by the economy, especially for R&D and technology management and development activities.

In order to ensure that research institutes and universities continue to be an important source of technical experts and R&D specialists, existing education and training programmes will be further strengthened. Additionally, a new S&T human resource fund, with an initial allocation of RM 300 million will be established to build up capabilities in targeted technologies on a continuous basis so as to augment efforts to improve industrial competitiveness and growth. The fund will provide scholarships for post-graduate and post-doctoral levels and fellowships for graduate research and advanced studies overseas.

This will form part of the national effort to increase the total number of R&D manpower to 1,000 per million population by the year 2000.

12. Selaku Pengerusi MPKSN, saya akan menunggu dengan penuh minat hasil-hasil perbincangan dan juga perakuan-perakuan dan rumusan daripada persidangan ini. Dengan ini, saya dengan sukacitanya merasmikan Seminar Kebangsaan Mengenai "Issues in S&T Policy Development".