Forum

ICTs in Support of Grassroots Innovation

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Abstract

The grassroots innovation movement triggered by the Honey Bee Network 25 years ago was aided and supported by information and communication technology (ICT) applications in many ways through (a) multimedia, multilanguage databases of innovators and outstanding sustainable traditional knowledge practices; (b) touchscreen-based gyan manthan kendra, *that is, kiosks set up in villages as far back as 1992; (c) multilanguage newsletters available on the Web and in print; (d) a countrywide network of fabrication workshops; (e) a portal, techpedia.in, that brings together information about more than 100,000 engineering projects to link them with informal-sector innovators to solve the problems of small enterprises; and (f) demonstration of videos of innovations uncovered during twice-yearly learning walks, or shodh yatras, all over India. The network has expanded into Latin America and Africa, as well as China, which has the largest database of grassroots innovations outside of India. ICTs will continue to help knowledge-rich, economically poor communities in shaping the development agenda.*

Since 1988, the Honey Bee Network has been developing a knowledge ecosystem that is fair and responsible to less visible, yet creative, segments of society, particularly those in rural areas. To our knowledge, this network was the first open innovation platform that enabled grassroots innovators and knowledge producers to freely share their work. We help to disseminate unique insights about how sustainable outcomes can be achieved, being careful to note both failures and successes of the network.

Our name takes inspiration from the honey bee, which collects pollen from flowers, an act essential to flowers by enabling cross-pollination. Similarly, the Honey Bee Network strengthens people-to-people learning and networking. The network pools solutions developed by communities across the world and shares them through a variety of channels in local languages. The network acknowledges and brings recognition (wherever eligible) to communities and knowledge producers, many of whom would otherwise remain anonymous. It also tries to ensure that grassroots innovators and knowledge providers receive a fair share of the benefits, if any, arising from commercial exploitation of local knowledge and innovations.

Having worked for almost 30 years with knowledge ecosystems, it was inevitable that we would encounter information and communication technologies (ICTs) in our work, both as ICT users and as witnesses to novel forms of ICT use. In this article, we review our experience with ICTs and point to the vast work that remains to be done.

Networking Innovators in India

When the Honey Bee Network was established in Ahmedabad, an "open innovation platform" was not a simple matter of starting a Facebook page. It required much more face-to-face interaction, even though modern ICT tools were slowly becoming available. It occurred to us then that rural communities could benefit from

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ICTs, and in 1992, we set up PC kiosks (elsewhere called telecenters) in several villages in Gujarat. In one village, Aithor, we set up a multimedia, multilanguage kiosk with help from a private company.[1] In keeping with the ethos of the Honey Bee Network, we wanted to allow the community to determine its own use of the technology. The community used the kiosk to display photos of local recipe contests, eye camps, biodiversity competitions, and so forth. Women from the community seemed to delight in displaying their neatly arranged kitchens at the kiosk.[2] Most surprising, we found the scanner to be in high demand. Villagers found that it was an effective way to give new life to worn-out photos, old marriage cards, and other such documents that were too fragile to carry far for duplication.

We built on our work with village kiosks in several ways. The first was to identify rural innovators and bring them together as a community. In 1996, SRISTI, a backbone organization of the Honey Bee Network, developed the first multilanguage, multimedia database of innovations and traditional knowledge. Called the Grassroots Green Innovations Local Language Database (GILD), it caught the attention of India's Department of Scientific and Industrial Research. With its support, SRISTI made 4,500 innovations and examples of traditional knowledge available online in four languages: English, Hindi, Gujarati, and Tamil.[3]

Then, in 2000, together with a number of partners that included India's Department of Science and Technology, we established the National Innovation Foundation India (NIF). Headed by the influential Indian scientist Dr. R. A. Mashelkar, the NIF set up 32 fabrication workshops in rural areas for use by farmers and other grassroots innovators.[4]

These workshops were networked and connected to SRISTI's Techpedia platform,[5] a virtual community of students and experts who were willing to mentor rural innovators. Linking youth with each other, as well as with informal enterprises and public systems, is essential if societal stagnation is to be overcome. Techpedia was thus created (and animated by one of us, Hiranmay Mahanta) to promote engagement among young engineers with the real-world problems of the informal sector. We believe that solving real-life problems provides a means for engineers to grow in their appreciation for the challenges faced by underserved groups. Thousands of students at Gujarat Technological University (GTU) are thus supported by the Techpedia team to scout out challenges faced by small entrepreneurs. The students write synopses of these challenges, and the majority go on to devise solutions in their final year of school. So far, 167,000 project titles and abstracts covered by 400,000 students from 600 Indian institutions have been uploaded to Techpedia.

To further encourage innovation, SRISTI also offers the Gandhian Young Technological Innovation Award,[6] which highlights the potential for developing products that are frugal, flexible, and friendly on an online platform. For example, three student award winners, Sai Vijay Gole, Saket Choudhary, and Yashesh Gaur from IIT Madras, IIT Mumbai, and DAIICT Gandhinagar, respectively, collaboratively developed a portable spectrophotometer to test water quality. Such interinstitutional collaborations were inconceivable before the Internet. Similarly, Rohit Bharatkumar Singh, Hitarth Narsi Patel, Navnath Bhimrao Mane, Tanmay Vinay Shinde, and Rahul Dilip Kapoor, all students from Mumbai University, developed a proof of concept for a Braille cellphone for people who are blind. The award has inspired numerous other applications, including some for pregnant mothers, for people with hearing disabilities, and for medical patients.

Techpedia has also provided many small enterprises with an online platform to network with engineering faculty and students. For instance, Thummar Uren K., Dave Heema, Ghetiya Shruti, and Joshi Abhishek, all from VVP College in Rajkot, under GTU (Gujarat Technological University) re-engineered an ultrasonic cleaning tank used for electroplating watch components. They were able to reduce the use of piezoelectric crystal sensors from 25 per unit to only two, cutting costs and power consumption without loss of sensitivity. The new tank is usable even by large watch-making firms. None of these projects would have been possible without ICTs.

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1. See http://www.sristi.org/gmk/aithor.html
2. See http://www.sristi.org/gmk/design.html
3. See http://www.sristi.org/hbnew/honeybee_innovation.php
4. See http://nif.org.in/map/microincubator
5. See http://www.techpedia.in
6. See http://www.techpedia.in/award

Going International

Over time, our work has become increasingly global in nature, thanks to a combination of virtual presence and physical participation at international events. In 1997, we organized the First International Conference on Creativity and Innovation at Grassroots. Representatives from 40 countries participated, and all the material presented was posted online. Around the same time, GILD was showcased at the First Global Knowledge Conference in Canada.

Efforts like these led to interest—and in some cases, to funding and support—from the World Bank's infoDev unit, Canada's International Development Research Centre (IDRC), the University of Colorado, and most recently, Tianjin University of Finance and Economics (TUFE) in China. The last now maintains the largest database outside India of grassroots innovations.[7] Thanks to support from the IDRC, about 3,000 examples of grassroots creativity in China are available at this website through the painstaking contribution of Professor Zhang Liyan and her colleagues at TUFE.

Our other efforts have also increased their geographic scope. NIF has received queries from more than 63 countries about grassroots innovations, thanks to a combination of its website, its social media accounts (Facebook, Twitter, YouTube), and its presence on various online trade portals, such as IndiaMart.[8] Techpedia has received attention from St. Martin de Porres, a university in Lima, Peru, that has launched a similar demonstration portal.[9] There have been expressions of interest from Germany and France, as well, in creating similar platforms.

Finally, we hope to build a network of mentors that would allow experts around the world to mentor projects of their choice. Graduate students at the Tata Innovation Program at MIT will review open projects maintained at Techpedia to see whether collaboration could be fruitful. Similarly, a class at Harvard's Kennedy School of Government was encouraged to take examples from the Honey Bee Network as a way to develop a new form of student-led product development. In this "relay model," a student group at one college takes up a project where another group has left off.

Grassroots ICT Innovation

Out of the hundreds of thousands of ideas, innovations, and traditional knowledge practices that the Honey Bee Network has identified, an increasing number involve ICTs. The following projects are a sample of some of the mobile applications we have encountered:

- Prem Singh Saini, a middle school dropout from Ambala, Haryana, developed a mobile-operated switch for irrigation pumps as early as 2004, when less than 5% of the Indian population had mobile phones. He also developed a stethoscope that could transmit the sound of heart beats through a mobile network to a doctor at a remote location.
- Anurag Rathore, then a secondary school student from Jallandhar, Punjab, suggested using the unique pattern of a person's gait as a password for mobile phones in 2009.
- Also in 2009, Abdul Razak, a school dropout of Madurai, Tamil Nadu, integrated a mobile phone with a burglar alert system.
- Shriprakash Dwivedi, a middle school dropout from Deoria, Uttar Pradesh, developed a mobile-based theft prevention system for vehicles in 2009.
- In 2012, Rohan Jolly, a seventh-grade schoolboy from Delhi, suggested embedding mobile phones in gloves so that people in cold areas could use their mobile phones more comfortably.
- Another example of community-based innovation using mobile phones is that of water delivery in Salatpur, a village of Gujarat. There, mobile phones are used to regulate the water supply to households. The phone provides real-time data about pump operation and electricity availability.

7. See http://cxcy.tjufe.edu.cn/index.asp
8. See http://www.indiamart.com/nifoundation
9. See http://techpediaperu.wix.com/usmp

Though grassroots educators are less educated than their formally trained urban counterparts, they have their own systematic approach to evolving solutions. Everything begins with identifying a problem—either one problem these innovators face individually, or one faced by someone else in their community. Among innovators who are entrepreneurs, it can be their customers who pose an unmet need in search of a solution. For instance, a tinkerer, Mansukhbhai Jagani, was approached by a farmer about tilling the fields. The farmer had neither bullock nor tractor to pull the plough. Jagani invented a motorcycle-based ploughing machine that has since been granted a U.S. patent. This solution has been entered into the Technology Commons (Sinha, 2008), a term we use to describe the following arrangement: Individuals are not only allowed, but encouraged to copy the design, but any firm hoping to capitalize on the technology must agree to a formal license.

In another case, a weaver and artisan named Chintakindi Mallesham was asked by his mother for a way to simplify the yarn-winding task that she performed on a device manually. She hoped that he would get a higher-paying job and purchase a modern machine, but Mallesham wanted to find a solution himself. With only a 10th-grade education, he knew nothing about electronics. But he taught himself through books and designed an electronically controlled device that could wind as much yarn as needed with greater productivity than was possible manually. Another innovator, Deepak Bharali, developed magnetic bobbins for jacquard looms to save time and eliminate yarn wastage. He was supported and mentored by the IIT Guwahati faculty.

The Future of ICTs and Grassroots Innovation

In 1929, Mahatma Gandhi announced a prize for a better-designed spinning wheel. The prize money of £7,700 would be worth approximately US$2 million today. The world seems ready for a similar challenge award to address the needs of underserved communities.

For people who are money-poor but knowledge-rich, ICT applications that connect creative communities, good mentors, curious youth, compassionate investors, and energetic entrepreneurs can make a big difference. One possibility is a consortium of engineers and computer professionals who will mentor and materially support grassroots innovators who are thinking ahead of their time.

We also welcome the involvement of the global community of ICT innovators. Since the early days of the Honey Bee Network, we have recognized the three major barriers to learning at the grassroots: language, literacy, and localism. That multilanguage, multimedia technologies are critical was obvious to us early in our journey (Gupta et al., 2000, Gupta 2003). Illiterate, local communities must be enabled to learn. They need information presented in their own language. And they should have access not only to local knowledge, but also to exotic knowledge—to innovations and practices from around the world.[10]

And yet, after 30 years of engaging in this work, there remains a serious inadequacy of content that addresses grassroots creativity in the local languages of the world. Information about grassroots innovation is lacking even in English, Spanish, and French. Why has this gap persisted? Why haven't projects in the areas of empowerment, ICT for social transformation, community participation, and so forth been documented and disseminated to unleash people's own creative solutions to local problems? Are there academic and institutional biases against such work, or we are barking up the wrong tree?

At the Honey Bee Network, we go on a semi-annual *Shodh Yatra,* or learning tour, where we travel on foot from village to village to identify rural innovators and share knowledge of innovations. These days, we carry cellphones with built-in projectors so that even in villages with no power and no screens, we can show videos of innovations to farmers on any flat surface. Communities engage enthusiastically. ICTs have thus been a tremendous tool in enabling our work with grassroots knowledge ecosystems. We hope the ICT4D community will work toward even more effective ways to increase the *intellectual* (not only physical or social) participation of knowledge-rich, economically poor communities in shaping the development agenda. ■

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10. See http://iccig.wordpress.com

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