

# RESTRUCTURING OF RESEARCH & DEVELOPMENT IN PAKISTAN

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## BACKGROUND

A large number of Research & Development Organisations have been established in Pakistan. The Federal as well as the Provincial Governments have made considerable investments, but the financial support has not been consistent and continuous. The private-sector industry has been critical of the R&D system as a whole. They claim that the R&D institutes have fallen behind the general expectations.

In the first decade after Independence, there was considerable discussion regarding the establishment of Research & Development within the universities or outside. The view that prevailed was based on the argument that Pakistan, with its limited resources, should concentrate on adaptive research and only a limited amount of fundamental research. The adaptive research, to benefit the industry, was expected to be done in specialised R&D institutions set up, outside the universities. The universities were to concentrate on basic research. However, when the R&D organisations were set up, their heads and other senior scientists had to be inducted from the universities. They lost the link with teaching, but could not establish the link with industry. The entrepreneurial approach could not be achieved. This resulted in research projects being selected according to the personal aptitude of the scientists, in most cases without any relationship with the needs of industry or product-improvement.

The budgeting and funding of these organisations also did not give any incentive for taking up research-projects based on market-demand or survey of the industrial need for technology. Where any research was done, it was to produce publishable papers in scientific journals. There were some attempts at import-substitution and reverse-engineering. Only a few of these had any impact on industry.

The de-linking from the market-demand for technology is illustrated by the approach of most R&D organisations, with only a few exceptions. It is interesting to note that, before 1947, the Agricultural College at Faisalabad did considerable practical research, which resulted in improved agricultural practices and improved seeds as well as new varieties of wheat and cotton. In those days, the professors at the college were directly involved in extension work. They were active in keeping contacts with farmers and taking the results of their research *directly* to the farmers, through many devices including demonstration-plots. After 1947, the agricultural college evolved into a university but the Government created a separate department for extension work. The link with the farmers was considerably weakened in this manner.

PCSIR also expanded considerably after its inception in 1949-50 and it was able to establish a large number of laboratories for applied search in a variety of scientific disciplines. This, in itself, was quite commendable. However, its impact on industry is still on the low side. Very few industrialists even attempt to use its facilities. It must be mentioned, to the credit of PCSIR, that in order to create this link with industry, a new organisation called STEDEC or Science and Technology Development Corporation was created. This organisation was to market the technology and services available with PCSIR. This experiment was somewhat successful, but STEDEC fell into the trap of producing goods based on PCSIR research and marketing the products from the pilot-plants of PCSIR. STEDEC can boast of a commercial approach, but it can hardly claim any technology-sales to industry, which was the real purpose for which it was created. The higher objective of promoting interaction between scientists and private industry and bringing projects from private industry to PCSIR, for research and development, could not be achieved.

Some R&D organisations were attached with departments like WAPDA. It was hoped that the basic financial strength of the parent body and its own technological needs would create a symbiotic relationship. In most cases, this could not be achieved, as the personnel policies of the parent body were also adopted for the attached research organisation. At times, this resulted in perverse situations: the unwanted officers from the parent organisation were posted to the attached research organisation. This created a serious morale problem within the research organisation and, in fact, hindered research. The Rawat laboratory, among many others, visibly suffered from this approach. The grass could not grow

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under the proverbial Banyan tree.

Administrative Aspects: A study of public-sector corporations, in general, and research organisations, in particular, reveals an unimaginative approach toward managerial and organisational issues. A survey by the Committee on Public-Sector Corporations, Autonomous and Semi-autonomous Bodies, headed by the author, collected a considerable amount of data. The analysis brings out some interesting points applicable to the research organisations and their effectiveness. The relevant findings follow: -

1. **Selection of Heads.** Selection of heads of research organisations was found to be highly discretionary. In 69% of cases, the selection was made without any standard procedure. In most cases the concept of search-committees to select a panel of names, out of which the government could select the head, was not even known.
2. **Tenure of Head of Organisation.** The survey also revealed that in 77% of cases the heads spent less than three years in the organisation. This points towards the desirability of introducing a fixed-tenure system in the research organisations, so that security of tenure is guaranteed under law.
3. **Governing Board.** In a large number of cases, the chief executive was also the head of the governing board. The meetings of the governing boards were rare and, in any case, not, regular. The governing bodies were performing only a ceremonial function and could not contribute to accountability or performance-evaluation. The procedure regarding appointment of head of organisation could be institutionalised only by amending the governing-law or charter. There was a view that the chief executive should not be the chairman of the governing body. It was also noticed that there was no real incentive for the members of the governing boards to attend the meetings. In the case of commercial concerns, the governing board consists of directors who are the main shareholders and can be treated as owners. They can hold the C.E.O. of the company responsible and accountable.

Although the idea within the government was based on the same format, but it was not implemented properly, with the result that in most cases there was not even the beginning of the corporate culture, which the designers had hoped for. In a scientific organisation, the corporate culture and accountability is difficult to achieve. However, strengthening the governing boards promises to be an effective method of achieving the twin objectives of accountability and a corporate culture, which is currently lacking in R&D organisations. In line with the recommendations of the Committee referred to above, it would be highly appropriate if: -

- a. The members of the Governing Boards have experience and qualifications having a clear relationship with the goals of the organisation and its speciality.
  - b. The members of the G.B. are of similar rank as the head, or in higher grade, so that they can be objective.
4. **Performance Evaluation.** Inadequate performance-evaluation by the governing boards or the administrative ministry was clearly brought out, according to the data. Only 36% of the organisations surveyed had conducted any study for improving efficiency. There were also serious audit objections in the scientific organisations that had not been properly addressed or rectified. Numerous disciplinary inquiries were pending in 31 % of the organisations. On the basis of this data, one can consider the desirability of the following possible steps: -
    - a. Performance-standards should be worked out by various organisations and duly approved by the governing boards.
    - b. A system of cash-incentives has to be introduced.
    - c. Merit Orientation & Outside Interference. The study found that outside factors are adversely influencing the functioning of organisations: 74% of organisations reported external factors hampering their performance. It was also apparent that 'Merit' was being ignored because of the traditional 'Sifarish' system, which had attained the proportions of an epidemic.

5. **Science Policies.** A number of science and technology policies have been made. Each policy resulted in some boost to the S&T system, although no policy has been implemented, in full, so far. The first Science Policy in the eighties resulted in the formation of a number of new R&D organisations and, ultimately, the ministry of science & technology; before that, it was only a wing in the ministry of education. The National Technology Policy of 1993 had an interesting angle to it, as the Pakistan Cabinet approved it and had an Action Plan attached to it. The cabinet also approved this and, at least, the first instalment of funds was also provided for implementation of the Action Plan. Among many issues, it identified a number of problems faced by the R&D organisations. These included lack of autonomy, poorly defined missions, lack of resources, lack of co-ordination and co-operation among R&D institutes and isolation from the client base.

6. **Findings of Consultants.** The Ministry of Science & Technology was able to get the advice of consultants, with the help of international organisations like the UNDP and the World Bank. The report of consultants in June 1992 prepared by Carl Erik Wegener and Jose Adeodato de Souza Neto, sponsored by UNDP, brought up some very relevant points. Some of their findings and recommendations follow: -

*“The linkage between the institutes and their clientele is generally deficient, if at all existing...The result of the lack of communication is that the individual scientists define and select the R&D projects, based upon their own interpretation of the needs of the users or on the basis of import-substitution.....A very limited percentage of the developed products and processes are utilised by the productive sector; however no exact data are available.”*

7. **Supply and Demand of Technology.** A consensual finding in current literature is that 75% of the successful industrial innovations are of the “pull” type. Marketing or production-people originally proposed them. The important feature of this method is that it detects the innovations that the market is willing to pay for.

8. **Current Thinking.** An interesting possibility for restructuring Research & Development has lately opened up in the country. This is because of a lot of interest being shown for the development of Science & Technology in the country and the considerable increase in the allocation of resources for science. There is a clear perception in the advisory boards set up by the Ministry of Science & Technology that restructuring has to take place first. Otherwise, the money will not be effectively spent and the science system as a whole might be blamed if, in spite of heavy allocation of funds, the output of R&D institutions falls below expectations. I will list below the salient features of the recommendations already made by the Review Committee on Restructuring. In fact, the measures suggested by the Review Committee have already been incorporated in a draft law, which has been circulated to all the organisations under the control of the ministry of science, for comments and suggestions.

- a. One of the new approaches is to form a Science & Technology Board of Management. This Board will become an effective arm of the ministry, to implement national science policy. The Board will have chapters or branches in the major cities, in order to deal with the R&D organisations on a regular basis. It will have the capability to analyse the work done by any R&D organisation and institute regular performance-evaluation. At the same time, the Board will have no power to interfere in the day-to-day functioning and decision-making of the R&D organisations.
- b. The concept of the Chief Executive Officer of the R&D organisations has been introduced. The head will have full powers of hiring and firing. The overriding goal will be to orient the work of the organisation, so that its research efforts are useful to the relevant industry. The success or failure of the C.E.O. of the R&D organisation will be judged from the usefulness of the services of the organisation and its capacity to sell new ideas and technology for product-improvement.
- c. The R&D organisations will be expected to meet a percentage of their expenses through Internal Cash-Generation. The revenues earned will remain under the control of the organisation and will not be credited back to the national exchequer.
- d. The requirements of Working Capital for each R&D organisation will be worked out. The approved amounts will be provided as Working Capital, so that the organisation can have a business-like approach and capability. There will be a marketing wing in the organisation, to

- boost sales of its products, services and technology.
- e. The cash generated by the organisation will be used to enhance its productivity and to reward its employees, according to an approved proportion. The income from patents will also be retained.
  - f. The R&D organisation, after strengthening and provision of Working Capital, will be expected to meet some of the expenses, according to an approved schedule. In accordance with this approved programme, the non-development part of the budget will be reduced in easy stages. This will put enough pressure on the organisation and its C.E.O. to husband the resources in a business-like manner and to reach out to prospective customers and clients. If the revenues are less than the (non-developmental) reduction, the C.E.O. will have to reduce staff by laying off. This is admittedly a controversial measure, but many countries have already adopted this method. New Zealand, Australia, South Africa and India can be cited as examples for adopting this measure.
  - g. In case the Board of Management is established, there will be no need for individual boards of governors. Instead there will be a number of standing committees for intellectual interaction and collective decision-making.
  - h. The new system envisages a tenure-system for the Chief Executives heading the R&D organisations.

## CONCLUSIONS

Research and Development capabilities exist within the country in a variety of disciplines. The link-up with industry will be beneficial to the R&D sector in a big way. The link-up can be achieved only through a variety of reforms *within* the science sector, as it requires a sea-change in the attitude of the heads of R&D organisations. The institution of performance-evaluation, peer-review and creation of incentives, through funding streams allocated on the basis of performance, can do the job.