

Science and public accountability

G. Venkataraman

A recent meeting in Delhi was unique for its attempt to get scientists, science administrators and auditors to exchange views and discuss ways and means of ensuring accountability in R&D. A report, and summaries and extracts by the author, from documents made available at the meeting.

Readers of this journal must undoubtedly have followed with interest the recent correspondence (see *Curr. Sci.*, 1989, 58, 673, 782, 836, 1001) arising out of the observations of the Science Audit Wing of the office of the Comptroller and Auditor-General (CAG). S. Sathyamoorthy, Director of Audit, CWM (II), who replied to the discussion, arranged recently, in close association with B. K. Chaturvedi, Joint Secretary (Finance), Department of Science and Technology, an unusual meeting with 'Science and public accountability' as its theme. The seminar was held in Delhi on 21 and 22 March. For the first time, scientists and auditors got together not only to exchange views but also to explore, as Chaturvedi declared in his welcome address, ways and means of promoting accountability in our R&D efforts.

In his inaugural remarks, science and technology minister (state) M. G. K. Menon drew pointed attention to the fact that the expectations of the public with regard to 'deliverables' had considerably increased. The S&T sector had enjoyed much support, and it was imperative to show performance in proportion to the investments made. Minister of state for defence Raja Ramanna emphasized that, while accountability is normally viewed simply as financial accountability, there are also other aspects to it, like performance accountability, environmental accountability and so on.

T. A. Chaturvedi (then CAG but since retired) spoke next to explain what the objectives of audit are. While it is true that the run-of-the-mill auditor tends to have the mentality of a policeman and would like to notch up an impressive

number of objections, the CAG has a different objective altogether. He patiently described how every effort is made to reconcile conflicting facts before finally including an audit paragraph in the report to Parliament.

The business part of the meeting was arranged in five sessions, almost entirely made up of panel discussions relating to various aspects of public accountability. Not all panelists focused on the theme they were to discuss, and there was a certain amount of rambling. As a prelude to the main programme, B. K. Chaturvedi gave a succinct overview of the investments being made in the S&T sector, the problems faced, and the specific issues the meeting should consider.

Funding priorities

The first of the panels addressed itself to the funding and the financial aspects. T. N. Seshan, Member, Planning Commission, who got the discussion under way, declared in a rather spirited address that, sitting on the Planning Commission, he was confronted with diverse requests for funds. Given the stated rural bias of the present Government, money for S&T would not flow as easily as in the past. A hard case must be made, with matching performance to show. P. J. Lavakare, Adviser, DST, sought to dispel the notion that scientists objected to accountability; rather their complaint was about the way the term was used. In short, the traditional method was unsuitable where S&T was concerned and a new measure of achievement and accountability was needed. Speaking on behalf of the educational

community, University Grants Commission (UGC) chairman Yash Pal lamented that, at present, S&T planning was literally being done in a vacuum, considering the negligible importance given to education in general and science education in particular. The views of S. Ramachandran, Secretary, Department of Biotechnology, were particularly interesting since much is expected of biotechnology in the context of solving many problems on the agricultural front. According to him the fault is not at all with science or even our scientists. Science has the answers but it is the system that is highly deficient, a point he illustrated with several examples. Planners often talk of priorities. P. N. Tandon, an eminent neurosurgeon, cautioned that priorities are fine but must be laid down with care. He described how there was a tendency to dismiss neurosurgery, for example, as a luxury and deny funding to it. On the other hand, in a large country like ours, the number of patients does tend to be large and if facilities for treatment are not made available locally, people go abroad. He observed that the fees paid to one particular hospital in the US during one year for coronary bypass surgery could well have been utilized to set up an entire hospital here in the country.

Managing science

The next session was on science management, chaired appropriately by Sam Pitroda, the main architect of the Centre for Development of Telematics (C-DoT). He duly described 'Sam's success formula', which clearly has much in its favour, the controversy over C-DoT notwithstanding. Ashok Partha-

Sarabhai on science management

The late Vikram Sarabhai is credited with imaginative approaches to science management. Given below are extracts from a lecture on science administration he delivered to the Nehru Foundation for Development, Ahmedabad:

Administrative practices are of paramount importance in creating environmental factors within an organization.

The twin tasks of Government, preservation and innovation, call for working cultures which are rather different. At one end of such a spectrum are certain administrative services acting on precedents and traditions, providing security and continuity, and impersonalized to the extent that if one person is substituted by another, every member of the organization is fully aware of how the successor will behave and operate under a given set of circumstances. At the other end, there are organizations based on research and development involving individuals who act on insights and hunches, non-conformists, questioning assumptions, innovating and learning. These two extremes clearly require organizations and working cultures which are rather different.

Institutions for innovation require organizations built around men. The early beginnings of any institution are crucial and the culture (or lack of it) brought by the first entrants plays a significant role in establishing the norms, procedures and practices of the organization.

In professional groups such as those of scientists and engineers, it is important to recognize that

motivation and control are largely inherent and contained in professional commitments. Money, hierarchical status and power are important for most cadres, but to scientists and professional groups, the need for autonomy of working conditions and opportunities for self-development are equally important.

The existing Government procedures for selection, evaluation, promotion, buying of supplies and equipment as also budgetary controls are highly inappropriate to the effective functioning of scientific laboratories and industries involving complex technologies.

It seems important that the chief executive, besides making and executing policy, maintains direct contact with his professional role. The body to which the chief executive refers for policy and strategic decisions must be compact in size and consist of members chosen for their individual roles and expertise rather than from a representation angle. Such features would be important in setting the 'tone' and 'quality' of the interactions which occur and the policy decisions taken.

Structures, procedures and techniques are important but these must be sustained by a cluster of attitudes conveying care, trust and nurture on the part of responsible persons.

sarathi, Additional Secretary, Department of Scientific and Industrial Research, cautioned that S&T is too diffuse a term. There was a clear distinction between science and technology and therefore also in the objectives and styles of institutions pursuing one or the other. Science needs support management whereas technology needs to be managed. Thus the Tata Institute of Fundamental Research and the Bhabha Atomic Research Centre cannot and should not be viewed in the same light; but audit tends to view them in an undifferentiated manner. The other speakers outlined their perception of an ideal management system.

In the discussion that followed, Chatterjee, who audits the Department of Atomic Energy, emphasized that

audit is a constitutional requirement and that we have to live with it. But, asked Yash Pal, does that mean that audit should be rigid? As chairman of UGC Yash Pal was keen on promoting excellence, and in this context had incurred some expenditure in some projects that involved the Indian Institutes of Technology. Audit objected, saying that UGC should deal only with universities. Maybe there was legal impropriety, but was it not compensated by the national good accruing? There was no response from the audit side.

The second day of the meeting began with a session devoted to a discussion of the internal monitoring processes in various agencies and departments like the Council of Scientific and Industrial Research (CSIR), the Indian Council of Agricultural Research (ICAR), the De-

fence Research and Development Organization (DRDO), and the Department of Atomic Energy (DAE). This was the only session where there were presentations. The session was presided over by V. S. Jafa, Secretary, Defence Finance, and most of the talks also were by persons dealing with finance or procurement. There was a wealth of detail undoubtedly of interest to some but dull for the most part. There was a moment of tension when the CSIR representative made rather critical observations about scientists, but this was defused later by B. G. Joshi of DRDO, who enlivened the proceedings with scholarly Sanskrit quotations on the one hand and quotations from Feynman on the other. I personally thought that very little useful emerged from this session.

Science and audit

Session 4, chaired by R. Parameshwar, Additional Deputy CAG, focused on the question of the relationship between science and audit. Unfortunately, our public, press and Parliament seem to feel that accountability simply means: 'What does the CAG say?' Speaking on behalf of the CAG, Parameshwar patiently explained the role of audit and how it functions. Auditors are trained to question, and they evaluate within the framework of the parameters set by the laboratories they audit. The principal objective is fact-finding, not fault-finding. K. L. Chopra of IIT, Kharagpur, would not quite agree since, in his experience, he often found objections being made simply for the sake of objecting. But he did concede that there was a lot that was wanting among the scientists themselves. P. M. Bhargava, former director of the Centre for Cellular and Molecular Biology, Hyderabad, said that, at present, scientists were being *held* accountable; instead, a system must be devised wherein they *feel* accountable. The present system seemed to be loaded against the conscientious performer. According to him, there was an enormous amount of irregularity committed strictly within the rules but audit, as it functions at present, seems unconcerned (see article by Bhargava in this issue). Speaking for science audit, Sathyamoorthy observed that science audit in India was a recent institution and still evolving. He also drew attention to audit's difficulty in dealing with a wide spectrum on the one hand and the lack of information on the other. V. Siddhartha of DRDO gave a scholarly commentary on the functions of audit, and expressed the view that audit is not going far enough in terms of connecting the results of the audits of different units that have an organic relationship between them. For example, if CSIR spends money on building research, then the audit of the Ministry of Works should check if use was being made of the know-how generated by CSIR. To scientists who fear audit he added the comforting remark that no scientific establishment has, as yet, ever been shut down for lack of performance! I too was a panelist, and made the point that performance assessment must be comprehensive instead of by auditors alone as at present. The review team must include professional scientists,

management experts, perhaps even psychologists, and of course the traditional auditors. There was some sympathy for this view among auditors, and I was pleasantly surprised to learn later that such a scheme is already operational in Sweden while France is experimenting with it.

Social accountability

The last session, again a panel discussion, had science and social accountability as its theme. Obviously the title was a bit fuzzy, but the presence in the chair of L. C. Jain, Member, Planning Commission, and well known as a Gandhian, set the tone to some extent. Several people spoke, including myself, each of us tending to have his own individual interpretation of social accountability. Perhaps the most invigorating remarks were made by Aromar Ravi, who, besides being the youngest speaker, is neither an auditor nor a professional scientist. He is involved with a unit called Development Alternatives, which is largely concerned with rural development and the like. Ravi is disappointed with our S&T effort because it was essentially a case of 'middle-class scientists doing middle-class science for middle-class people!' The so-called acceleration of growth rate benefits, according to him, only a small minority, whereas among the majority, there has been a rapid rise in unemployment. He is therefore concerned whether all the effort being made in S&T would ever change the quality of life of the poor. Naturally he wants efforts to be skewed heavily towards the rural sector, and if science can help, then well and good. But care is required. There was, for example, the case of a group of scientists who had designed an excellent fuel-efficient stove for use in rural areas. However, the stove soon lost its popularity, for the designers had not allowed for the fact that village women are used to cleaning their fireplaces with cow-dung. And when dung was repeatedly used on this stove, it ceased to be efficient. The moral: For success, social scientists must also be associated. While Ravi's views were undoubtedly thought-provoking, it is not at all obvious that we can afford to abandon our S&T thrust. Even villages need electricity, communications, transport, kerosene and the like. Besides, there is defence, which,

unfortunately, always requires the latest technology.

An overview

The meeting certainly provided, for the first time, a valuable opportunity for scientists and auditors to get together and exchange views. While auditors were well represented, one would have liked to see more working scientists. Given the past experience, one obviously could not expect instant rapport between the two sides, but certainly one could see some mutual respect emerging. I, for one, found many senior auditors quite sincere, besides being helpful and sympathetic. At the same time, there was ample evidence of the traditional barrier of suspicion. If the links established during this meeting are developed, then, in course of time, one could see the emergence of a healthy relationship.

Many, including the present writer, wondered whether anything would come out of this meeting. Not likely, despite the several practical suggestions made, since nothing like a follow-up seemed to be in evidence.

Cost and time overruns have become standard features of not only most R&D projects but projects in general. The establishment feeling is that this is largely the result of sloppiness on the part of project managers. However, since the problem is endemic, surely there could be a deeper reason? Unfortunately this is seldom considered. Instead the cry goes round every now and then: fix responsibility. And if the order comes from sufficiently above, a scapegoat is also found. But all this has not solved our problem—not in forty years.

The recipe for success in R&D is not all that complicated. Essentially one has to bring together the right kind of people and then give them freedom to act. This is a tried and tested formula that has worked the world over and on the few occasions it has been tried, it has worked well here also. In general, our system may grudgingly permit the accumulation of talent but it severely frowns upon autonomy, flexibility and the like. In the name of protecting public interest, we have neatly tied ourselves up in an unimaginable tangle of rules, controls, procedures and checks. But none of this has helped one bit. On the contrary, barring the odd exception, we have perfected the recruitment of the

mediocre, who, lacking commitment to progress, often keep themselves busy by devising ingenious ways of beating the system and bleeding it. As Bhargava pointed out, wastage and shady operations are quite widespread. The establishment's answer to this has always been to impose more controls and checks. In all this, it is the person with drive and talent who suffers. No matter what one's professional reputation and credentials, one is treated on par with all the rest and slowed down in the process. And so the cry goes round that Indian scientists are no good and are non-performers. One finance man vitriolically remarked during the meeting, 'Our scientists are not Michelangelos, and mediocre scientists will get only mediocre treatment.'

No amount of articulation seems to convince our establishment that it is not Indian scientists who are wanting but our system. Writing recently in *The Hindu* (25 May 1990), P. V. Indiresan, a former director of IIT, Madras, observed: '... in a recent nationwide selection of the most outstanding hundred or so young engineers in the entire US, ten per cent of the places went to Indians—nearly ten times the national average. This is the kind of talent we have lost... tears of inconsolable sorrow are shed when the flower of a nation's youth is lost in war... Yet when it comes to top technical talent, the only desire our society has is for them to forsake our country and settle abroad, actually compete against us and work to diminish our prosperity.'

Notwithstanding the loss of talent, there is still quite a bit of it left here but unable to give off its best thanks to the shackles imposed. Add to this the overall poor work culture, the plethora of holidays, etc., and non-performance is all that one can expect.

Our system is so complex that when I deal with a finance man I am expected to be up to his level of understanding on matters financial, when I deal with a contracts man I should know enough

on legal matters to answer his queries and objections, and so on. Nobody bothers that all this cultivation of unrequired expertise leads to dilution of technical talent. The scientist and the engineer must be *allowed* to perform, and *enabled* to perform *in the area of his or her chosen profession* instead of being obstructed, as, sad to say, happens most of the time. Perhaps our institutes of management should give serious thought to how our S&T should be managed and then train the required managers so that scientists become free to do what they can do best.

I once had a long and anguished talk with a very senior bureaucrat who is quite knowledgeable. He felt that scientists should not complain but must be ready to sacrifice in the Indian tradition. 'Think of Ramanujan', I was told. Is this being realistic?

I would be unfair if I were to lay the blame entirely on the establishment since scientists too have their own share to carry. For one thing, scientists turned bureaucrats are often more obscurantist than honest-to-goodness bureaucrats themselves. Secondly, there are serious lapses of concentration on the part of many senior scientists who have earned such epithets as non-resident director, director-at-large, etc. There really does not seem to be a pressing need for travelling so much and getting involved in the business of other bodies, organizations and institutes, when one's own home is not in order. Then there are the endless conferences, workshops and what have you, complete with bags and company-sponsored lunches/dinners. Finally there is the talented minority at the fringe, young and dynamic no doubt, but somewhat uncommitted to our institutions; like our journals, for example. 'We cannot publish in them until they attain world standard and achieve wide circulation', they say. Sounds reasonable no doubt, but who is to achieve all this? Some Maxwell's demon?

Altogether it seems to be a painful

chicken-and-egg problem. The scientists say: 'The system is dreadful. Streamline it first and give autonomy before demanding performance.' (Science Audit believes there is already too much autonomy.) The establishment retorts, 'No way', citing horror stories. 'What we need', they say, 'is more accountability.'

And so it is all boiling down to accountability without true responsibility, flexibility and adequate freedom to operate. I am afraid this is not going to work, and we have seen this already. Maybe we should be prepared for endless rounds of 'exposures' and 'raps' by the auditors and perhaps also for more meetings (like the one reported) searching for the missing accountability. We have yet to learn that responsibility and accountability go together, and that we cannot have, as at present, two groups, one enjoying power without responsibility and the other saddled with responsibility but not given the enabling powers.

I know a very bright person who had studied physics in college and was therefore reasonably knowledgeable about what science is. Later he joined the Indian Administrative Service. While in service he was a hard man to please, as I learnt from experience! Subsequently he took voluntary retirement in order to enter business, and promptly was up against bureaucratic hurdles like those he himself used to place earlier. Once out of Government he became wiser. I met him after his retirement and we exchanged tales of woe. I then asked him, 'Will things ever change?' He thought intensely for a minute and replied, 'Not for at least a hundred years.'

G. Venkataraman is Director, Advanced Numerical Research and Analysis Group (ANURAG), DRDO, P. O. Kanchanbagh, Hyderabad 500 258.

India's S&T budget

B. K. Chaturvedi, Joint Secretary (Finance) of DST, offered at the Delhi meeting a bird's-eye view of the manner in which investments in S&T have

grown over the years. His presentation, which was rich with statistical information, is summarized below.

In absolute terms, expenditure on

S&T has grown from less than a billion rupees two decades ago to more than twenty-five billion rupees now (see Figure 1). The growth in expenditure as a percentage of GNP can be seen in Figure 2. Most of the money for R&D