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When ace scientists like Rajesh Gokhale turn rookie entrepreneurs

By *Hari Pulakkat*, ET Bureau | 26 Nov, 2015, 06.32AM IST

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When Rajesh Gokhale sets up a new lab, he orders sophisticated equipment and some chemical reagents. For a research collaboration with the National Chemical Laboratory (NCL) in Pune, he ordered six buffaloes along with the regular stuff. He could have ordered elephants, but buffaloes were more manageable for the laboratory staff. These two animals have something in common. They get white patches on the skin, similar to the human disease leucoderma that Gokhale is now studying. Drug companies are not interested in finding a solution to leucoderma, as whiteskinned people do not find it a problem. Gokhale, the director of research body Indian Institute of Integrative Biology (IGIB) in Delhi, thinks he has done some new science that could help develop a drug.

Scientists of distinction are setting up companies but with a difference — to help solve difficult problems of business and society.

Gokhale has won international recognition for his research on how the tuberculosis bacterium builds its formidable cell wall. It won him first the prestigious Bhatnagar Prize and then the Infosys Prize, along with a host of other awards. The Indian scientific establishment expects big things from him as a science leader, but Gokhale is also an intensely practical man. "I have given up on TB as the road to translation is hard," says Gokhale. He switched to dermatology, an area where research applications are easier to commercialise. His first firm, Vyome Biosciences, is on the late stages of developing an anti-dandruff and other anti-bacterial products. His research on leucoderma is about to result in a second company. When set up, it will be incubated inside the NCL Venture Park in Pune.

The NCL Venture Park, adjacent to research and consulting body National Chemical Laboratory (NCL), is now a crucible for commercial science. Inside it are 35 scientist-promoted companies testing ideas that could make a difference to Indian industry in the near future. They include new bio-absorbable materials, highly-sensitive and quick ways of testing pesticides, new methods of effluent treatment, rapid cancer diagnostics, green roads, new vaccines, renewable energy and so on. NCL Venture Park provides lab facilities for commercialisation, and seed money and consulting. Gokhale's venture, when fully formed and cleared by the government, would need some of these facilities to develop drugs.

The scientist-entrepreneur has been a rare phenomenon in Indian industrial history. The earliest example was KH Gharda who set up Gharda Chemicals in 1967. AV Rama Rao, a distinguished chemist and the brain behind many generic products of Indian companies, launched services firm Avra Laboratories in 1996 after retirement. Avra and Gharda Chemicals are exceptionally successful companies. Since then, some young scientists have created a few companies around the country. Liberal government grants are attracting scientists to test their commercial ideas, especially in biotechnology. Among the recent scientist-entrepreneurs are some distinguished scientists with a global reputation, and they are looking at entrepreneurship in a new way: for translating hard research problems into commercial ventures.

Growing Trend

NCL Venture Park is the node for such efforts, but the trend has picked up in other institutions in the country. Entrepreneurship attracts scientists in the IITs, the Council of Scientific and Industrial Research (CSIR), other national laboratories and the universities. Biologists and chemists are now especially interested in commercialising their work, but it is not uncommon to find even physicists setting up companies based on their research knowledge. "Scientist-led enterprises have higher knowledge intensity and better technology foresight," says V Premnath, scientist at NCL and CEO of NCL Venture Park, "as scientists have the luxury of working on such topics."

NCL has a long history of working with industry and translating research into useful products. Even at NCL, scientists needed to be exposed to the advantages of setting up companies. "We brought a Cambridge don to talk to them," says Premnath. It was Richard Friend, a pioneer in flexible LEDs, who formed three companies while teaching and researching at Cambridge. Peter Dobson, a professor from Oxford, also came to talk to the scientists there. The spirit of entrepreneurship now permeates the laboratory so much that scientists do not need to be persuaded to set up companies.

Many scientists at NCL are actually engineers, but science is fundamental to their research. Ashish Lele is an engineer-scientist with a strong interest in polymers. He has been probing polymers at atomic scales, studying how the handholding of atoms that make up polymers can result in interesting properties like self-assembly. He has shown how atomic handholding can make a gel repair itself when injured. Like Gokhale, he has won the Bhatnagar Prize and the Infosys Prize. One of his research interests now is polylactic acid, a widely-used bioplastic. Although called an acid, it is a polymer that is biocompatible and bio-degradable. It is not easy to work with, as developing a device with the right mechanical strength requires a high level of knowledge.

His first company Orthocraft, established a year ago inside NCL Venture Park, is developing screws from polylactic acid. These screws are required while repairing tears in the knee ligaments, but are used in India only when the patient can pay the high price. As no Indian company makes them, the alternative is to use metal screws and a second surgery to remove them later. Orthocraft is now doing pilot trials with its biodegradable screws, and could launch them at a considerably lower cost. NCL is developing end-toend technology for polylactic acid, which is a strong contender for biodegradable packaging as well.

After setting up one company, Lele started exploring another related idea: using silk to make useful products. "Silk is a natural biocompatible material," says Lele, "but all our silk goes for making sarees." His new company will develop a silk-based porous plug as a replacement for bone cement. As the bone grows into the pores, plug dissolves. Silk had been used in ancient India for making sutures, and is still used for sutures employed in eye surgery. "A lot of technology is required for converting natural silk into the right material and in the right form," says Lele. He set up Biolmed for this work.

Lele had some prior exposure to entrepreneurship as he has seen another company from close quarters: Tridiagonal Solutions, founded by his colleague Vivek Ranade, an engineer-scientist interested in gas-liquid flows. It led him to start Tridiagonal Solutions to provide modelling and process engineering solutions for companies. Ranade, a fellow of the Indian Academy of Sciences, exited this company a few years ago. He now runs a second company, Viviera Technologies, for effluent treatment. Ranade's startups look to address a problem seen at NCL repeatedly: large companies are interested in ready-made technology and won't make any effort to develop lab-scale technology. "NCL is still falling short of industry needs," says Ranade. "We need to bridge the gap."

NCL scientists believe startups can bridge this gap, by developing a technology from NCL's labs to market-ready condition. Scientists also start companies after spotting a serious problem with industry. Venkat Panchagnula, who researches methods of bioanalysis, formed a company that can detect pesticides quickly at low concentrations. "Pesticides are a major non-trader barrier for India's food export industry," says Panchagnula. India does not have the technology to assess pesticide contamination quickly and reliably, as the accredited labs use imported technology and do not do R&D.

A grape farmer, for example, has to spend `8,000 per sample and take four samples an acre for testing pesticide residues. Since it takes 7-8 days for the results, the testing delays farmers. In 2008, Nashik grape farmers lost `250 crore when their exports to Europe were found to contain pesticides. When Panchagnula's students were asked to formulate a problem, some of them came up with a method to test pesticides. The group's solution morphed into a company, Barefeet Analytics. It is developing a technology that can test over 1,000 samples a day instead of the 25 tests an Indian lab can do now.

NCL has sprouted many startups because it works in an applied subject. Chemistry professors elsewhere have also found their subject useful to start companies. Aswhini Nangia, professor of chemistry at the University of Hyderabad, works in the new field of supramolecular chemistry that studies properties of small aggregates of molecules. Nangia is interested in a part of this subject called crystal engineering, which tries to understand properties of crystals and then modify them. In a specific project, Nangia has figured out a way to stop demozolomide, an anticancer drug, from discolouring too soon. His company Crystallin Research is now taking this work forward. Its next project is to up the bio-availability of curcumin, which is said to have antioxidant and anticancer properties.

The University of Hyderabad has set up an incubator for scientists like Nangia to develop their startups. Such incubators are sprouting elsewhere too, even in institutions with no history of commercialisation. The Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) in Bengaluru is devoted to fundamental research, but this year some professors surprised the management by asking for permission to launch companies. JNCASR, which had no rules for allowing scientists to start companies, had to form a committee and form them. Its first company is a fluid dynamics simulation company, Sankhya Sutra Labs. A second one, on tackling infections, is brewing in another lab.

Sankhya Sutra Labs came out of the labs of Santosh Ansumal i , a physicist-engineer who had figured out a way of improving fluid flow simulations. Understanding f luid flows correctly is important in many industrial situations, but it is a hard problem to solve. In critical situations like aircraft design, scientists rely more on experimental data. "We have converted a computer science problem into a physics problem," says Ansumali. Last year, he created Sankhya Sutra Labs along with a collaborator, Sunil Shirlekar, then at Intel.

Breaking New Ground

This lab now provides services, but is working on converting its ideas into a software package that can be sold to many industries. Shirlekar and Ansumali are aiming at expanding the market for fluid dynamics simulation. Fluid dynamics is relevant not just for aircraft or cars. Accurate simulation can improve everyday products like ceiling fans, mixers and washing machines. "We are trying to do something undreamt of," says Ansumali, "by bringing fluid dynamics simulation to the small and medium scale industries."

Bengaluru has several institutions that is beginning to breed knowledge-intensive academic startups. The Indian Institute of Science, for example, has seven startups in its incubator, mostly by professors in engineering departments. A few entrepreneurial ideas are brewing at the Institute for Stem Cell Biology and Regenerative Medicine. The IITs also have several academic startups, mostly by engineering professors with the odd scientist thrown in. T Pradeep at IIT Madras is one of them.

Pradeep is a chemist who has specialised in nanoscience. He got interested in pesticide contamination after he read about endosulfan and its toxic effects in Kerala, and figured out that nanoparticles can break down pesticides. After extensive trials, Pradeep formed his own company. Inno Nano Research is now looking to advance the technology. Pradeep is interested in looking at arsenic contamination, a 100-year-old problem that is increasing in severity every day. "I do not want this to become a 200-year old problem," he says. He is obsessed with water quality, and wants to put quality sensors into water bottles. He is studying how nature makes clean water. In the long run, mimicking nature's ways is the only truly sustainable method of working.