

INDIAN SPACE RESEARCH ORGANISATION

HEADQUARTERS

MEMORANDUM

For : Prof S Dhawan, Chairman, ISRO/
[redacted], Secretary, DOS.

File / Ref: 01/29/15

From : Y S Rajan,
ISRO HQ

Date: September 5, 1977

Subject: SCIENCE POLICY FOR THE COUNTRY.

1.0 Sometimes I wonder why I should worry about this at all in the circumstances prevailing in the country (past and present). However various trash that appears in the newspaper daily in the name of discussions on science matters really increases nausea and depression. The issue seems to have boiled down to CSIR, Scientists versus IAS, procedures of consultation etc while the real problems are almost untouched. As a Government servant myself, there is very little I can do in this matter. I cannot analyse the issues and express any views because it can always be interpreted as public criticism of the Government. Also considering the general state of elite in the country, mostly it will be infructuous to write one or two guarded letters or articles. If I can express my views to the powers-that-be, I hope at least I would have done something in this regard. I happen to be fortunate to be able to address this to a Science-boss, who would at least listen. Hence I am putting forth my ideas on the subject to you; I am doing it partly to relieve myself of some of the burden !

2.0 One of the greatest tragedies which have taken place in the Indian Science over the past few years is to mix up science and technology in an undue hurry. Self-seeking scientists and scientists-politicians have used these as exchangeable words; their short term goals have been to seek funds for their laboratories or projects by fooling the politicians & administrators. This has created a state of confusion where the subtle but important difference between long term scientific research and quick-result-oriented development activities has been ignored and almost not understood at all. Import substitution, completion of erection & installation of imported hardware and facilities, etc have passed in the name of science and technology. This has done considerable damage to both science and technology. The administrators have not been educated about the processes of science & research and have been fooled to expect some quick results by showing some of the activities which are neither development nor research i.e. building of a laboratory and installation of an equipment or computer system and so on. On the other side the importation goes

unchecked both by the scientists concerned and also other sectors of the economy. Thus without the true nature of science not being discussed or understood at all, much of the elitist show-business that has gone on so far, has not made a dent in the social/ economic sc~~en~~ce of India.

- 3.0 Yet another grave damage to the system has been done by many of the scientists and science bosses whom, I am sorry to say, I would not categorise as scientists because many have not even caught in their daily life the right philosophy of science which is observation, empiricism, and theory based on observation; also in the entire process of science and technology there is an implicit faith in this world and more so in the material nature of human activities and development of human society. This subtle factor when not understood and imbibed, leads them to treat science as 'Pooja' or a magic wand. The resultant consequences in a tradition-bound and superstition-ridden society have been disastrous. Though I agree that basic production activities, even the largely imported machineries etc used in the commercial sector would slowly lead to the changes in the attitudes of the society, the casual relations can be "reversed"; i.e. if the correct attitudes are consciously imbibed in the society, the industrialisation can be made faster. When the scientists and technologists take unscientific attitudes towards life, or don't even understand the basic premise of science, it is too much to expect the politicians especially the bulk of the staid and obscurantist ones to understand the inner dynamics of the present day societal development ~~human~~ and human progress.
- 4.0 There is a confusion about the entire development process in the country; the mixture of ideas that float around range anywhere between an obscure and revivalist interpretation of Gandhism to the populist intrepr-
tation suggesting various panacea.
- 5.0 Recently I saw an article about the defence science which has justified the entire defence science activities because of the immediate utilisation function resulting from the differences in the environmental conditions in which the foreign equipment are made and those prevailing in India ! We know the disastrous results of the mechanistic interpretation of import substitution as practiced by DRDO and the Services. The author does not realise that the direct result of such a simple interpretation is to condemn the entire defence Science in India to a modifier of an equipment

imported or producer of the necessary spares from "indigenous" sources. This is an essential technology function needed on the short run for a country which is (hopefully !) trying to catch up with the rest of the world in terms of some basic assured living for its people. But can it be called science at all? I don't say that such popular articles don't have a role. But issues on science policy in the country are not discussed anything beyond this level !

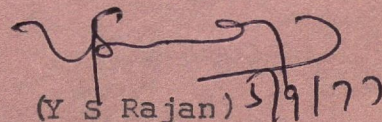
6.0 The same confusion can be seen in the whole controversy about CSIR. S&I are mixed up in the minds of people who criticize and suggest changes. I am not for a moment suggesting that science & technology should be decoupled and separated into watertight compartments. Not at all. They cannot be as they have organic linkages. Technology is the outward sign of a changing society; ~~a~~ sign of the changes in the productive forces that are taking place in the society. We have to acquire it - imported and indigenous only as a short term process; but acquisition of a sign can at best be a short term effect that cannot be sustained without internal dynamics leading naturally to the outward signs. In other words, the contradiction or hiatus that exists in today's India between the rate of technological growth and the "internal will" of the masses cannot last long. Either the internal will of the society should correspond to the technological growth or else the growth is bound to stagnate whatever be the amount of external or foreign transplatation.

7.0 It is in this context the science (and all the implicit philosophy and methodology behind it) has relevance. Science is the provider of the internal will to a society to make material progress; it observes material nature; it believes in the material origin of life and therefore man's ability to observe, understand and control it. Having said so much, I do not want to shy away from the statement that the development and growth of science in a society cannot be decoupled from its social movements or social dynamics. It cannot be grown in an ivory tower with formulas (though occasionally one can produce a Raman or Ramanujam); the general social role of science is not just to produce eminence but to propel a society (or to be one of the important ingredients that propel a society towards material progress). How much the Indian science has contributed towards this end? Would the Indian scientists turn their minds to the roots of some of these issues - the social origins and the social necessities of science and not necessarily populist panacea?

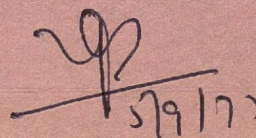
8.0 I view the reports of the re-organisation of CSIR, DAE etc in this light. There is no use taking a tribalist approach to the problem by reducing it to the level of a fight between bureaucrats versus scientists and to the procedures of consultation. I still, even in these days, believe that the assertion that the scientists alone should decide about themselves and their organisation is not correct in principle as it is the society that sustains them. Society exerts itself through various channels and one should take note of all these and allow for these. The real issue is whether India wants to grow materially or not, and whether Indian society will develop the inner mechanism of this development for which Science is an essential ingredient. This means fixing some goals of development, certain vision of the future, and certain philosophical attitudes towards the world and its growth. From this broad canvas one can derive the plan of action with lots of debate, of course. Without this theme in mind, the whole issue of debate by the scientists as it is conceived in the case of CSIR etc is likely to fizzle out as to who gets the lolly-pop and who gets a brick-bat.

9.0 Though I am reasonably clear about the issues I am concerned whether the situation can be reversed and politicians/administrators could be educated by well-meaning scientists; in this process I do not consider the whole "tribe" to be useful. Today by and large the national perspective is lacking and the issues are seen as protecting the empires. Today a great deal of *qualified* ~~specified~~ "Scientists" look at their work as means to earn in order to fulfil the middle-class yearning for luxury goods (I don't preach asceticism by any means !). Unfortunately science is not seen as a tool in scientists are to be blamed. How would one correct the situation? This is a question I am just leaving with you, at least for the present, for the reasons I have mentioned in the beginning.

With regards,


(Y S Rajan) 5/9/77

P.S.: I don't in any way under-rate the little operational fights some well-meaning scientists would carry on various issues, while I describe the broad scenario. World or society does not come to a standstill waiting for a great-leap forward or for an all powerful mid-wife to pull out the revolutionary baby. But the broader scene should be remembered often so that the little issues don't become an end in themselves.


5/9/77

Research & development in the defence forces

by Lt. Gen. K. P. Candeth (Retd.)

Our Defence Correspondent
(Ind. Express Aug 23, 77)

IN 1947, when India became independent, the Armed Forces of India, obtained all their defence equipment from Great Britain. For some time thereafter, it was felt that as a peace-loving country there was no necessity for an armament industry to be set up and even the necessity for a standing Army was questioned. However, India soon found out that it takes two to make peace as it takes to war. Successive conflicts with Pakistan and the Portuguese in Goa, China and internal insurrections in places like Hyderabad, Nagaland and Mizoram established clearly the necessity for an Army and a defence industry.

Even after Independence, we continued to be dependent for some time on UK for our equipment, but soon found that the cost of importing all our arms and ammunition requirements was prohibitive and it was realised that we must undertake development of arms and equipment ourselves and so set up a Defence Service Organisation and Technical Development Establishment (TDE). The electrical and mechanical engineers who manned TDE were really expert repairers and maintainers of equipment, but their training did not equip them for design and development, nor did they have the requisite scientific and laboratory backing and facilities to design and develop equipment.

It may be argued, as indeed many have done, that it would be cheaper for a developing country to select arms and equipments from various countries and enter into agreements with them to manufacture them under licence in India. Indeed, recourse was taken to this method initially as agreements to make Vijayanta tanks, Leonard class frigates and MIG aircraft bear witness.

However, this method has serious drawbacks. Firstly, each country produces equipment to satisfy its own needs to work best in the terrain and climatic conditions in which it expects to fight and for the tactics it employs. The equipment produced by outsiders may not satisfy all our requirements. To take a case in point, the tanks produced in UK and European countries are primarily designed for use in Europe, in the mud and slush of Flanders and in the winter of Europe; they do not cater for the dust and heat of the Punjab and Rajasthan, and this was a major defect in the design of Vijayanta tanks. Similarly, the Russian radars supplied to our Navy were built for operation primarily in the Baltic Sea and Northern European waters whereas our fleets operate in the hot and humid waters of the Indian Ocean in which climate these radars need frequent rest and maintenance to keep them going.

Secondly, the country supplying the equipment can call the tune by deriving fresh supplies or crucial spare parts, or equipment may become obsolete in the country of origin and so new equipment and spare parts may not be available. In fact, during our conflict with Pakistan in 1965, the British stopped all sales of arms and equipment to us and caused us much embarrassment. The Russians too tend to be very tardy in sending us fresh supplies of brake pads required for the braking gear of our MIGs resulting in many of our aircraft being out of action.

Lastly, it must be realised that

we can only obtain equipment which is already in use and surplus to the supplying country's needs. Further, in such items as electronic devices, it means that the supplying country knows our exact capacity, wavelength on which we operate, and even our tactics. Again, as a large number of these items come from commercial companies, there is no guarantee that they will not sell the same equipment to countries hostile to us or give them information of the equipment given to us. This would jeopardise our security.

Therefore, it is essential that we take measures to design, and produce our own weapons and equipment in our country. For this, we need dedicated scientists who have at their command facilities to design, test and develop arms and equipment, and factories at call to give form to their ideas. This calls for close liaison between scientists and the defence forces, for the scientists must know the requirements of the forces and must be able to see how each equipment is used in practice, its drawbacks and limitations, so that they can eliminate the defects by improved designs. A remarkable example of what has been achieved is the use of improved paint and cathode treatment of ships which has almost cutback the time ships can be kept at sea, thus saving congestion in drydocks and cranes of ships.

The realisation that science and scientists have a great part to play in helping our country's defence efforts resulted in the creation in 1973 of a Defence Research and Development Organisation (DR & DO) by amalgamating the Defence Science Organisation created in 1948 and the then existing Technical Development establishments. The head of this organisation is the Director General, DR & DO who also functions as the Scientific Adviser to the Raksha Mantri. The policy is laid down by the Defence Research & Development Council which is presided over by the Raksha Mantri himself and all matters relating to the design and development of equipment and spare parts, or improvement of performance of the existing equipment, are referred to this organisation for advice and solution, in order to maintain liaison with the Services, there are Scientific Advisers at Service Headquarters and at the Army Commander level who attend manoeuvres and exercises, and watch the performance of equipment and advise on use, improvement and preservation of arms and equipment.

The DR & DO is headed and staffed by eminent scientists and their work and advice have already resulted in saving much foreign exchange and are making us increasingly self-sufficient and consequently less dependent on foreign supplies. This organisation which started in a small way in 1948 has matured and grown and now has a strength of over 2500 scientists and has call-over establishments and factories employing scientific and technical personnel expert in their own fields of work. It is now engaged in over a thousand defence projects, which will make us more and more self-reliant. Research and development is necessarily expensive, but the neglect of it will mean dependence on foreign countries for our security and so it is an activity that must be fostered if we wish to retain our right to an independent foreign policy.