V Sangita

Build entrepreneurship early in our education

Select areas where we have a raw material advantage and build technology around it. Then, we can become globally competitive - Dr S Sivaram.

BARRING A FEW drug and pharmaceutical companies, bulk of Indian industry has been neglecting the vital spend on R&D. Most Indian corporates spend less than a per cent of their turnover towards this. Bridging this vital gap are the 38 labs under the Council for Scientific and Industrial Research (CSIR).

The National Chemical Laboratory (NCL), located in Pune, is one such. NCL is a prosperous research lab under CSIR. Out of the Rs.55-60 crore annual budget, (second largest budget after National Aeronautics Lab's Rs.120 crore), nearly 50 per cent is contributed by industry-sponsored research. With global clients contributing to about 40 per cent of its revenue, NCL has been at the helm of chemical research in the country in sectors pertaining to pharma, drugs and fine chemicals.

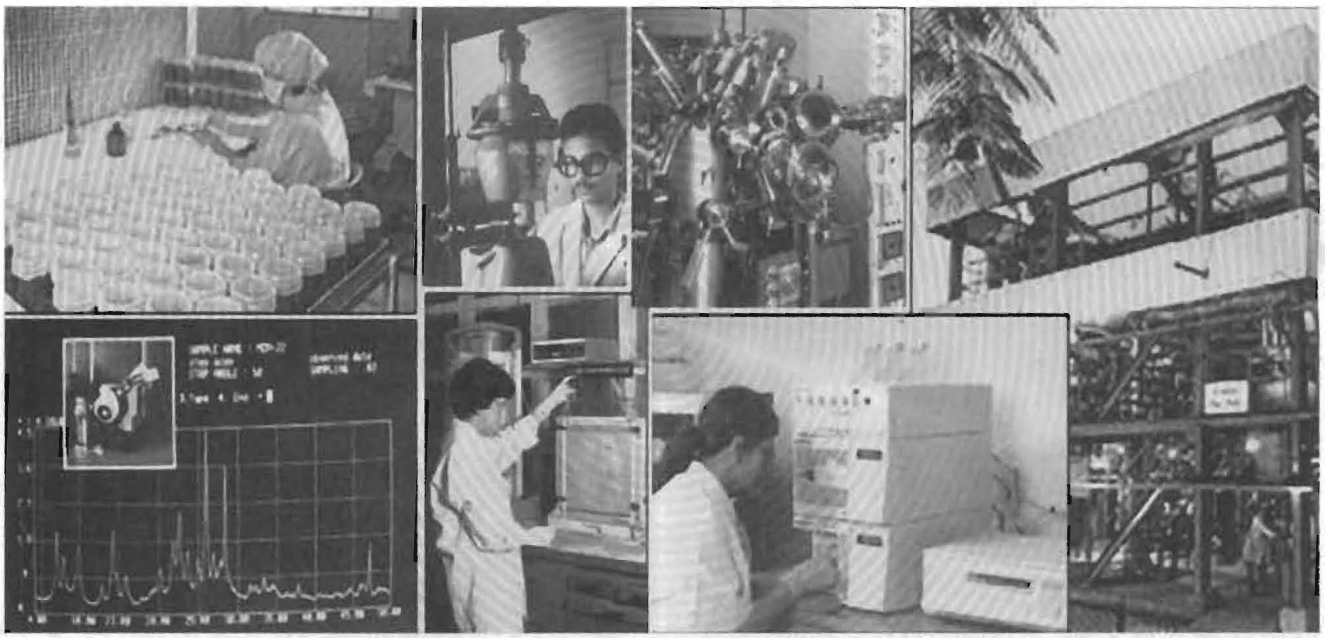
Director Dr S Sivaram has breathed chemistry all his life. After completing his education from IIT-Kanpur, he spent seven years in the US. He returned to India and worked in IPCL from 1974-88 and in 1989, joined NCL. In an interaction with him, Dr Sivaram explained what India needs to focus on in the field of science and research.

Choose areas to be global leaders

The CSIR has launched the New Millennium Programme of Technology Initiative (NMP). Under this, select labs work together on specific development work. Sivaram stressed that we should choose a few areas where India can become a global leader. "If your technology is not globally competitive, it won't be competitive in India also. If a technology is already mature, then we shouldn't pitch too much on it. Select areas where we have a raw material advantage and build technology around it. Then, we can hope to become globally competitive. So we need to look at technology local to India and create technology that can be globally viable and competitive," Dr Sivaram explained.

Today, under the NMP, around 24 programmes have been incubated. Sivaram added that India's considerable IT skills should be leveraged to network all these programmes and research labs so that a massive infrastructure can be created by bringing together industry, institute and research facilities together. Presently, he mentioned that these 24 programmes bring together over 300 partners.

A major study that is being undertaken is on effective use of bagasse.



Presently this by-product of the sugar industry, generated in large quantities, is just burnt! "Bagasse is mainly composed of cellulose, 250 million tonnes of bagasse contains 60 million tonnes of cellulose. We are sitting on one of the largest cellulose resources in the world. But presently, we have no data on the quality of cellulose that can be obtained from bagasse! What kind of cellulose is this? Is it good or inferior? What can we do with this cellulose?

"Tamil Nadu Newsprint and Papers Ltd (TNPL) uses technology to convert bagasse into paper. Now we are combining paper and wood chemistry and are networking with research labs, EID- Parry, Central Pulp & Paper Research Institute, Thapar Group (BILT) and others to study the quality of the cellulose. If industry can get a greater value from this bagasse, then they will be interested. We thus have to build chemistry around raw materials native to our country," stressed Sivaram.

The long and short of it...

Sivaram referred to the importance of research labs focussing on long-term research subjects. "When industry invests in research programmes, it is for a short horizon – of about 2 or 3 years. These programmes are funded in mission mode.

"Industry contribution to revenues of a lab like NCL at 50 per cent is an ideal level. Public labs should not be too focussed on short-term goals. For such goals, we can work together with the industry. But we should concentrate equally on long-term research projects, for which we need government backing. Industry can be partners or spectators for such programmes, and jump in when they want," said the director, NCL.

Sivaram cited the project of fuel cells as an example. "Presently industry is waiting on the fence to see if it can be of commercial interest. Under this, H_2 is extracted from methane and is used for electricity. Presently, we are burning hydrocarbons that produce a lot of harmful emissions. We believe such clean technology will become relevant by 2010-15."

Such fuel cell projects will be of tremendous value in setting up numerous small capacity power plants. Distributive power plants, where a community can generate and distribute its own needs are much more efficient in covering more people, instead of having a mega plant that can suffer huge transmission losses, according to the director.

NCL's Dr S Sivaram
Every organisation needs a Chief Technology Officer who can link business and R&D

Sivaram speculated that we could have 25-50 KW power stations in a community built on a fuel cells based system. Siemens manages a 200 KW in California that provides power to over 5000 people, he mentioned. But he added that when size becomes small, engineering becomes a bigger challenge.

Learn to say we failed!

Sivaram pointed to a very important change in mindset that is needed. "I often notice people taking important projects with vague project objectives, where goals are not quantifiable. This is because they do not want to undertake the risk of failure. Right now, for *eg*, fuel cell efficiency is say around 25 per cent. When I say I want an improvement, then people say let us try 30! But if the world's average is 55 per cent, then we must be able to promise at least 50! I am doing this internally, putting hard numbers against targets. I do not accept anything that is not quantitative.

"We can either succeed or fail. There is no intermediate. Up front, we should define clear parameters for success and also for failure. We shouldn't mind admitting that we have failed. The system must also be forgiving and allow failure. A corporation like GE starts with over 100 new ideas a year. Many of these fail. But they keep moving on," Sivaram mentioned, referring to his long interaction and experience with GE.

Are we generating new ideas?

He pointed to the unique value that NCL strives to bring to companies like GE and DuPont. "GE research is a $5 billion enterprise! What is the value we are bringing to them? NCL constantly evaluates the intellectual property we generate for these companies. Are we generating enough ideas?"

In the last five years alone, NCL has filed for 60-70 US patents with GE. Thirty of these have been granted! GE's investment in NCL is nearly Rs.40 crore.

The NCL director pointed to vital gaps in most organisations. "Every organisation needs a CTO who can link business and R&D. Presently, our R&D heads are not linked to business. Our business heads do not know how to sell R&D. Look at a company like DuPont or GE. Here, a chief technology officer links both R&D and business so that they support each other." Aditya Birla Group, a highly diversified group and a big player in chemicals, fibres and chloralkali has such a set up. This set up is more important for well-diversified organisations, he added.

Sivaram stressed on the need to build a culture for entrepreneurship early in our education. Many labs have persuaded CSIR to set apart a budget for PhD students to encourage them to become entrepreneurs. "Hopefully, at least 10-15 per cent of these students would take their ideas into the marketplace. We will support their research during the incubation period and help them develop their ideas," he explained.

Such a concept is prevalent in Europe and the US. Will this focus help bridge the gap between R&D and business in a big way, with lab researchers marketing their products? ■