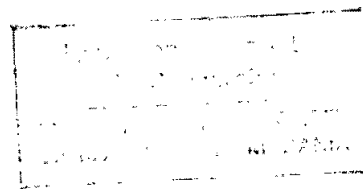


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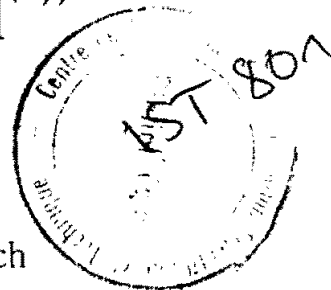
PROCEEDINGS
of the Seminar on
"THE ROLE OF RESEARCH IN
NATIONAL DEVELOPMENT"

(February 19-20, 1986)

Organised by
Pakistan Council of Scientific and Industrial Research

Inaugurated by
THE PRIME MINISTER OF PAKISTAN

at
PCSIR Laboratories, Karachi



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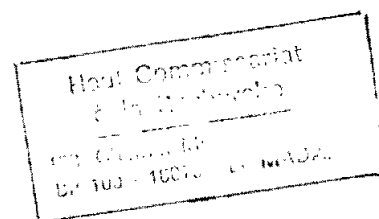
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MESSAGES

THE PRESIDENT'S MESSAGE

I congratulate the Pakistan Council of Scientific and Industrial Research on organising a Seminar on "The Role of Research in National Development", and take this opportunity to extend a warm welcome to the eminent scientists, economists, and scholars who are participating in it.

The theme of the Seminar is, indeed, of crucial importance to developing countries like Pakistan. They are trailing behind the technologically advanced nations almost in a state of perpetual dependence. They must, therefore, aim at developing their indigenous research capability and innovative potential, and formulate a plan of action to become self-reliant in scientific and technological progress.

In this context, I would like to pay a tribute to the Pakistan Council of Scientific and Industrial Research. It has played a valuable role in national development by utilizing its research facilities for assisting towards achieving increased productivity and improved quality of products.

I am sure that the distinguished delegates at this Seminar will not only highlight the vital role of research in national development, but also formulate concrete recommendations on how quantum jump in science and technology can be achieved to make up for the lost time.

I wish the Seminar all success.

General Mohammad Zia-ul-Haq
President
Islamic Republic of Pakistan

PRIME MINISTER' S MESSAGE

I felicitate the Pakistan Council of Scientific and Industrial Research for organizing this national Seminar and Exhibition of their achievements.

Eradication of illiteracy and promotion of science and technology are among the five basic objectives of my Government. The Pakistan Council of Scientific and Industrial Research (PCSIR), the country's largest scientific and industrial research organisation, should take advantage of the Government policy to develop indigenous technologies and shorten the gap in the technology status between the developed nations and Pakistan.

The theme of the Seminar "The Role of Research in National Development", being organised by PCSIR, provides a ready forum for identifying areas of research for solving national problems and to bring about rapid social and economic development which is the crying need of the hour. Research should be aimed at accelerating agricultural and industrial development which should benefit all citizens and regions. Therefore, my advice to the scientists and engineers is to make concerted efforts for innovation and improvement in production sectors.

I am sure that the PCSIR will continue to serve the nation with devotion and would help in the growth and spread of science and technology at grass-root level.

(Muhammad Khan Junejo)
Prime Minister
Islamic Republic of Pakistan

MINISTER FOR SCIENCE AND TECHNOLOGY'S MESSAGE

I congratulate the Pakistan Council of Scientific and Industrial Research (PSCIR), for arranging the Exhibition of its products and patents and for organizing a 3-day Seminar on the Role of Research in National Development.

The scientific and technological revolution which we are witnessing today at once presents a challenge and an opportunity. We stand today on the threshold of a new order where we must choose between two clear cut alternatives. Either we go forward and acquire mastery over scientific knowledge and high-tech fields for the betterment and prosperity of our people, or we stay behind and rely upon others for such hand-outs as they care to throw our way. The new democratic government has selected the first alternative. The S&T capability is being improved through provision of additional funds, equipment and trained manpower and through the establishment of new R&D institutions and laboratories, where gaps exist.

I hope the Seminar organised by PCSIR will deliberate on research as a tool for solving national problems and come out with specific recommendations for promoting R&D activities. At all times, we must remember that research and development activities must be goal oriented, so that we can make a definite contribution towards national development.

Hamid Nasir Chattha

Minister

For Science and Technology

ADVISER TO PRIME MINISTER ON SCIENCE AND TECHNOLOGY'S MESSAGE

I am happy to note that PCSIR is organising a seminar on the "Role of Science in National Development". The importance of the Seminar can be seen from the fact that the Prime Minister of Pakistan has very kindly consented to inaugurate the Seminar and preside over its proceedings. This will provide a welcome opportunity to take scientists of PCSIR to show the good work they have done to the Prime Minister.

PCSIR is one of our leading scientific organisations in the country. Over the past years it has developed a number of industrial processes which have had direct impact on the economy of the country. I congratulate the PCSIR administration and the scientific community for their dedication and commitment.

I hope they will live up to the expectations of the nation and new enthusiasm that has been generated due to the priority that has been given to science and technology in the programme of the Prime Minister which has been announced recently. I wish them success and Godspeed in their endeavours.

M.A. Kazi
*Adviser
to the Prime Minister
on Science and Technology*

INAUGURAL ADDRESSES

INTRODUCTION TO PCSIR

By

Naeem Ahmad Khan*

It is indeed a singular honour for the Pakistan Council of Scientific and Industrial Research, and for me as its Chairman, to welcome you, Sir, to one of the premier research and development organisations of the country established way back in 1949 as the Department of Scientific and Industrial Research under the Ministry of Industry. Since then, with a view to making a viable organisation, a number of Constitutional and structural changes were made in 1951, 1953 and finally in 1973 when it became an autonomous organisation under an Act of Parliament. The principal functions of this organisation have been to create a scientific and technological base for the utilisation of indigenous resources and adopt and adapt various technologies for import substitution and to provide technical assistance to the industry. It started with a manpower of about 20 scientists and technicians in borrowed naval barracks in Karachi. By the Grace of Allah, it has established, over the years, a network of multi-discipline laboratories at Karachi, Lahore, Peshawar, monodiscipline centres like the Fuel Research, the Leather Research, both at Karachi, National Physical & Standard Laboratory at Islamabad, and Pak-Swiss Training Centre at Karachi, while the proposed multi-discipline laboratories at Quetta are under consideration of the Pakistan Government for which already the Government of Baluchistan have donated a 30 acre piece of land at the Quetta Industrial Estate. A Solar Energy Centre has been established at Hyderabad. The Government of Sind has very kindly given us an 8-acre plot on the Badin Road. A small meteorological laboratory is being established there to assess its suitability. This has provided us with a nucleus and we would like to extend our activities to include other related disciplines in the near future for which a 50-acre plot would be needed on Super Highway.

PCSIR as of today has about 2500 employees of whom 641 are scientists, engineers and technologists and 800 are technicians. Amongst the scientists and engineers, 137 hold doctorate while about 400 possess Master's degree and more than a dozen of our junior scientists are pursuing studies abroad for Ph.D degrees.

The efforts of PCSIR have already resulted, inter-alia, in the development of about 5 industrial processes out of which 280 have been covered by patents. Many of these have been leased out for commercial exploitation and, on a conservative estimate, the annual turnover of these processes appears to be around Rs.15 crore.

The methodology followed to take the research activity of the Council to its logical end consists of mission-oriented work at bench scale, followed by a critical evaluation of data for scaling up the work, in many cases to pilot plant scale. Finally, the process developed is offered for industrial exploitation on nominal fees in order to promote indigenous technologies. As it is, however, PCSIR finds it extremely difficult to have its processes readily accepted by an entrepreneur who is much more in favour of imported turn-key plants. It may be that part of the blame lies within ourselves for perhaps not properly projecting our work; but more than that, this fact underscores the poor link not only between PCSIR and the industrial sector (public and private) but also between ourselves and the planning authorities. This poor communication probably forms the root cause behind our lack of participation in planning the installation or maintenance of large-size industrial plants.

However, Sir, as you may have seen during your visit to the Open House arranged on this occasion, a number of notable and promising processes/products have been developed in the field of agriculture-related technologies, minerals and materials, engineering, pharmaceutical, chemical and rural technologies and others. To quote a few examples, mention may be made of the development of bio-fertilizers, chemical pesticides, micro-nutrients, laboratory glassware, processing of minerals such as graphite from Azad Kashmir and low-grade chromite ore from Baluchistan, coal briquetting, dyes and pigments, fish protein concentrates, dehydration of fruits and vegetables, materials for low-cost housing, and technologies for rural healthcare.

PCSIR has always been alive to the need of manpower development for national capabilities in science and technology. Sir, while we talk of research and development organisations like the PCSIR, we are prone to overlook a very important contribution in education. However, Sir, our contribution is substantial as 76 scientists secured Ph.D degrees as a result of their work in PCSIR Laboratories. It is

*Chairman, Pakistan Council of Scientific & Industrial Research.

almost half of the total of 153 Ph.D's produced in science subjects by all the universities of the country put together as published by the University Grants Commission. This is all the more significant as in PCSIR equipment and other facilities are much below par as compared to those in some of the developing countries. Besides, in order to develop manpower for higher-level leadership in science and technology, a concerted effort has to be made to produce technical personnel between the level of engineers produced by engineering universities and technicians from the polytechnics. Pak-Swiss Precision Mechanics Training Centre established under PCSIR has produced about 700 mid-tier technical personnel. These qualified personnel from this Centre are in great demand by the industry. PSTC has also been making valuable contribution in rendering advice to engineering firms and solving their production and machinery problems.

One reason for the lack of impact of science and technology on our economic development is the rather poor acceptability of things that are not traditional. This is why sunflower, safflower and soyabean cultivation, for example, has not yet made the desired impact, and our annual foreign exchange expenditure on edible oils keeps on mounting. Our laboratories have also conducted studies on improving the traditional technologies of oil-exPELLing and cane crushing and it has been established that by simple modifications of the traditional oil-exPELLers and cane-crushers, the yield can be very substantially increased, adding at least one billion rupees to our gross national product. This should give you, Sir, some idea of the potential of some of the work done by PCSIR. Similarly, the crying need for providing safe drinking water to our rural population can be efficiently yet cheaply met by a simple and low-cost technology now available for this purpose, provided the acceptability factor is taken care of suitably.

Most of the processes and products of PCSIR have the potential of being taken up as large-scale industrial production units. But the mechanism of achieving this, in the face of investment-shy atmosphere, arising from credibility gap, uncertain domestic and international market and presumably the long period required from the initiation of a project to actual production etc., is not just there. Some Research and Development institutions even in the developed countries under such situations, have successfully experimented with having an attached industrialisation arm to establish credibility for their developed processes and technologies. I would also, therefore, suggest, Sir, that the PCSIR should be allowed to establish a Scientific and Technological Development Corporation of Pakistan for which a proposal is already under consideration of the Government.

Efforts to establish linkage with industries have been made at various levels, through visits to industries and through the circulation of our Newsletter to the Chambers of Commerce and Industry and others. Recently, two series of visits of our eight-men delegation of senior scientists to public sector industries, one to the engineering sector industries and the other to chemical sector industries, were organised and efforts are now being made to institutionalise the interaction between PCSIR and these industries. Yet another step PCSIR contemplates to undertake this year is to establish Liaison Offices in Mardan, Sialkot, Gujranwala, Multan, Sukkur, Hyderabad and Dadu industrial areas to assist small and medium level industries.

Amongst other measures, the holding of this Seminar is a vital step in forging links between PCSIR and the industry. It is our earnest hope that the problems which mar such linkage will be spelled out and remedial measures would be recommended to make an easy flow of the results of research to the industrial sector.

In all, about a dozen papers will be presented, out of which seven will be read by eminent industrialists like Mr. Aziz Zulfikar, Mr. Yousuf Shirazi, and Mr. S.S. Jafri in the first and the second sessions of the Seminar, while in the third session, special panels would be formed to make recommendations which will be discussed and finalised in the final session. Dr. I.H. Usmani, who is in Pakistan nowadays, has also been requested to give the benefit of his thoughts on the subjects of the Seminar.

The Seminar will be attended by about 150 invitees, out of whom nearly half will be from the industry and other organisations, while the rest will be drawn from the universities, the Government departments and the PCSIR.

While it may be somewhat satisfying to speak of one's achievements, it would also be in the fitness of things to mention the deficiencies. The recent decision of the Government to award 400 scholarships for higher studies in various sciences is a great move in the direction of developing manpower for upcoming technologies of the future. While measures to build up the necessary infrastructure on their return are needed, we should not fail to upgrade the existing facilities to meet the demands of precision and accuracy required for present day research. What this really means is that we should not only establish new

facilities but a concerted effort is also required to be made to modernize and balance the already existing PCSIR facilities. The PCSIR, which already has 641 scientists, would be one of the few organisations to employ quite a large number of these who return. It would thus need to make considerable efforts to balance and modernize its Research and Development facilities so as to derive the maximum benefit from the old stalwarts and the new, energetic and enthusiastic entrants to the scientific corps in Pakistan.

Sir, while I may appear to be taking pride in the achievements of PCSIR, I have in fact, been emboldened to dwell on this by your benevolence in having accepted to find time to inaugurate this Seminar on 'The Role of Research in National Development', a theme of interest to us, and in relevance to which we have tried to display some of our activities, for which we seek your support, patronage and guidance for future development.

Thank you.