cise. The target for releasing the *India Science Report* has been set for December 2004. While NCAER would provide the necessary statistical methodologies, they would welcome suggestions relating to the contents, etc. from any quarter during this six-month feasibility period, beginning January 2003 for incorporation during the formulation of the *India Science Report*.

Sources:

(1) A Note on S&T Indicator: An Overview, NCAER research team, New Delhi.

(2) *India Science Report*, a feasibility study based on presentations by the NCAER research team.

Nirupa Sen

MEETING REPORT

Altering business models for remaining contemporary and competitive*

A seminar on 'Business models in an era of changing technologies and markets' was held in Hyderabad. Speaking to a mix of engineers, engineer-scientists, CEOs and industrialists, the Chief Minister of Andhra Pradesh, N. Chandrababu Naidu said that the only thing that is permanent in the world is 'change' and this required reshaping business models for profitability and sustenance. He said that Andhra Pradesh (AP) had been promoting engineering graduates and out of every four NRIs, one is from AP. Changing business models also meant the way in which governments did business. He cited an on-line processing time of four minutes for loan applications and obtaining a site for industry in half an hour. With the application of IT in daily government business, registration of properties took fifteen minutes and the introduction of an e-seva and AP on-line portal had reduced corruption, improved transparency and saved time, he added.

In his keynote address S. Ramadorai, CEO, Tata Consultancy Services (TCS) said that the Indian industry had grown by 35% in the last three years. In the TCS journey, he said that it had been necessary for building credibility with changes made on the technology front and inventing new business models for survival. This was especially true in the IT industry and software services that had to learn to adapt and survive, with business volumes expected to grow to 40 billion US dollars. Business models had to keep track-records going and inculcate an ability to obsolete products. This meant integrating new technology, generating customer value, reducing waste, increasing transparency and eliminating bottlenecks. TCS had risen to the era of changing technologies and markets by establishing laboratories in Hyderabad and Pune with the motto 'survival is the name of the game, believe in it and prepare for the future'.

The session on 'Service industry: Getting closer to the end customer' had speakers from Thomas Cook (Ashwini Kakkar), Unit Trust of India (B. S. Pandit), and McKinsey and Co. (Pramath Sinha). With the service industry mainly dependent on outsourcing partners, time was replacing cash as the most precious commodity and there was a critical need for future proofing organizations in an increasingly chaotic world. For this service industry, business models had to incorporate a customer-centric approach, and generate ideas through teamwork (a weak point for Indians, it was cited), remembering that long-term goals were in fact a summation over several short-term goals. This would involve business process re-engineering (BPR), concept of fair profit and passing on the value of innovation to the customer. In fact, it was cited that a combination of BPR, change of emphasis from back office operations to customer focus and putting in place a centralized database that handled data of about 28 million unit holders had been part of Unit Trust of India's initiatives since 1999. Pramath Sinha said that industry leaders worldwide are leveraging IT to achieve market dominance, though it was difficult to find a correlation between IT spending and profitability gains.

Panellists in the session on 'A profitable public sector: Myth or reality' were from BHEL, ECIL, British Gas India and Tata Services. It was shown that despite the public sector having to face severe criticism for dismal performance, 'it' had mostly survived. The role of the public sector, it was stated, was to serve as a nerve centre of development in India and to provide for hard times that the country had to face during intermittent technology-denial periods. The greatest asset to the country was the public sector acting as a buffer for building immunity to denials. Successful public-sector undertakings (PSUs) such as ECIL had transformed, without being doled out prescriptions on how to change, by working out a strategy based on appropriate technology and co-operative management. The Indian Oil Corporation had faced the crisis by inculcating the latest technology. GAIL had adapted to the environment and made business profitable, especially after laying the LPG pipeline between Jamnagar and New Delhi. There was however a word of caution from C.K. Sharma, Department of Public Enterprise, Uttar Pradesh that the reply often heard when he enquired about absenteeism of erring employees in PSUs, of the employee not being available in the forenoon and not working in the afternoon had to change. PSUs had

*A report on the seminar on 'Business models in an era of changing technologies and markets' coinciding with the Fifth Annual Function of the Indian National Academy of Engineering (INAE), jointly hosted by Tata Consultancy Services and INAE, in Hyderabad during 16–17 December 2002.

delivered little of what was expected from them and the very existence of PSUs needed serious review, he added. In fact, as one participant pointed out, there was no attempt to analyse causative reasons for failure of PSUs and perhaps, this would have to be left for another INAE seminar!

Then came the deliberations of where the manufacturing industry was heading. Manufacturing industries are vital to a country as they minimize imports and help growth of other sectors such as agriculture. But due to resource conservation and delaying investment in technology and R&D, India had lost the opportunity to becoming a global manufacturing hub, felt Prakash M. Telang, Tata Engineering. He spoke of the lessons we could learn from China by adopting staged innovation strategies, hiring people with advanced degrees and providing intense in-house technical training with a focus on process R&D. He suggested how this industry could meet challenges, for example, by changing product mix rapidly, making marketable products based on our own R&D with a focus on Third World consumers, bringing down costs by process innovation, better coordination along the supply cycle and tuning to client needs. Tata Engineering had introduced knowledge-based engineering system tools for optimizing design, process and product performance supported by a variety of conventional CAD tools, for example, in converting a 2D drawing to a 3D model in a die casting or a cutter body modelling for crankshaft milling, or surface modelling of a vehicular body. The Indian manufacturing industry needed a review of its mode of operation for creating an environment that was globally compatible and enabled by a cross-functional team. This had to be amply supported in equal measure by reforms for this sector from the government in areas such as indirect taxes, labour laws, import duties, power sector reforms, etc. he added. More exports from this sector would, it was felt, change attitudes and establish international benchmarks much quicker. The plus points for the Indian industry would be taking advantage of outsourcing contracts and industry loans for frontline areas of research such as nanomaterial-based catalysts, fuel cells, carbohydrate or alkane-based feedstocks, etc.

There were presentations from two young and successful Web entrepreneurs from Hungama.com and Herald Logic. So, while there is reorientation of business models for keeping afloat in industry circles, there was also a plea for an urgent drive for streamlining IPR issues in various select areas such as biotechnology, etc. for dispelling the mistrust prevailing among pharmaceutical manufacturers, well in time for the accession to the WTO convention on 1 January 2005.

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MEETING REPORT

Refresher course in quantum chemistry*

Quantum chemistry is considered to be one of the dreaded subjects in the M Sc programme in chemistry in most of the universities. Many students look upon this field as a final hurdle that they have to overcome, so that the course can be completed. This is a serious drawback, because a large percentage of research publications in experimental chemistry these days have a quantum-chemistry component. Advances in computer hardware and software have made numerical solutions to Schrödinger equation practical, albeit with many approximations. These developments help in relating the equations to observables in chemistry. In addition, application of ideas based on symmetry, overlap of orbitals and perturbation theory has brought a novel conceptual framework in chemistry. It was reasoned that students would be more receptive to quantum chemistry if, in addition to the formalistic treatment, numerical studies of specific problems and qualitative arguments to convert the outputs of computer programs to 'understanding' are simultaneously provided. With this idea in mind, a refresher course in quantum chemistry for teachers was conducted.

Basic quantum chemistry, with all its mathematical background, is available in textbooks and also on the web. Worked-out assignments and problem-solving sessions are also available. Despite all of these, enough connection is not established in the minds of students between quantum chemistry and the rest of chemistry. Our emphasis in this course, therefore, was to teach the basics of quantum mechanics in the morning lectures and provide hands-on sessions on the use of quantum chemistry in obtaining further insights on experimental problems in chemistry in the afternoon sessions. To achieve this, we considered laboratory components where participants will be putting into practice, with the help of PCs, the quantum chemical methods that they learn in the lectures. Lectures on quantum chemistry and the mathematical background along with group theory were arranged, so that the relationship between wave function and symmetry of the molecular system is used in the most optimal way in understanding chemistry. There were attempts to show how the electronic structure methodologies discussed in the lectures are useful in designing molecules, materials and drugs. We also had some classes on molecular mechanics, which is often used in combination with semi-empirical and *ab initio* electronic structure theory. We wanted to

*A report on the Academy Refresher Course in Quantum Chemistry held during 16 February–2 March 2003 at the University of Hyderabad and jointly organized by the Indian Academy of Sciences, Bangalore and the School of Chemistry, University of Hyderabad.