

Grassroots Innovations And The Educational Sector: Bridging The Knowledge And Value Divide

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ABSTRACT

The Honeybee Network and NIF (National Innovation Foundation) have been scouting, spawning, sustaining and scaling up grassroots green innovations and helping their transition to marketable products. The major stumbling block for these innovators is their inadequacy and inability to access the modern tools and techniques.

Most of the innovators need optimization in design process or product formulation through blending with modern science and technology inputs. NIF hopes to bridge this gap between the informal science and formal science so that the knowledge assets of the technical institutions can be accessed by the grassroots innovators.

NIF seeks partnerships with educational institutions that understand and appreciate the “value potential” of grassroots innovations which have both relevance and commercial value to the rural populace and who can provide technical inputs to improve product performance, design, and ergonomics of the innovations. They can help NIF catapult these grassroots innovations to top notch products by liberating and leveraging their complementary resources. Their learning can be best capitalized in these endeavors

which can ensure that our combined efforts will make the grassroots innovations turn into products that are better prepared for success.

What is required is a heresy from their doctrines, an attitude of collaboration, an open mind, humility for the institutions of higher learning to come forward and contribute to the cause of the grassroots innovators and also 'profit' from it. They have the wherewithal and expertise to dictate the shape development of the innovations. These innovations require their corroboration and proof and demonstration of their knowledge assets.

INTRODUCTION

Innovations have become an imperative to survive in this infinitely more competitive and cataclysmic world. To have a culture of innovation in the country what is required is a shift in our mindset - from conceptualizing our insurmountable problem of poverty to converting it into an opportunity to serve the millions of poor around the country. In today's world order where knowledge and innovations are the accepted currencies, we must take pride in the intellectual capital our rural brethren possess and help them make the most of it. We thus must promote the innovations for and by the poor.

The Honeybee Network and NIF (National Innovation Foundation) have been with providing institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations and helping their transition to marketable products. The major stumbling block for these innovators is their inadequacy and inability to access the modern tools and techniques. NIF thus hopes to bridge the gap between the informal science and formal science so that the knowledge assets of the technical institutions can be accessed by the grassroots innovators.

THE PARADOX

Ignited by the determination to transcend their hardships, the creativity and ingenuity of grassroots innovators has generated innovative and simple solutions to their day to day life's problems which have never ever been able to entice the attention of our top notch scientists. And when they set out to find their own solutions, they have had to bear the

double whammy –the indifference of the govt. and disdain from the scientists community and hence never got the respect and reward they deserved.

There are many such nonconformists in the rural areas whose brilliant innovations are still obscure and unsupported. These grassroots innovators –the farmers, artisans and farmhands - may not have invented the aeroplanes and television but do share the same ‘spark of brilliance’ as the utility of their innovations is immutable for the rural poor. They have proved beyond doubt that technological ingenuity is not the preserve of modern scientists. It is time that the scientific community and the educational institutions sat up and listened to the needs of the thousands of enterprising rural populace brimming with innovative ideas.

These innovations from the breed of grassroots innovators question our orthodox scientific dogmas and have proved time and again that we need not be fettered by academic straitjackets to be counted among the league of innovators.

THE SPECTRUM OF MECHANICAL INNOVATIONS

Mechanical innovations constitute about 50% of the total entries NIF receives in the annual national campaigns. The degrees of innovations typically fall between marginally innovative and highly innovative i.e from radical to incremental innovations. A great deal of these is modifications in existing equipments which serve the farmer community’s requirements better. Quite a number of innovations can be categorized as combination of functions of several different machines. Some innovations serve the needs of a specific niche segment and the others are for mass use. They can also be segregated on the basis of their degree of complexity in use and design. Some innovations are modular and some architectural. The cost saving and added utility make these innovations hugely popular with the agrarian community.

The mechanical innovations can be categorized on the basis of their following characteristics: Degree of complexity; Adoptability; and Niche Specificity

Some mechanical Innovations at NIF

S. No.	Innovation	Innovator	Place	Description
1.	Pulley with Stopper	Shri Amrutbhai Agrawat	Gujarat	Very simple and useful device for lifting water from well particularly for rural women.
2.	Multi-utility Fuel	Shri S J Joe	Kerala	An energy saving stove

	Stove			
3.	Multi-cylinder Single acting Reciprocating Pump	Shri Shakun Das	Chattisgarh	A pump which can be used for agriculture, industrial and domestic applications.
4.	Areca nut Dehusking Machine	Shri Narasimha Bhandari	Karnataka	Used for processing all kinds and sizes of areca nuts
5.	Motorcycle Driven Shanti	Shri Mansukhbhai Ambabhai Jagani	Gujarat	An innovative motorcycle driven multipurpose ploughing machine
6.	Energy Efficient Oil Expeller	Shri Kalpesh Gajjar	Gujarat	A high quality energy efficient oil expeller
7.	Relay Switch	Shri Ponnusamy	Tamil Nadu	A device to protect of motor from burning.
8.	Bicycle with rider induced and terrain induced forces for transmission system	Shri Kanak Das	Assam	A bicycle designed for transmission of energy from shock absorber for smooth riding of bicycle on uneven road
9.	Battery Charging Shoes	Shri Rajesh Ranjan	Jharkhand	A dynamo, gear and rotor assembly placed at the lower layer of the shoes so that the energy generated by walking can be used to charge the batteries.
10.	Micro-Windmill driven battery charger	Shri N. V. Satyanarayana	Andhra Pradesh	Can be used to charge batteries of cellphones, walkman etc while traveling.
11.	Handy Auto Air Kick Pump for two wheelers	Shri Arvindbhai Patel	Gujarat	Can be used for inflating the tyres of two wheelers
12.	Cotton Stripper Machine	Shri Mansukhbhai Patel	Gujarat	Can be used to remove shells and seeds from a particular variety of cotton.
13.	Coconut/ palm tree climbing device	Shri Joseph Appachan	Kerala	A mechanical device used to climb coconut/ arecanut/ palm trees easily
14.	Bicycle weeder	Shri Gopal	Maharashtra	A simple device which

		Malhari Bhise		consists of a plough and a bicycle wheel to remove weeds
15.	Mini washing machine	Kumari Remya Jose P	Kerala	A very simple and economical washing cum exercising machine
16.	Vanraj Tractor	Shri Bhanjibhai Mathukia	Gujarat	A low cost and highly maneuverable tractor.
17.	Aaruni Tilting bullock cart	Shri Amrutbhai Agrawat	Gujarat	A non hydraulic tilting arrangement for the trolley.

We have many more such unaided grassroots innovations which are equally exemplary.

The matrix in Figure (1) depicts that most of the grassroots innovations are highly adoptable, of low complexity and for use by the common man in a rural setting.

BLENDING THE INFORMAL AND FORMAL SCIENCE

The research projects at the universities that should get filtered for consumption by the public up to the grass root level never go anywhere beyond their library shelves. What is required today is not the conventional 'transfer-of-technology' paradigm, in which scientists/ research scholars developed technologies and passed them on to farmers, which in most cases has produced disappointing results. These technologies have low acceptance with the farming community as they are costly or do not suit their farming conditions. Their assistance to rural innovations has also been nothing more than expensive dabbling.

The new paradigm should be to look at what farmers themselves are experimenting with (or has innovated) and then use this as a starting point for joint research and development by farmers and researchers. They can take up projects based on grassroots innovations which would will not only accelerate the 'innovation to marketable product' development process but also improve the quality of

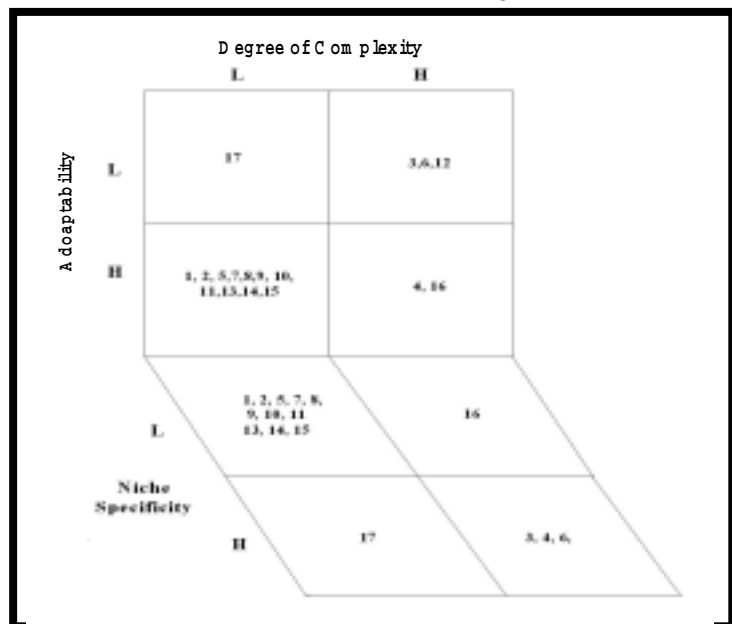


Figure (1): Classification of Innovations

technical professionals in the country.

The institutions of higher learning like the IITs and IIMs being the generators of knowledge and experiences can help the grassroots innovators by marshalling their complementary capacity, resources and experience for the benefit of the grassroots innovators. Working on grassroots innovations calls for serious work and commitment but the gains will be prodigious. Although daunting, the learning opportunities for the students from their involvement in the product development will be far richer when they work on these innovations. Besides, the 'innovator and student' interaction is one proven method of two-way learning.

GAPS IN THE TECHNICAL VALUE ADDITION

Technical Institutions like the IITs can partner with NIF in being the stewards of the innovations and polish them into robust marketable products.

- **Value addition:** Harness the insights and knowledge of the roster of their experts in fields relevant to the innovations.
- **Validation:** Validate new principles/innovations and evaluate the characteristics and potential of the innovation.
- **Testing:** Test the innovations for their utility
- **Design and Ergonomics:** Create cost effective product designs and ergonomic improvements which are aesthetically appealing as well as better meet the functional demands.
- **Customer feedback:** Introduce changes in the prototype based on customer feedback
- **New Material:** Reduce material costs for producing innovations.
- **Ideas:** Develop prototypes from the ideas of farmers/artisans.

COLLABORATION AND LINKAGES WITH DIFFERENT INSTITUTIONS

Two students of Industrial Design Centre, IIT Mumbai, have taken up projects on Coconut Dehusker and Groundnut Pod Separator. NIF supported this project undertaken by IDC to modify the product. And through TECH-GC, IIT Mumbai an idea competition was conducted and many students have shown interest in NIF pursuing their ideas

- IIT, Delhi has provided immense help voluntarily for design, development and expert evaluation of grassroots innovations.

- IIT, Mumbai; IIT, Kanpur, NIT, Jalandhar, REC, Surat; were mobilized for taking up the projects on grassroots innovators.
- Students from IIT, Kanpur had taken up the task of validating around twenty innovations. They visited the innovators in the summer vacation and had interacted with them.

Center for augmentation and incubation of grassroots innovations at IIT, Kanpur:

To incubate innovations and traditional knowledge and to forge linkages between informal scientific knowledge system and the excellence in formal sector a 'Grassroots Innovation Augmentation Network (GIAN) – Technology' is being planned to be set up at IIT, Kanpur.

GRIDS (Grassroots Innovation Design Studio): Under an agreement, signed on April 17, 2001, with National Institute of Design, GIAN established a (GRIDS) with the help of Govt. of Gujarat for facilitating formal design inputs to the grassroots innovations.

SRIJAN: A one-day workshop 'SRIJAN' was organized by IIT, Delhi on 2nd March 2002 to bring together the expertise of formal technology and the excellence of the informal grassroots innovators.

GIAN-North East at IIT-Guwahati: IIT, Guwahati has taken an exemplary step by giving infrastructure and logistics facility for setting up GIAN-North East.

THE PITFALLS

There have been a few faux pas in our carefully designed and executed product development projects and in our efforts to pool competencies of various educational institutions. Some of the piquant incidences which put us in a quandary are as follows:

- Students of a technical institute made fundamental changes in the innovations. The innovator was very disappointed with the results and forsook his claims on the innovation.
- Another innovation which was tested for its functionalities at a renowned technical institution did not perform those functions when it was being shown to some potential investors.
- Conflicting results after testing of an innovation from two technical institutes of repute. This could possibly have happened because different testing equipments used for testing, improper calibrations of the same equipment and sometimes testing is not done for long enough times resulting in inconsistent performance of the machines.
- Technical experts in their efforts to add value to the innovation ended up instead in disfiguring the innovation

- The innovator and the technical experts at logger heads over the claims made by the innovator

The purpose of citing the mishaps here is to prevent such incidences from happening again and provide a basis for learning. These productive mistakes also provide insights into what will work and what wont.

NATURE OF PARTNERSHIPS DESIRED

NIF has devoted extraordinary efforts to creating strategic and sustainable partnerships with an impressive array of educational institutions viz, Indian Institute of Management (IIMA), National Institute of Design (NID) etc NIF tries to tap into the expertise that resides outside it in the institutions of higher learning with complementary core competencies and limitations and has persuaded some of them to appreciate their role in the value chain. NIF is keen on constructing and leveraging value from partners like IITs and developing collaborative advantages. The models can any one of the following:

- Innovators design, experts give suggestions
- Joint efforts i.e. experts and grassroots innovators jointly develop innovations.
- Experts redesign the innovations - functionality same but new design.
- Experts find new applications of an existing machine.
- Ideas from farmers/artisans can be jointly worked upon.

THE PAYOFFS

NIF has created several incentives for educational institutions to contribute and collaborate with it and share their knowledge assets.

IPR sharing arrangements

The IPR of the innovation can be shared by the educational institution and the innovator in case the inputs from the institution are substantially large and befits their equal recognition and rights. However, it will be appreciated if the rights are assigned to the innovators only.

Joint honour and recognition for co-creators of new knowledge

NIF recognizes and awards those who partner with the innovator to scale up the innovations

Material for discussions in class

The case studies and success stories of innovations to marketable products are worthy of inclusion in the course curriculum of institutions of higher learning to instill creativity in the students. These stories will provide the students an appreciation of the realities and complexities of product development and the roles played by the various members of the product development team.

Learning Opportunities

Theory without practice is ineffective because the practical settings rarely represent a theory.

The students will have an opportunity to learn from close quarters how the uneducated people have an uncanny ability to make machines without a design. They will also get an exposure to new principles that are generated from some grassroots innovations.

Open up new vista of research

These insights will inspire the students to find new applications of new materials. The innovations may also lead to identification of several additional applications for variations of a technology developed for another application.

New Products

The intervention of experts may result in low cost products which will be socially and environmentally benign.

Perfect their Product Development Methodologies

Their interventions will also expose the students to the nuances, intricacies, and exceptions from the practical settings of product development as most of these have no theoretical underpinnings. This will help them hone and distill their product development methods as product development methodology is best learned by applying structured methods in a practical setting.

Contribute to the cause of society and environment

Their efforts to ensure that the product make ecologically sound use of resources and create minimal hazardous wastes will have an enormous impact on the society and the environment. Thus, they will be doing their bit for the society and the environment by being an actively contributing to the green grassroots innovations.

CONCLUSION

NIF seeks partnerships with educational institutions that understand and appreciate the “value potential’ of grassroots innovations which have both relevance and commercial value to the rural populace, and who can provide technical inputs to improve product performance, design, and ergonomics of the innovations.

They can help NIF catapult these grassroots innovations to top notch products by liberating and leveraging their complementary resources. Their learning can be best capitalized in these endeavors which can ensure that our combined efforts will make the grassroots innovations turn into products that are better prepared for success. What is required is a heresy from their doctrines, an attitude of collaboration, an open mind, humility for the institutions of higher learning to come forward and contribute to the cause of the grassroots innovators and also ‘profit’ from it. They have the wherewithal and expertise to dictate the shape development of the innovations. These innovations require their corroboration and proof and demonstration of their knowledge assets.
