

Inventors of India : Knowledge Network for Incubating Innovations into Enterprises

September 24-26, 2004, KLMD

Indian Institute of Management, Ahmedabad

Report: September 24-25, 2004

The workshop focused on two categories of innovations – mass impact and high tech.

Lt Gen V K Dhir (Director General EME & Senior Colonel Commandant Directorate General of Electronics and Mechanical Engineering, Army HQ), was the chief guest.

Prof Bakul Dholakia, director, IIMA, in his speech introducing the institute emphasized that development is all about innovation and entrepreneurship and he hoped that this workshop would be an important step in moving in that direction.

Prof Rakesh Basant of Centre for Innovation, Incubation and Entrepreneurship (CIIE), pointed out that CIIE was itself a result of a similar workshop conducted in 1998 to facilitate linkages between the formal and informal sources of knowledge by bringing together the creative spirit of innovators and the excellence of formal scientific institutions. Subsequently, CIIE was set up with the purpose of promoting the growth of innovation-based entrepreneurship in the country.

Prof. Basant mentioned that most incubators have their origins in engineering colleges. However, it was felt that more managerial support was required and institutes like IIM could fill this critical gap. At CIIE, teaching and training, research and incubation activities have synergised with the active support of the faculty and the students. CIIE takes the initiative in scouting innovations as well as actively creating a network, which ensures that these innovation-based enterprises receive other critical support that IIMA may not be able to provide.

Prof Anil.K.Gupta highlighted the fact that innovators often don't prove to be good entrepreneurs as they are improvisers – constantly looking for new things whereas successful entrepreneurship requires doing the same thing consistently. He outlined the objectives of the workshop as:

1. Linking the formal and the informal sectors
2. Utilizing this opportunity of learning from the clarity and commitment that the Indian army incorporates in its pursuit of innovation
3. To form specific task groups that would meet frequently to follow up on the suggestions and decisions generated in this workshop

Prof Gupta also commented on how we could learn from the experiences of the Army in trying to build an environment of innovation given its culture of unquestioning obedience. Lt Gen V K Dhir (Director General EME & Senior Colonel Commandant Directorate General of Electronics and Mechanical Engineering, Army HQ) in his

keynote address “Institutionalizing Engineering Innovations: A perspective from the Indian Army”, reminisced about how as a junior staff member at Defense Services Staff College, Wellington, he had talked about the need for innovations. But his views were not accepted by the establishment as it was felt that such ideas went against the grain of army discipline. However, things have changed and he proudly acknowledged that since he has reached a stage where he is heading an organization, he is now able to institutionalize innovation in the army. In his presentation, he said that there is a very thin line between success and failure and innovation can often make all the difference.

He outlined the organizational structure for promoting an innovative spirit in the army. He emphasized the unique background of innovations for the defense forces where innovating is often a matter of necessity rather than choice illustrating this point with case studies. For instance, he cited the case of Windy 505, a multipurpose vehicle indigenously designed to meet the specific requirements of the army such as traveling in difficult terrain and also equipped with missiles, surveillance capability etc. This vehicle has now been compared with the American Humpty, a vehicle that was used in the Iraq war.

The Lt General also stressed that several innovations developed by the army such as lightweight foldable stretchers have cross-sectoral applications. He highlighted the need to formalize the linkages between the innovative research in the army and the rest of the country. This could be done through participation in (including hosting) inventors seminar, innovation training programme for army personnel, capsule courses at army institutes, building technology networks within the army inventor community and with the fraternity in other sections.

Lt Gen Dhir ended his presentation by listing the following specific needs of the army and requested the gathering to approach them if they have any ideas/suggestions/solutions for them

Needs

- Portable air conditioning systems
- Clothes for cold climate
- Mobility in desert
- Remotely operated mine breaching
- Solar power generators
- Night vision devices
- Stealth technology

Some of the other suggestions that came up included forming systematic task forces for specific needs, wide dissemination of the knowledge available with the army for civilian use also, a bank of creative ideas, creation of multidisciplinary groups that are period and target oriented and the army organizing a contest for innovations that would fulfill their needs. Some queries were also raised regarding administrative affairs within the army, the conflict of interest between career growth and involvement in innovation-based projects and the mindset of army personnel. Lt Gen Dhir replied to these and mentioned

that changing mindsets and reconciling conflict of interest are serious problems, but societal changes are being reflected in the army's perspective as well and the army is working its way through them.

He said that unlike the usual protocol in army communications, he has given the freedom to any one with an idea, within the army, to approach him directly. In response to another query, he said that the army facilities could be used for testing technologies.

Prof Anil K Gupta taking forward the discussion on "Policy and Institutional Issues in Incubating Innovations" stressed the importance of encouraging a conducive policy environment which could include tax concessions, changes in the duty structure (points that were highlighted in the last workshop also) and changes in the policy of financial institutions. He commented on the regrettable lack of response from the formal institutions including R&D laboratories. He also lamented the fact that people were working in isolation and that a general atmosphere of distrust prevailed.

Speaking from the experience gained by the Honey Bee Network, he said that there have been mistakes. For instance, he said that one of the issues that came up was at what stage should an entrepreneur be involved. It was felt that maybe if the entrepreneur is involved from the initial stages, there would be a greater sense of ownership and urgency with relation to the process of innovation development. The need for appreciating the struggles undergone by the innovators and their consequent high expectations coupled with the difficulties in converting their innovations into enterprises – these were some of the lessons that have been learnt over the years.

He said that as had been suggested by Prof Pankaj Chandra, an Innovation Forum can be established and CIIE could facilitate that process.

Prof Gupta said that he was optimistic about the future of innovation-based enterprises and quoted the example that GIANS have licensed 14 technologies none of which are patented. This shows that there are entrepreneurs who respect Intellectual property Rights (IPRs) and who are willing to invest in technologies that could be easily copied.

Several grassroots innovators presented their innovations. This included Bhanjibhai Mathukia (check dam with multiple semicircular arches – a design modification that has never been attempted before, Vanraj tractor), Arvindbhai Patel (auto compression sprayer, auto air kick pump- he has made 11 innovations), Ashok Dhiman (tea making machine), Paresb Panchal (motorized *charki* for kites- he has received 15,000 orders in Ahmedabad itself) and Yusuf Khan (Ground nut digging machine and threshing machine- he has sold more than 20 units of each).

In the discussion during the presentations, various issues emerged. For instance, it was mentioned that Bhanjibhai did not want a patent for the check dam. He wanted it to be an open source technology. It was suggested that he should get a trademark registration for Vanraj tractor. When asked if any market study had been done for the tea-making machine, it was mentioned that a detailed discussion with representatives from industry,

academia and other experts resulted in suggestions, which were incorporated in the product development process. Presentations regarding some other innovators including Kanak Das (bicycle with rider induced and terrain induced forces for transmission) and Mohammad Saidullah (amphibious cycle-runs on land as well as water) Remya Jose (washing machine cum exercising machine developed by a Class X student), Sukhranjan Mistry (tile making machine which makes low cost tiles) and Dhanjibhai Kerai (a physically challenged person who has made modifications in a scooter which he can now drive himself) were made.

Prof Pankaj Chandra highlighted some innovative models of co-operation from Japan (TAMA model) and Italy (Third Italy) as part of his presentation on organizing small producers for technological innovations. He also spoke about the engineering cluster in Rajkot that collaborates on orders, processing and manpower.

He enumerated some of the challenges faced by small entrepreneurs. These included identifying areas of innovations that have market value, dilemma of matching innovators and customers, locating producers who will provide process/product support, seed funding for innovations, R&D orientation and managing regulatory environment.

In the discussion that followed, it was suggested that universities could play an important role in building clusters. Another worrying issue that was pointed out was that the prevalent systems in India don't sustain excellence be it in the industry or the academia.

Post lunch, presentations by innovators continued. The innovators who made presentations included Amrutbhai Agrawat (innovative pulleys – there had been no change in the design for the past 2000 years, Aaruni tilting bullock cart), Mansukhbhai Patel (cotton stripper – has a US patent, latest model does the work of 1200 people in one day), Bharat Srirang Kamble (motor protection device- offers complete protection from motor burn outs and has fault specific indicators), Yagnesh Mehta (air curtain blower - more cost effective and energy saving compared to existing aluminium blowers) and Mansukhbhai Jagani (Bullet driven Santi - a motorcycle driven plough). Presentations regarding some other innovators including Manoharan (dual purpose rotary huller - hulling different items in small quantities simultaneously), Trilokya and Champak Bora (technique to transmit music through electric circuits – can be used to hear music simultaneously in all the rooms) were made.

Prakash Parkhi, a small entrepreneur who has been providing logistics and support to Bharat Srirang Kamble, also spoke. It was highlighted that it had become difficult to license Kamble's technology as he was insisting on recovering his costs from a single licensing agreement. It was pointed out that he could not expect the entire sum from one deal and should opt for a number of non exclusive licenses. One suggestion was that the Coimbatore Chamber of Commerce could be approached for commercialization.

The issue of existing standards impeding development of innovations was discussed. It was mentioned that the Vanraj tractor did not get certified because the vehicle did not conform to the enforced standards.

There were certain queries related to patents. Prof Gupta said that the renewal of patent (by The Honey Bee Network) is based on the licensing enquiries generated on that product within a period of three to four years. However, there are some exceptions. It was also pointed out that maintaining patents is expensive.

One of the participants wanted to know whether innovations were copied. Prof Gupta pointed out that artisan communities have their own ethics and that blatant copying rarely happened. It was more common in the field of plant varieties and farm practices.

It was suggested that an innovators association could be formed and they could help each other. Some efforts have been made in this direction.

Subsequently, the participants divided themselves into four discussion groups based on their interest areas:

Group 1 – Blending informal and formal science

Group 2 – Valorising grassroots/ mass impact innovations

Group 3 – Managing Microventure Fund: Principles and Procedure

Group 4 – Taking innovations to market

The groups made presentations the following day.

September 25, 2004

The first group (Blending informal and formal science) focused on the following points:

1. Innovation-Inventor Support Mechanism
2. Knowledge – Skill - Resources
3. Link Agencies
4. Indigenous Technical Knowledge
5. Certification Agency
6. IPR Issues
7. Policy Issues of Formal Sector
8. Joint venture – Contractual Research

The suggestions regarding issuing of public notice two months prior to Research Council Meetings inviting innovations from the informal sector, translating articles in technical journals into regional languages, the need for the intermediaries to understand the language of grassroots people as well as technical experts, minimizing test fees and frequent revision of standards were found to be quite pertinent.

It was also added that the university systems should be flexible enough to allow faculty members to contribute to work on informal science.

In the discussion that followed, various relevant issues like the need for sectoral group discussions between formal and informal science at the regional level, making state research councils proactive, using EDUSAT for talk back sessions on innovations, building a network of incubators and listing scientists of various institutes and their interest areas were raised. Regarding students taking up innovations as practical projects, it was pointed out that they would probably prefer working on something that would further their careers. It was felt that even the faculty might not be very keen on research on grassroots innovations.

There were two speakers on the second topic(Valorising grassroots/ mass impact innovations). The points mentioned by the first speaker were: identification of institutes that can assist in value addition, categories of value addition, diversification of the use of the innovation, participation of entrepreneurs in value addition and venture capital support for value addition.

The second speaker mentioned that there was some confusion regarding the definition of the grassroots innovator- whether it is an individual innovator without formal technical knowledge and support? The group felt that value addition could be done in four ways – rigorous evaluation, prototype development, customer feedback and raising capabilities (increasing knowledge base and skills). Emphasis was placed on the need for market pressure to enable effective functioning of product development centers and clusters.

Some of the points that were raised in the discussion were the need for incentives for research experts and scientists to work on grassroots innovations, providing grassroots innovators exposure to formal sector institutes and labs and also allowing scientists to pursue ideas in this field. At this point, attention was drawn to the recent circular issued by the Ministry of Human Resources Development stating that the IITs should focus only on high tech products and not low-tech innovations.

An idea given by Yagnesh Mehta, one of the innovators, regarding building a portable refrigerator for the army triggered several responses, the outcome of which was the suggestion that a technology network focusing on alternative materials and alternate sources of energy should be made.

A participant talking about the Chinese experience with innovation said that students were actively involved with incubators and often wrote business plans, did market studies etc. In this context, it was mentioned that NIF has set up SCAI clubs in 23 institutions. SCAI organizes a competition for business plans on grassroots innovations.

The third group (Financing Grassroots Innovations –Managing Microventure Funds) focused on the following points:

1. Nature of financial requirements vary
2. In a competitive environment, response time is crucial
3. Government support schemes are useful but have constraints
4. Microventure Innovation Fund status
5. Mentoring and monitoring costs are high compared to the kind of funding
6. Issues of scaling up and sustainability

The group's recommendations included creating a network of angel investors, setting up self help groups of innovators in an area, greater dissemination of information regarding government and NIF support schemes.

The group ended their presentation with certain broader issues that need to be considered. These were:

1. Is microventure fund a commercial or a developmental activity?
2. Will these remain government or NGO supported efforts?
3. Can GIAN be objective in assessing commercial potential?
4. Should commercialization of innovations be the objective or motivation/diffusion?
5. How to avoid fund becoming "easy money"?
6. Have we contributed to raising the innovators' expectations?

The ensuing discussion threw up some suggestions, which included CIIE building a mentoring network, decentralization of government support mechanisms, involving commercial banks that have money reserved for social services as well as using their extensive network and the idea of a group of innovators starting an enterprise together.

One of the participants associated with Automotive Components Manufacturers Association (ACMA) said that the association could be given information that can be disseminated to their members.

Venture financing was suggested as the best option for investments in innovations. But it was pointed out that the current trend in venture financing is looking at investing at a later stage in the innovation development cycle.

The need to be flexible in formulating and negotiating license agreements was stressed.

The fourth group (Taking innovations to the market) highlighted the following points:

1. Classification of innovation
2. IPR Protection
3. Market readiness
4. Market strategy
5. Publicity and advertising
6. Media coverage
7. Government support – incentives and measures
8. Support to enterprise for working capital
9. User ministries/organizational support where required
10. Support interface market establishment/ mechanism co-ordinated by CIIE or NIF as a society or a company under Section 25.

Regarding advertising and publicity, some of the suggestions included organizing a roadshow and celebrating an innovation week or day. The need for tax incentives for user industries was stressed.

It was suggested that it was important to lobby with the big players and that associations should be roped in. Certain participants offered to take the responsibility for building linkages with various associations.

Mr Rawat – Automobile Manufacturing Association of India
Mr Yagnesh Mehta – Air Conditioners Engineers Association
Dr Gayatri Sabarwal – Association of Biotech Enterprises
Dr A Mukhopadhyay – Institute of Engineers
Dr Sharad Shah - Individual networking with medical fraternity
Mr Devendra Jain – Plastic related association
Dr A K Srivastava – Post harvest and farm tools related association
Dr Bhatnagar – Association of Physics teachers, Materials Science Society

Anil Passary offered to do regional networking in Chattisgarh and Orissa.

A suggestion was made for starting a company called 4MI- Make Money out of Mighty Minds of India where all stakeholders will have a share and innovators will have equity.

A participant pointed out that there should be clarity between technologies for licensing and products for retailing and the possibility of developing catalogues for retailing purposes and technology transfers.

The other issues that emerged included difficulty in getting grassroots innovators access to facilities like tool rooms a number of which remained underutilized, using regional newspapers and hiring stalls in major exhibitions for disseminating information.

Subsequently, Chintan Bakshi and Vijaya Vittala of GIAN (West) and GIAN (North East) respectively presented on “Incubating Innovations into Enterprises- Experiences of GIAN”.

Responding to a query in the difference of approach between GIAN and a private investor in the development of a tractor, the presenter pointed out that the private investor had a huge personal stake and could focus on a single project. GIAN, on the other hand, with a lean team has to handle 10-15 projects at a time. Another suggestion was that since demand patterns for tractors had changed in the past few years, a new need assessment exercise was probably required.

One way of overcoming staff constraint would be a team comprising mainly of volunteers to augment GIAN's efforts. A suggestion which came up in this regard was involving students from technical institutions, especially in their last term, where they could possibly have more time and could also continue their involvement once their course is over. Such an engagement would give them a greater sense of ownership.

GIAN's experience has also shown that entrepreneurs may also not take a product to the market. An entrepreneur had taken the license for a technology, but did not launch the product commercially. He had invested in the innovation out of a sense of social commitment and had not really looked at the technology as a source of revenue.

GIANs could use the facilities available at Entrepreneurship Development Cell which are being funded by the Department of Science and Technology.

Lt Colonel A D Sadana in his presentation on “Experiences of Indian Armed Forces/Engineering Wing”, spoke about the strengths of the army and the specialized environment to which army innovations have to cater such as meeting real time demands, exacting quality standards and no incubation. He presented information about some of the innovations including low cost simulator for the use of a radar, GPS holder and Intelligent DC Adapter. He listed some other areas where the army requires innovative products. These were:

- Solar power supply
- Embedded systems
- Keypad manufacturers
- Aeromodelling
- Enclosures/cabinets fabricators
- FRP, ABS structures
- RF amplifiers
- RF antennas

This was followed by presentations. The presenters included Dr K Natarajan (normal cure composite type seal for cable joint – indigenous product used in BSNL sites in south India), Prof S P Bhatnagar, Department of Physics, Bhavnagar University (Stepper motor

damper and centrifugal switch - unique magnetic fluid), Dr A Mukhopadhyay, Tata Steel (online property predictions system –OPPRESS- for rolled steel coils), Dr V M Mayande, Principal Scientist, Central Research Institute DA (developed and commercialized 12 innovations related to mechanization of dryland agriculture), Dr Nawab Singh, (small scale feed pelleting machines, spent goat meat products), Satish Deb (treadle printing), Dr V N Pratape, CFTRI (mini dhal mill, versatile dhal mill – licensed 17 licenses for mini dhal mills and 9 for versatile dhal mill), Dr G S Sodhi, faculty in Delhi University (fingerprinting technology focusing on calcium component in sweat), Dr Venkateswarlu, Central Research Institute for Dryland Agriculture(yellow dye from *kusum* and use of sweet sorghum for ethanol. Other applications of the innovations were discussed.

The issue of a patent revealing more than it hides was raised. In fact, this had prompted the department of physics, Bhavnagar University to take a cautious approach towards filing patents. The lack of manpower including decreasing number of research students was mentioned.

Tata Steel has a different approach to patenting wherein it files patents and believes in letting the competition “chase them, if they can”.

An interesting concept which came up in the CRIDA presentation was that of farm machinery custom hiring center in which location specific needs are identified, the equipment is bought by entrepreneurs and then hired out to farmers.

The CFTRI representative attributed their success in negotiating so many licenses to an emphasis on continued R& D as well as demonstration, training and feedback.

Elaborating on the status of fingerprinting technology usage in India, the presenter mentioned that only 3% of the cases are solved by application of forensic science and the rest by third degree methods. With human rights organizations acquiring greater influence, he drew attention to the frightening possibilities when criminal justice system would have to depend solely on forensic science given our present lack of expertise in this field.

Another innovation that was discussed was an injection vial rubber cap for taps which reduces flow rate of water by 70-75%.

Post dinner, the participants met again for presentations. The presenters included Lakshman Prasad (currency note fastener, EVM enclosure), Rama Anand (making furniture from used and discarded tyres- has patents in 117 countries), Devendra Jain (wood plastics composite – environment friendly and durable), Dr.Satish Verma, Central Sericultural Research and Training Institute, (silkworm feed substitute, silkworm bed disinfectant and other innovations – most of the technologies have been commercialized), Dr Srinivas Rao , Project Directorate of Biological control, ICAR(protocols for mass scale production of natural enemies for key crop pests), Deepankar (unique welding

machine – focus on energy efficient devices), Jasbir S.Ryait (industrialist) and R Sudhakar, Central Tobacco Research Institute (banana fibre separator – enables conversion of waste banana plant portions into fibre which has multiple uses).

An interesting aspect which came out during Lakshman Prasad's presentation was his desire to promote innovation, particularly among the youth. He has published seven books on innovations and is also involved in bringing out a quarterly. Unfortunately, though using the currency note fastener can result in saving Rs 600 crore per annum, he has not been able to convince the RBI about the merits of his innovation.

Rama Anand sees that her innovations have a social impact by contributing part of her income for the welfare of the handicapped. An interesting issue which came up from the experience of Devendra Jain was – “The cost of being first is extremely high, especially in business.”

The experience of CSRTI is an example of how a central institute has been able to commercialize its innovations and earn considerable revenue on them.

A lively discussion took place regarding the safety and efficiency of the welding machine. Deepankar said that a significant part of his work is focused on developing devices to solve rural problems. He has also been involved in incubating enterprises initiated by students.

Jasbir S.Ryait, industrialist, mentioned how he had supported a grassroots innovator who had developed a truck that could run on six wheels when it is empty and 10 wheels when full.

The banana fibre separator has high social utility value. Families now have an additional source of income that could prove to be invaluable, particularly during natural calamities when the entire crop gets destroyed. They would still be able to use/sell the stem, peduncle and leaf stalks and earn money.