

## **Summary of the discussions of the Twenty eighth meeting of Scientific Advisory Committee to Cabinet (SAC-C) held on 11<sup>th</sup> December, 2014 at Vigyan Bhavan Annexe, New Delhi**

The agenda of the meeting and list of participants are at Annexure I and Annexure II, respectively.

### **M28 Opening Remarks**

**Dr. R. Chidambaram**, Chairman SAC-C warmly welcomed all the members. He then briefed the Committee about the agenda of the day on enabling policies for rapid growth of Science & Technology including higher education. He said that the agenda was prepared after extensive consultations with many stake holders and these interventions are important for India to become a Knowledge Economy. He observed that the recent enhancement of stipend for research fellows by the government is a good and positive measure. He expressed his concern at the vacant faculty positions in universities, IITs and NITs. Underlining the dichotomy, he said that, on the one hand, we are concerned on how to assure careers for our young talent pursuing science and on the other hand we are facing large vacancy in faculty positions in these institutions. In this context, he recalled the article he wrote on "Getting the best brains for Science" in Scientific American India Guest column in March 2006, and the recent editorial in Nature regarding the harsh reality about postdocs lacking the prospect of assured careers. He then presented the agenda items in four broad categories viz. Processes, Faculty, Careers and Technology. He suggested that the members could discuss the agenda items category wise. He further informed that SAC-C intends to bring out report on the needed interventions in each category, as an outcome of the deliberations, for submission to the Government.

This was followed by the consideration of the Action Taken Report (Annexure III). The Committee noted it.

Chairman then invited Dr. K. Vijay Raghavan for initiating the discussion on the main agenda items.

**Dr. Vijay Raghavan, Secretary, DBT & DST** said that all the agenda points are extraordinarily important and complimented the PSA's office to put them together for discussion in the SAC-C. The deliberations shall possibly show

ways of dealing with these issues. He specifically pointed out three areas of major concern:

- (i) Across the administration, there is an attitude that it is much wiser to do nothing than try to do something in situations dealing with finances, decision making etc. It is far safer to move the files rapidly to another table and not to take action.
- (ii) Institutions are very good in advising, but their ability to reform internal systems and to do new things is very limited and restricted to a few institutions. The institutions expect that their problems will be solved from outside. Want solutions, but do not want to make internal reforms.
- (iii) Regulatory System - We assume that we have to be 100% safe in everything that we do. Citing the example of development of GM crops, vaccines etc., he indicated conflict of technology with its application due to poor communication of science and poor decision making.

He felt that unless these matters are dealt with and clear solutions found, it's going to be difficult for the nation to make big strides in S&T. He suggested that the SAC-C in its advisory role should convey the concerns to Hon'ble Prime Minister.

Chairman then invited Dr. Shailesh Naik, Secretary, MoES for his views.

**Dr. Shailesh Naik, Secretary, MoES** appreciated the efforts of SAC-C in flagging the very important issues. He said that one of the major issues is the existing rules of DoPT. He mentioned about the difficulties in transferring scientists from one institute to other within the same organisation, leave alone transferring between organisations. He strongly felt that it is desirable to have mobility of scientists across the organisations and this is possible only if certain amount of independence and flexibility to scientific organisations is permitted and parity in service conditions including retirement age across the organisations is maintained. To make this happen, decisions taken by heads of organizations or joint committees should be trusted.

He talked about complete messing up of the modified FCS. He mentioned that, with the existing format, it is impossible to screen out anyone. He further said that general recruitment rules may not be applied to scientific community.

A lot of time is lost in reporting things to UPSC and DoPT and getting the necessary approvals.

He felt that our scientists can certainly do and deliver much better, if the same facilities and environment are provided here as in developed countries. And for creating such facilities within the country funds should not be a constraint. He also gave the example of starting training schools on the lines of BARC model for creating manpower in specialized areas of 'climate change'. The school is running excellently, but DoPT is not regularizing it on the basis that it would lead other institutions to seek for similar facilities!

Dr. Chidambaram remarked that we should be able to replicate our own successful excellent systems. In super-specialized areas, where adequate manpower is not available, BARC-type of training schools would be very helpful and desirable. He then requested Dr. Katoch, Secretary & DG, ICMR to present his views.

Completely agreeing with Dr. Vijay Raghavan and Dr. Naik, **Dr. Katoch, Secretary & DG ICMR** further elaborated the issues involved in mobility of scientists from one science organisation to another, including universities, particularly in medical schools. He said that the government had spent a good amount of money in creating fellowships, but there are inadequate positions for them to be absorbed. The situation is so alarming that a medical doctor with DM or MCH degree gets Assistant Professorship almost after ten years. In this context, he cited the benefits of the discontinued recruitment scheme of 'All India Talent Search Exam for Medical'. He suggested that the government may create, say about 1000 additional positions every year and distribute them across the science agencies. These positions might be filled on the lines of civil services to generate an assured pool of manpower every year.

Chairman then requested other members to express their views.

**Dr. S.K. Joshi, former Secretary & DG, CSIR** said that the delay in processes has to be avoided by all means. The question of mistrust is a serious issue and it needs to be sorted out through mutual discussions. He urged the Committee to think of a way for protection against harassment which happens when one takes decisions as a Director or Chairman of the Governing body. He mentioned that two good people, who have done their best in the interest of institutions, are being punished. A mechanism must be thought of to deal with this kind of

situation, otherwise good people will hesitate to head institutions. He suggested that a committee of elders may discuss this issue with the judiciary.

**Dr. Satyamurthy, Director IISER Mohali** informed the committee that he had an opportunity to make a presentation to the President of India. One of the slides was on difficulties of doing science in India with three bullet points (i) How does a scientist work if he is completely worried about RTI questions (ii) audit objections (iii) compliance to vigilance.

Risk taking in the process becomes particularly vulnerable to those, not only while in office, but also even after demitting the office. Unlike the government officials, scientists do not have any immunity at all. He mentioned that the President himself expressed the opinion that there is a need for change in governance structure. People occupying decision-making positions need a certain amount of immunity and protection, while in office and thereafter.

**Dr. Chidambaram** observed that Heads of institutions must feel secure to take bold decisions in the interest of Science. Prof. Devaraj, Vice chairman, UGC also agreed that people sitting at a decision-making position must have some free hand and immunity.

**Dr. K Vijay Raghavan** commented that this is not peculiar to science administration, but one must be courageous to do right things. Unless one puts forth the right example, one is succumbing to the view that nothing needs to be done.

**Dr. Dipankar Chatterji, President, Indian Academy of Sciences**, expressed his concern for (i) handling the two body problem i.e. mobility of the faculty along with spouse working in the same profession from one institute to other and (ii) inadequate number of training programmes / schools with dedicated staff. In this context, he mentioned about the lecture of Prof. Naba K Mondal for India Neutrino Programme having a budget of Rs.1500 crore, where the college students and teachers will be trained. He further added that these dedicated training schools had been very successful in BARC & ISRO. He also said that civil service mode of selection for scientists are unheard of abroad.

**Prof. Dinesh Singh, VC, Delhi University** said that usually academics are withdrawn from the real world. There is a need for a platform where constant engagement of academia & industry and issues concerning the nation may take place. He pointed out the shortcomings in the recruitment process of the university system for not being able to recruit people from outstanding national

institutes such as TIFR etc., or abroad. He was of the opinion that, unless we address the undergraduates entering the streams of knowledge, the situation is not going to improve. There is need for a change in the mind-set at an early stage. He gave the example of the innovations by UG students at the start up incubators in the colleges of Delhi University. He urged the committee to have some policy intervention to overcome these issues.

**Dr. Sikka, former Homi Babha Chair Professor and former Scientific Secretary, O/o PSA to GoI** mentioned that in many of the state colleges, an Assistant Professor gets the salary equivalent to or less than the research fellows and requested UGC to look into this matter. He pointed out that currently the job market for the graduates of Physics and Chemistry in industry has shrunk since these jobs are being taken up by engineering and management graduates. For providing assured career, he shared the example of the training school of BARC.

**Dr. J.J. Irani, former Director, Tata sons** brought out a few issues regarding why good people are not coming to Science in India. He said that the situation in India is very different than in USA where the salaries for Ph.D are equivalent or better than those in industry. The main hindrances in the Indian context are (i) societal/parental pressure to join industry for better financial gains (ii) need of finances to look after old parents (iii) bureaucracy and political interference. He stated that in USA, research is funded by small donations from people, and by Carnegie, Rock feller, Bill Gates Foundation, etc., but, in India, no such culture is prevalent. Only a few companies like the TATAs are making efforts to adopt these practices. He opined that changes in the policies supporting industrial research are to be sorted so that best people can be engaged into it.

**Dr. K Vijay Raghavan** observed that there had been no political interference in the functioning of Science Ministries. He said that, despite problems, there has been a feeling of optimism and gave the example of how DBT, ICMR along with health ministry had jointly worked and introduced 3-4 vaccines in the immunization program of the country.

**Chairman** said that research, development and delivery are crucial for a knowledge economy. Universities are good in research but bad in delivery while industry is good in delivery but lags behind in research. Both are weak in the middle part of development. Therefore, interactions between Academia and Industry are necessary to synergise their competencies for rapid industrial

development. Chairman then requested the members to express their views on enhancing Academia-Industry interactions.

**Dr. Krishna Ella, CMD, Bharat Biotech** underlined the importance of enabling policies for encouraging academia industry interactions. There is a need for mutual trust between industry & academia. The new generation entrepreneurs are looking for this mutual trust with academia and it will happen only when in-house R&D efforts in industries expand. He also informed that scientists working in industry also look forward for academic exposure and would like to have adjunct faculty positions in universities / research institutions. He also opined that involvement of DoPT in scientific appointments may be discouraged. Responding to a query from Chairman, Dr. Ella said that industry may be willing to support adjunct position in universities and it would be better if scientists working in industry are chosen for such positions.

Taking the life sciences sector as an example, he said several companies have excellent R&D facilities and it is evident through publications and patents. For example, his company has over 100 research publications with an impact factor of 3 to 17 and over 30 patents to its credit. The company is recipient of Bill and Melinda Gates Foundation and Welcome Trust grants. But the Ministry of Science & Technology shies away from providing research grants to Indian Industry, on par with the research institutes. He felt the thinking of the Government has to change and enable the Indian industry to develop new technologies. He also emphasized the need to carry out clinical trials within the country itself rather than carrying out in Vietnam, Cambodia, Russia etc. He also touched upon data integrity problems being faced by the Pharma industry as well as regulatory issues. He suggested auditing of research institutions may need a fresh look.

Availability of skilled manpower, especially for life sciences & pharma companies is another major problem. He felt that by introducing skills, in consultation with industry, in the masters as well as the undergraduate programme, may alleviate the problem to a great extent.

He emphasized the need for strengthening the Angel investors by providing some incentives to put their money in start-ups. He mentioned that, in USA, the innovations are supported by angel investors, not by private equity.

**Prof. Devaraj, Vice-Chairman, UGC** informed the members that UGC is setting up of 100 'Kaushal Centres' in central universities based on skills for knowledge up-gradation along with the National Skill Development Corporation. Under this scheme, Rs.5 crores will be given to each centre along with one Knowledge Resource Centre. These will be based on the skills required for the industry.

As further information, **Dr. Renu Swarup, Senior Adviser, DBT** informed the members about the Finishing schools in biotech sector promoted by Karnataka state on similar lines. The curriculum is worked out in consultation with industry and the model is working well and it needs to be scaled up. It may be adopted by other states and in other subjects as well with industry as partner.

**Dr. Sumantran, formerly Vice Chairman, Ashok Leyland** felt that still there is a large gap in the thought process and objectives of the academic community & the industry. To leverage the mutual knowledge and capabilities of the two communities, much understanding is required. He cited the example of the institutes in Germany such as Max Plank, Fraunhofer and technical universities, which have successfully bridged the gap between academia and industry.

He said that, in the country, good interaction takes place in certain sectors such as small scale electronics, medical devices, small innovations in mechanical systems and materials; but such interactions are not visible in big engineering science in the industrial domain. However, the country has an excellent track record in the technology areas subjected to the denial regime, such as nuclear, space etc. But a lot needs to be achieved in other sectors that are not subjected to denial regimes including the automotive and aerospace sector.

He emphasized on developing the mechanisms required to facilitate interactions, communication platforms, project-based linkages between universities and small companies. To cross this hurdle, policies are needed for (i) funding projects as well as to maintain a balance of the public funds and money for specific organizations (ii) work required to fill the gaps in bigger manufacturing sectors (iii) a framework for working of Indian companies with universities, research labs and along with foreign entities. He cited the Taiwan model of the electronics industry, which encouraged its linking with right sources of capital. The risk capital in these is very different from the other big projects so the right co-existence of different sources and linking to the right innovators or entrepreneurs is important.

Adding further, Dr. Chidambaram said that strengthening of the MSME sector is very necessary and gave examples of the TIFAC programme, introduced when he was chairman, TIFAC, of technologically homogenous MSME clusters, e.g. Baruipur surgical instruments cluster and Howrah foundry cluster, working with a proximate academic institution like Jadavpur University.

**Dr. Ajai Chowdhury, Founder Chairman, HCL** expressed his views on encouraging start-ups for angel investments. He particularly mentioned about a new tax introduced in the last budget under Section 56 which would tax start-ups for the funding received from the angel investors. This is creating a lot of inconvenience to the growth of start-ups. He opined that entrepreneurship training should be introduced in every engineering college. Small companies and start-ups should be nurtured to innovate and they should be linked to the angel investors. The country should build the whole ecosystem of business and technical mentoring.

For the larger problems in the country such as in defence, electronics, telecom, smart cities, DARPA type of funding should be encouraged where there is a deep collaboration between government and industry and full funding is provided to industry for building new technology.

**Dr. T.S.Rao, Senior Adviser, DBT** emphasized the need for a robust regulatory system in the country. He said that several problems exist in taking forward the technologies in the health care system. He further said that under Stanford India Biodesign programme (a collaborative effort between Stanford University and DBT), 23 prototypes were developed and out of them 13 were licenced. About 6-7 years is spent on developing prototypes. However, considerable time is lost in bringing the products to market place due to regulatory issues. If so much time is taken for putting the technology into translation, then the whole purpose is lost. Therefore it is necessary to streamline the regulatory framework and harmonize it with WHO and FDA. Unless this is done, the developed technologies will not reach the masses and remain in the R&D domain.

**Dr. Renu Swarup, Senior Adviser, DBT** mentioned that setting up of the public sector company BIRAC has helped in changing the eco-system in the biotech sector. Starting from university entrepreneur system, university innovation clusters to the incubators providing mentoring through seed fund, an ignition fund called BIG, taking it through SBIRI and beyond to industry

partnership, similar to DARPA funds. She said that presently it is very limited. The whole model can be translated for other areas, but still a lot of issues are there for scaling up, especially when government funding goes into the private sector.

She urged that there is a need for a separate auditing system if this model has to be adapted since the present system doesn't give any provisions for writing off a project or accepting the failures in the project. There is no provision for risk funding. She shared information about the Israel model for scaling the medical devices sector, where 1000 medical tech companies were set up and government funds came along with angel funds and with risk sharing.

**Dr. Devang Khakhar, Director, IIT-Mumbai** expressed his concern on executing bigger research projects in educational institutions as they place a huge burden on the institution in terms of cost of administration, electricity and other basic facilities. Presently around 10-15% amount of the total project budget is usually sanctioned for institutional overhead and, for bigger projects, the cap is Rs.5 lakhs. He said that large research projects should be approved with the overheads without a cap. Funding agencies should look at this issue and the limit may be extended for special projects requiring high maintenance cost.

**Dr. K Vijay Raghavan** informed about the recent meeting where the issue was discussed and recommended that as far as the overheads are concerned, the cap is being raised to Rs.20 lakhs with no distinction between capital and recurring heads. For larger projects, the management cost will be worked out on a case to case base and integrated into the project cost. He said that there is a need to address a more fundamental issue on overheads i.e. the perception of finance that, by not giving overheads, the money is being saved. He felt that institute fundamentals do require presence of quality overheads.

**Chairman** added further saying that a somewhat related issue is the need for trail funding. Advanced and sophisticated expensive facilities, as a part of major projects, are created at various institutes and universities. Once the project period is over, the host institute finds it difficult to maintain the facilities as they normally do not receive any funding from their parent ministries for the same. It would be necessary to keep these facilities running and the departments that sponsor such projects may consider providing trail funding to maintain these facilities at least for a period of 5 years.

**Dr. Tessy Thomas, Project Director, AGNI, DRDO** shared the issues associated with production of indigenous innovations and advanced technology. She said that during the R&D phase, a small MSME is involved in the making of the prototype, but if it is successful and production is taken up, according to government policy, open tendering has to be called for. In this process the MSME involved during research phase may be left out. She said that government should facilitate their entry to manufacture the specific technologies developed.

**Dr. P. Balram, Former Director, IISc Bangalore** recalled the recommendations of Mukunda Committee in 1990 which formulated the idea of the 4-year U.G program in science with a research component. Based on this IISc had introduced the 4 year UG program, inclusive of skill development and field experience. The idea was to make the students at par with engineering graduates. He said unfortunately the matter of Delhi University starting 4 year program in all disciplines has become public and political. This led UGC to take a view on the program of IISc also. He said that SAC-C has also recommended 4 year course in science due to the importance of UG research which is critical for skill development. He requested that UGC may look into these recommendations and define a suitable nomenclature for UG courses of four years.

**Dr. Prodipto Ghosh, former Secretary (Environment & Forests) to GoI and Distinguished Fellow, TERI** said that presently the governance across the entire government departments is same. DoPT should streamline the present issues pertaining to scientific institutions. A special personnel administration structure for scientific establishments may be created within DoPT. And similarly segregate and reinforce separate auditing norms by a separate vertical of CAG pertaining to specific situation and catering to scientific establishment.

Chairman appreciated the views and requested Dr. Ghosh to provide inputs related to proposed processes and scientific management structures.

**Dr. M.S. Raghunathan, Professor, IIT, Mumbai** supported the idea of IAS type service for science. He said this may attract young people to join science. These selected young people may be also engaged in UG teaching during their Ph.D itself. Presently teaching profession is unattractive and students in science do not look forward to taking this profession. He further added that four year

programme is dependent on the availability of outstanding faculty and few select institutions may have such faculty. He felt that the four years course cannot be run uniformly throughout the country.

**Prof. S.M. Chitre, Professor Emeritus, UM-DAE Centre, Mumbai** shared information about the five year integrated M.Sc course in the Centre for Excellence in Basic Sciences at the University of Mumbai. This is similar to IISERs in approach but institutionalised at a fraction of the cost since it is a part of the university of Mumbai. It is supported by the Department of Atomic Energy and teaching staff come from BARC and TIFR also. He felt that it has been a successful model where students acquire skills, depth of the knowledge with field work and maturity to take up jobs in the research institutions.

Expressing his satisfaction at the quality of discussions on various topics, **Chairman** constituted the following four sub-groups to develop background notes on the assigned topics.

### **Group I - Processes**

#### **Composition:**

1. **Prof. K. Vijayaraghavan, Secretary, DBT & DST - Chairman**
2. Dr. Renu Swarup - Member
3. Shri. Neeraj Sharma - Member
4. Nominee of DAE - to be nominated by Secretary, DAE - Member
5. Dr. Yogeswara Rao, - Member Secretary

#### **Topics to be covered:**

1. Trail funding for major R&D projects
2. Flexible Complementing Scheme - implementation issues, if any
3. Flexibility in recruitment of Scientists - quick hiring of scientists
4. Deemed abolition of posts
5. Scientific Organisations : Issues relating to Auditing Practices
6. Importance of Social Sciences in Technology Delivery
7. Any other related topic

### **Group II - Faculty**

#### **Composition:**

1. **Prof. P. Balaram, former Director, IISc - Chairman**
2. Dr. Ved Prakash or his nominee ó Member
3. Prof. Dinesh Singh ó Member
4. Prof. Gautham Biswas - Member
4. Prof. K.N. Ganesh - Member
5. Shri. Neeraj Sinha, O/o PSA - Member Secretary

**Topics:**

1. Enabling rules for Mobility of researchers from one scientific organisation to another
2. Joint appointments between academic institutions / universities and research institutions and / or adjunct positions in universities for scientists from National Laboratories / industry
3. Possible recruitment of foreign nationals against permanent positions
4. Establishing of Centres of Excellence in super-specialized fields - choices of fields
5. Sharing of fragmented faculty resources in higher education and Research - use of NKN
6. Any other related topic

**Group III - Careers****Composition:**

1. **Prof. N. Satyamurthy, Director, IISER, Mohali - Chairman**
2. Prof. Dipankar Chatterjee ó Member
3. Dr. D.M. Salunke - Member
4. Prof. Prathiba Jolly ó Member
5. Shri. Neeraj Sinha, O/o PSA - Member secretary

(Dr. S K Sikka, Dr. S.M. Chitre, Dr. V.M. Katoch, Prof. M.S. Raghunathan and JJ Irani to provide inputs)

**Topics:**

1. Assuring careers for talented young people taking up scientific research
2. Any other related topic

**Group IV - Technology****Composition:**

1. **Prof. Devang Khakhar, Director, IIT-Mumbai - Chairman**
2. Dr. J.S. Yadav - Member
3. Dr. Krishna M Ella - Member
4. Dr. V. Sumantran - Member
5. Dr. D. Yogeswara Rao - Member secretary

**Topics:**

1. Mechanisms for enhancing academia - industry interactions, including problems related to joint development of technology
2. Funding start-up companies

3. Enabling policy for introduction of first of its kind products that are developed based on indigenous innovations (advanced technologies)
4. Any other related topic

All the Members of the SAC-C were also requested to provide their inputs on specific topics to the respective Chairman or Member Secretary.

The meeting ended with vote of thanks to the Chair.

**LIST OF PARTICIPANTS**

|     |                        |                      |
|-----|------------------------|----------------------|
| 1.  | Dr. R. Chidambaram     | Chairman             |
| 2.  | Dr. Dinesh Singh       | Member               |
| 3.  | Dr. B. K. Gairola      | Member               |
| 4.  | Prof. S.K. Joshi       | Member               |
| 5.  | Dr. Krishna M. Ella    | Member               |
| 6.  | Dr. Pratibha Jolly     | Member               |
| 7.  | Dr. Prodipto Ghosh     | Member               |
| 8.  | Dr. M.S. Raghunathan   | Member               |
| 9.  | Dr. N. Sathyamurthy    | Member               |
| 10. | Dr. S.K. Sikka         | Member               |
| 11. | Dr. J.S. Yadav         | Member               |
| 12. | Dr. Dipankar Chatterji | Member               |
| 13. | Dr. Juzer Vasi         | Member               |
| 14. | Shri Ajai Chowdhry     | Member               |
| 15. | Dr. J.J. Irani         | Member               |
| 16. | Dr. V.S. Ramamurthy    | Member               |
| 17. | Dr. V.S. Sumantran     | Member               |
| 18. | Dr. Tessy Thomas       | Member               |
| 19. | Prof. Devang Khakhar   | Member               |
| 20. | Prof. P. Balaram       | Member               |
| 21. | Dr. V.M. Katoch        | Member- Ex-Officio   |
| 22. | Dr. Shailesh Nayak     | Member- Ex-Officio   |
| 23. | Prof. K Vijayraghavan  | Member- Ex-Officio   |
| 24. | Shri H. Devaraj        | Representative, UGC  |
| 25. | Dr. Satish Kumar       | Representative, DRDO |
| 26. | Prof. S.V. Raghavan    | Member Secretary     |
| 27. | Dr. S.M. Chitre        | Special Invitee      |
| 28. | Dr. Renu Swarup        | Special Invitee      |
| 29. | Dr. T.S. Rao           | Special Invitee      |
| 30. | Shri Neeraj Sharma     | Special Invitee      |
| 31. | Dr. D. Yogeswara Rao   | Special Invitee      |
| 32. | Dr. Ketaki Bapat       | Special Invitee      |
| 33. | Dr. Manju Gerard       | Special Invitee      |