



CSIR@105 NOT OUT

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HOW do we keep CSIR relevant as the nation marches ahead from its 75th year of independence to the centenary year 2047? When I was in the Indian Institute of Science (IISc) as a PhD student in 1976 my first exposure to CSIR was a visit to CSIR-Central Food Technology Research Institute (CFTRI), Mysore to do some experiments on analytical ultracentrifuge. As a faculty in IISc I also participated in 1987 in the grand opening of CSIR-Centre for Cellular & Molecular Biology (CCMB), Hyderabad, then the best equipped laboratory for biological research in India – “a jewel in the crown”.

Prior to the open market economy in 1990 the industry and other institutions depended on CSIR's facilities to do R&D. Centre for Biochemical Technology (CBT) was responsible for supply of biochemicals across the nation when import was restricted due to governmental regulation. This helped me to do competitive research in molecular structural biology at IISc, for which I received the Shanti Swarup Bhatnagar award in 1990. But for CBT, it would not have been possible. Little did I imagine that one day I would head this laboratory to establish genomic sciences in India.

In the early 90s, India as well as CSIR faced major financial difficulties and many CSIR laboratories had to reorient themselves to generate external funds with industrial collaborations. By the turn of the century, Indian industries' dependency on CSIR for R&D facilities significantly decreased as most of the industrial labs, especially pharmaceutical companies, could import equipments freely. Hence CSIR had to focus on the generation of new knowledge and intellectual property.

When I moved to CSIR from IISc in 1997 as director of CBT to establish genomics technology in India, it was a sunrise science then. But I was unaware of the vastness of the CSIR skill base in every area of science and technology and its contribution in making India self-sufficient. After establishing the Institute of Genomics and Integrative Biology (IGIB) in New Delhi, a globally competitive institute in genome science, I took over as Director General of CSIR in 2007.

CSIR - Contributions that touch every Indian

Although over the past decade as a CSIR director I had been exposed by my predecessor Dr R.A. Mashelkar to the biological and chemical sciences laboratories (about 50% of the 40 laboratories of the CSIR family), still I was ignorant of CSIR's many contributions of the past. I recall a journalist from Singapore once told me, "CSIR is the most guarded secret of India." I realized as a CSIR DG then that there is some truth in the statement.

Let me illustrate how unknowingly every citizen of India uses the outcomes of CSIR technologies:

- Indelible ink when you cast your vote
- Amul baby food you drink as a child
- Pesticides and tractors (Swaraj and Sonalika) of the green revolution
- Every generic drug you take and the drugs we export as a pharmacy of the world
- Every porcelain sink and toilet "Made in India" that you use
- Every low-cost spartek tile that you stand on in your home
- Most of the petroleum products that you use
- The safety assurance of roads and bridges on which you travel

- Technology of fly ash to waste plastic that we use to build roads
- Concrete slippers that keep the Indian rails on track when you travel by train
- Every leather product developed through non-polluting technologies that you use in India and export abroad
- Endorsement of environmental safety of all major infrastructure projects in India that benefit us
- Safety for coal mine workers and enhanced production
- packaged food to aromas from lavender to rose water
- Rice bran oil we consume
- Even the *Science Reporter* that you hold in your hand is a publication of CSIR since 1964.

CSIR is like "Intel inside" for innumerable strategic sector technologies from sensors of missiles to radiation safety glasses of atomic reactors and head-up display of our indigenous supersonic jet "tejas" to five-seater aircrafts for training. It is also the timekeeper of the nation (IST) and maintains all the standards that we use daily. Identification of the extent of the continental shelf of India gave access to larger marine resources for people of India. Protection of our Indian traditional knowledge by developing TKDL, the traditional knowledge digital library, is a hallmark. The list can go on and on.

CSIR always stood up to meet the challenges that the nation faced. Prime Minister and President CSIR on 14th November 2007 during my first meeting after taking up the office of DG, CSIR said, "CSIR is 65 years old and was built by Dr Bhatnagar to meet the challenges of that time. I would like you to build a new CSIR that would fulfil the aspirations of modern India."

Till that time, I managed an old laboratory of CSIR (CBT) for 10 years to transform it into a leading genomics institute. But the size and budget of IGIB in 2007 was 1% of CSIR. Scaling up is a different ball game well known to chemists. What works at the laboratory level does not work at the industrial scale. It is important to look back in order to look forward. This demand from the President CSIR led to a series of actions over the next 10–12 quarters with the support of an amazing group of champions drawn from outside CSIR. To name a few, Mr Dipankar Basu (Retd. Secretary, Coordination, GOI); Late Dr P.K. Biswas (Retd. Advisor S&T, Planning Commission) and Mr Zakir Thomas (IRS) with multifaceted experience including IPR. This team was specifically strengthened by the late Mr V.K. Gupta, architect of TKDL and Dr S. Sivaram (Director, CSIR-NCL) with support from Dr V.S. Ramamurthy (ex-secretary DST, GOI) and illustrious Prof. M.M. Sharma. CSIR and I would ever remain indebted to them.

Gathering this expertise was a key step towards building a new CSIR for new India the seed of which was sown more than a decade ago by creating a position paper in 2011 with the younger colleagues in CSIR family — the *CSIR Vision and Strategy 2022*.

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Learnings from the past

So, what have we learnt from the past to arrive at the present CSIR@80?

1. Gather the best minds from diverse fields who would be committed to CSIR and the nation beyond promoting themselves.
2. Recruit the best potential leaders and give them freedom to operate.
3. Commission projects much ahead of time than be a part of the bandwagon.
4. Traverse a path not trodden by others.
5. Give scientists respect and treat them as valuable national assets, through creation of outstanding scientists, distinguished scientist positions and giving respectable designations.
6. Empower scientists to create startups by creating incubators in national laboratories.

In fact, Prime Minister Shri Narendra Modi, also President of CSIR, gave a clarion call for “Stand up India and Start up India”, a mission that CSIR as an organization is most equipped to fulfil.

To give an identity and brand to CSIR laboratories spread through the length and breadth of the country, we made CSIR one family by prefixing CSIR to all laboratory names. We organised CSIR Techfest 2010 at Pragati Maidan to make the public aware of the contributions of CSIR. The CSIR 800 programme was launched to create initiatives that would make a difference to the life of people at the bottom of the economic pyramid. One example of the outcome of the CSIR-800 programme is the electrical rickshaw nucleated by CSIR in 2008. The Soleckshaw or E-rickshaw replaced conventional cycle rickshaws to a great extent.

The AcSIR (Academy of Scientific and Innovative Research) was established in 2012 by an Act of Parliament to create human resource in transdisciplinary areas. Today, AcSIR, a virtual networked university, established without any additional funding from the consolidated fund of India, is producing nearly a thousand PhDs a year. Currently more than 5500 students are pursuing PhD in S&T.

CSIR became the first public funded organization to establish internet and video connectivity across its 38 laboratories way back in 2010 from Srinagar to Trivandrum and from Goa to Arunachal Pradesh. This became the backbone of

project planning in 2012 and implementation during the XIIth plan 2012-17. This infrastructure was instantly available for daily consultation among the scientific leaders much before Zoom or MS Teams was available.

Most recently, CSIR’s role as a frontline S&T organisation was clearly visible during the COVID-19 pandemic. CSIR played a major role in developing PPEs and ventilators, genomic surveillance and diagnostics (FELUDA), and Covaxin adjuvant, all in record time.

Fifteen years back, CSIR initiated the open source drug discovery (OSDD) movement for neglected diseases, an approach that was embraced by the world during the COVID-19 pandemic. CSIR-IGIB, established two decades ago, developed the genetic landscape of India, a basal data for development of genomic medicine ahead of time. This positioning allowed India, through the INSACOG – a multi-laboratory, multi-agency, Pan-India network to monitor genomic variations in the SARS-CoV-2 – to carry out genomic surveillance during the COVID-19 pandemic.

The way forward

Although much of what was envisioned in *CSIR@80: Vision and Strategy 2022* has been achieved, many targets remain relevant today. What is the way forward?

CSIR needs several disruptive thought leaders. It needs to work on creating thousands of startups to create wealth and to go in for major organizational restructuring to participate in India’s start-up ecosystem as an enabler. CSIR also needs to put in place a mechanism to reward risk taking and even celebrate failure in high-risk projects. Young scientists need to be empowered much more to dream of the impossible and to make it happen.

What do I dream of for the nation?

- An innovative and developed India in 2047, with average life expectancy of 80 years;
- None left behind for a lack of opportunity;
- Skill India making hundreds of millions of youth employable;
- Affordable healthcare as a right for all;
- Rural India with urban infrastructure;
- Robodoctors in public health centres & robotic surgery in rural settings;
- Application of metaverse in education and commerce;
- India leading the world in digital health and AI applications;
- Functional food-based personalized genomics and traditional knowledge to tackle life style disorders.

I believe, CSIR can play a role in each of these aspirations. The question is how CSIR’s future leaderships will prepare CSIR for India @2047 ahead of time and will contribute to the Indian growth trajectory to make CSIR matter to people of India more.



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