

Cillage : Revisiting S&T inspired Indian model of holistic development

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Introduction

I wish to express my gratitude to the organizers for this opportunity for me to speak here and pay my respects to the memory of most respected Nanaji Deshmukh by way of this memorial lecture. I feel specially privileged to be able to do so in his birth centenary year. One of the most revered personalities in recent times, Nanaji was a modern rishi in the true sense of the term. He left active politics to give practical shape to ideas of self reliance and integral humanism that were propounded by Pt. Deendayal Upadhyay. Deendayal Research Institute and Mahatma Gandhi Chitrakoot Gramoday Vishwavidyalaya, the first rural university, are a living testimony of the mission to which Nanaji had dedicated himself. The Chitrakoot project or the 'Campaign for self reliance' aims to demonstrate a sustainable and replicable model based on self reliance in villages for India and the world. A deep thinker and a person concerned with development of Indian society along sound lines, Nanaji had even taken active part in Bhoodan movement started by acharya Vinoba Bhave by spending two months with him. I had the good fortune of meeting him on the occasion of Padma awards function in 1999 when he was decorated with Padmavibhushan. I had received my Padmabhushan in the same function.

I have not had the opportunity to see activities at Chitrakoot first hand. But whatever I could read about the activities there has left me thoroughly impressed and inspired. I have been myself interested in experimenting on sustainable development models in rural areas. Reading about Chitrakoot while preparing for this lecture has redoubled my confidence in linking knowledge and societal development activities. I see a lot of parallel in the two approaches.

I have spent almost entire professional life of mine on development of national capability in the area of atomic energy notwithstanding externally imposed embargo regime. After having secured our strategic autonomy, we also succeeded in dismantling the embargo regime that was clamped around us, so that the growth of nuclear power development in the country gains momentum. Given the need to rapidly enhance the share of non-fossil energy in our energy mix, this has become more important today than

any time before. Last few years, I am devoting time on challenges related to energy, education and leveraging science for societal development. In all these areas, there is a need to emphasize on India specific development that addresses specific Indian challenges and maximizes value creation within the country. A key aspect that I have realized as a result of all this experience is the need to transform our education system to make it a more effective human resource development framework that empowers every youth to become a prime mover to take the country forward and to add net value rather than become a net burden on the society. This must happen in the context of emerging knowledge era and leveraging its potential for our priority developmental needs. At the same time our education system should also recognize the societal transitions driven by technology that are taking place at an ever increasing speed and lead the efforts to prepare our society to remain an effective player in the competitive world around us while sustaining our time tested core value system. I would like to use this occasion to talk about this theme. I believe, that would be a fitting way to pay tributes to Nanaji's memory.

Model for Rural Development

Talking about the country as a whole, roughly two third of our people still live in villages. Their average income is only about half of the average income of their urban counterparts. Creating conditions to raise their income to become comparable or better than what is possible in urban areas is in my view the critical challenge before our education and development programs. While the rural habitat that perhaps took shape in an agrarian era and the urban habitat that probably became the preferred choice in the industrial era, are here to stay, the new age society and its economy is more likely to be driven by knowledge and could equally flourish in both rural as well as urban habitat. Knowledge based technologies do allow a much higher degree of democratization and decentralization. For example with a technology like 3D printing backed by a strong communication infrastructure, manufacturing could well become a more decentralized process. We have already seen the impact of ICT on the services sector in terms of growth and more comprehensive opportunities that are now available across the board regardless of where one is located. Under such conditions rural habitat could well become the

preferred alternative even for industrial activities on account of the possibility of greater proximity with nature provided there is adequate supporting infrastructure. Livelihood opportunities in rural areas can thus grow well beyond what agriculture and allied activities can provide. We thus have an opportunity to not only bridge the urban rural divide but also to facilitate rural youth, who constitute a far bigger segment of our so called demographic dividend, to leapfrog to realize their full potential leveraging the opportunities that are available in the emerging knowledge era. This could actually mean a quantum jump in the India development story.

How can this be done? As I mentioned earlier, the answer lies in creating greater livelihood opportunities in villages well beyond agriculture and allied activities and ensuring that the young students, as they come out of schools and colleges, are able to capitalize on these opportunities. Thanks to the game changing developments that have taken place in respect of opportunities in the cyber space, ICT technologies and direct enablement of people that they can cause; each youth can now put together a decent earning opportunity for himself or herself provided he/she, through the education imparted, becomes knowledgeable enough about the socio-economic opportunities around, either existing or newly created and has acquired the skills to benefit from them.

A time tested way to facilitate a holistic learning environment necessary for realizing such an objective is to link imparting of knowledge with socially useful productive work (SUPW) in the current context in our education institutions. Making SUPW close to real world socio-economic environment would require linking education with these activities in the neighborhood including related development activities. Through this mode, the education domain while it contributes to development of capable human resource could also create new inputs for our society as well as our industry through:

- 1) New innovations based on latest knowledge acquisitions ahead of others. This would create a superior edge for our country in terms of new products and processes giving us a competitive edge in the local as well as global market,

- 2) Linking knowledge institutions to ongoing socio-economic activities in business/industrial entities to overcome obsolescence issues and maintain/regain their competitiveness and

3) Exploring issues of development of strata at or nearer to the base of socio-economic pyramid and devise as well as implement solutions to minimize disparities in our society.

I do believe that linking education and development this way would significantly enrich higher education while at the same time paving the way for development on a more sound footing in a bottom up mode.

A typical framework to pursue such an approach, is to set up what I call a CILLAGE (city in a village), a knowledge centre within a rural domain with modern research activities and living facilities to attract capable researchers. Such a CILLAGE could be a standalone rural university like Mahatma Gandhi Chitrakoot Gramoday Vishwavidyalaya, a rural campus of an existing university or a higher education institution in a rural area. Each such CILLAGE could establish several technology demonstration centers in the neighborhood for the benefit of the local population. Such centers could house a range of relevant technologies that can facilitate higher livelihood with a much broader outlook much the same way as Krushi Vidnyan Kendras (KVK) do in the context of agriculture. Initially such technologies could be sourced from outside but eventually one could expect a significant technological contribution from CILLAGE itself. We can call such demonstration centers as **Advanced Knowledge based Rural Technology Initiative, AKRUTI** for short. To facilitate linkages between CILLAGE and AKRUTIs in terms of training, capacity building, problem solving and identifying new research problems, a Rural Human and Resource Development Facility (RHRDF) should be established in each CILLAGE. RHRDF in my view would not only benefit the neighborhood through technology and capacity building but also the knowledge institution hosting it through exposure of students and faculty to real life challenges enriching the learning process and facilitating greater relevance and impact of research being carried out through choice of research problems that people in the neighborhood want to be solved. Depending on the attractions that a CILLAGE can create for high caliber researchers on the basis of facilities and academic/research excellence in the institution, I have no hesitation to say that through the choice of original problems needing solution; we can even expect the research in such institutions to become world class. Such institutions can become the fountainheads of new

technology that can benefit the neighborhood through AKRUTIs and domains beyond through other channels.

In addition to promoting technology enabled development and related gain in terms of livelihood enhancement, a CILLAGE can also contribute to a new paradigm in the school education around. A high bandwidth node at a CILLAGE (for ex. NKN) could facilitate broad band connectivity in about 20-25 kM radius surrounding the CILLAGE through low cost broad band wireless technology thus enabling schools in rural neighborhood to reap the benefits of modern day ICT capability. Proximity of AKRUTIs with schools should further enrich education through exposure to real life SUPW relevant to new technology era that we seek to usher in.

I believe that such an ecosystem would contribute to improved quality of education, higher livelihood and an ambiance of innovation that would move the neighborhood upwards on the path of socio-economic development consistent with the objective set earlier.

Pandharpur Experiment

As a part of activities promoted by Rajiv Gandhi Science and Technology Commission in Maharashtra, with which I am associated, these ideas are being experimented upon with the support of a number of institutions and individuals at Shri Vithal Education and Research Institute (SVERI) at Gopalpur near Pandharpur. Another experiment has been initiated at Gondwana University, Gadchiroli to try out these ideas in the context of forest and tribal neighborhood.

Let me use this occasion to describe the activities around Gopalpur. In addition to SVERI a number other institutions and individuals such as Maharashtra Knowledge Foundation (MKF), Maharashtra Knowledge Corporation Ltd. (MKCL), BAIF, National Knowledge Network (NKN), BARC, IIT Bombay and others are participating in this effort. The objective has been to realize an Integrated Education, Research and Development Framework that can be set up on sound economic principles and that promotes economic activities in the neighborhood that would continue to remain

competitive through ongoing linkages with knowledge and technologies at the state of art level. I believe that such a framework is crucial to empowering people at the grass roots and promoting faster and more permanent inclusive economic growth in rural areas. Such a framework also facilitates broad based and mutually beneficial urban-rural partnerships to sustainably bridge the urban/rural divide.

The project was initiated in February 2013. Clearly it would take some time to fully see the anticipated outcome.

Rural human and resource development facility (RHRDF)

An Integrated Education, Research and Development Framework in the form of CILLAGE – AKRUTI network has been established at SVERI. A rural human and resource development facility (RHRDF) (see fig.)

has been set up at SVERI for demonstration and training on various technologies relevant to rural development. As an initial step, 60 SVERI staff, 23 RHRDF staff and more than 200 villagers were trained by around 30 BARC scientists who had provided the initial technology package to be used for enhancing the livelihood of local people.



Technologies included bio-digester 'Nisargruna', 'Soil Organic carbon testing kit', 'Water purifier for safe drinking water', 'Seed bank for improved crop', 'Tissue culture', 'Solar driers', 'Vibro-thermal disinfectors for grains', 'Laser leveling of land', 'RIA kits' and 'Local weather forecasting'. Attempts are being made to access as well as locally develop additional technologies to enlarge the portfolio of technologies that can impact rural development and livelihood. RHRDF is the bridge to take technologies from laboratories to people in rural areas through Akurti programme and promote local innovation in terms of further development of technologies oriented to local needs. Till date more than 2000 farmers have visited the training facility of RHRDF and 835 farmers including 119 women farmers have availed training in appropriate technologies. Some of these farmers serve as village interns and carry the training and demonstration work forward at Akurti centres

6 Akurti centers have been established in the neighborhood area (at villages Ambe, Tisangi, Bhandishewgaon, Anwali, Kem and Mundewadi). About 10 more Akurti Centers are being set up in the next phase. This process would continue to the maximum extent possible. So far more than 150 training and awareness programs have been conducted in various villages in 6 talukas around, through Akurti centers. Various technologies have been introduced in more than 35 villages involving more than 2000 farmers.

In order to expose engineering and other students to identification of real field challenges and development of appropriate technologies to address them, an agro based project competition was conducted by RHRDF in which about 15 engineering and agricultural colleges took part. 61 projects were presented by students. Large number of farmers also visited the event and shared their problems and views on the projects.

Students (UG, PG, PhD and MBA) and faculty of SVERI regularly participate in various surveys, marketing and research activities related to RHRDF. Some of the research problems under investigation are:

1. CFD analysis of Nisargaruna bio-digester plants,
2. Vertical axis wind turbine fabricated by a local fabricator,
3. Development of low cost housing material,
4. Energy analysis of grape drying,
5. Milk adulteration detection kit,
6. Lab-on- a chip with various societal applications,
7. Arduino based device to measure weather parameters along with soil moisture,
8. Solar heating steam based water pumping solution.

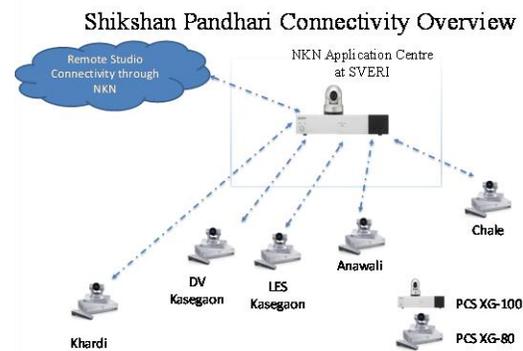
RHRDF has become a regular destination for students to search project topic. Some 1000 students have visited RHRDF for this purpose so far. Similarly entrepreneurship development has become another important activity at RHRDF. Around 10 entrepreneurs are already in business. So are a few women self help groups. Preliminary surveys to assess impact of technologies propagated by RHRDF have been conducted. Results are encouraging although it is too early to draw more specific

conclusions. Comprehensive surveys covering education (an integral part of this effort as I will describe later) and development intervention together are being planned.

SVERI/RHRDF has also developed/improved several new products primarily to reduce cost and make them more appropriate and user friendly.

Shikshan Pandhari

‘Shikshan Pandhari’ is a pilot ICT enabled school education programme to enrich quality of education in rural areas surrounding a Cillage (SVERI in the present case). A NKN node has been established at SVERI and serves as a hub to support school education in the surrounding area of around 20-25 kilometers radius through low cost broad band wireless connectivity. Delivery of ICT enabled learning content and education management is expected to cover both the prescribed curriculum as well as participation in ‘socially useful productive work’ (SUPW) involving ‘Akroti’ and such other activities. An important aspect is to ensure that this effort is complimentary to formal education system in a non-intrusive way. The project is being implemented by Maharashtra Knowledge Foundation (MKF) and presently covers a class room each in five schools in five different villages around SVERI.



As of now Open Education Resources (OERs) in Marathi for Std. IX have been developed and tried out. Plans are being drawn up to spread this development to other schools in zero marginal cost education modes. Simultaneously the programme is being

Training for Usage of NKN through Tablets



expanded to cover other levels from Std. VI to Std. VIII with bridge for Std. V. Work is

MKCL teaching Methodology for Efficient use e-content & knowledge through Tablet PC



in hand for introduction of programs of life-skills, work-skills and tech-skills at all levels of the primary and secondary schools. Similarly development of ICT based evaluation tools and mechanisms for Continuous Comprehensive Evaluation (CCE) so as to assess students' self-development, social development and creation of value/wealth with innovation are being pursued. A teacher's class portfolio and school portfolio needs to be developed. It is now proposed to make the contents developed so far to other schools on zero marginal cost basis.

Under a separate programme, a two-year *PG Diploma in e-ducation and Digital Society* (PG-DEEDS) has been developed for teachers' education consistent with the new digital paradigm and is being delivered through Yashwantrao Chavan Maharashtra Open University (YCMOU), Maharashtra Knowledge Corporation Ltd. (MKCL) & I-CONSENT a voluntary teachers group. Expansion of Shikshan Pandhari to cover other levels in school education, its spread to other schools on zero marginal cost basis, PG-DEEDS to reorient teachers to the needs of new age education and CILLAGE/AKRUTI network for synergy between higher education and research as well as neighborhood development for mutual benefit together should usher in a new education paradigm for sustainable development with right level of livelihood.

Mahanetra

BAIF Development and Research Foundation have a long experience and tradition of designing and implementation of development oriented intervention in tribal/rural areas with a pre-identified exit policy. In order to broaden the experience of implementation of appropriate technologies following a hub and spoke model in different areas, BAIF were requested to take up project "MAHANETRA" (Maharashtra Network of Technology and Innovation Hubs for Rural Areas). The programme which began in mid 2013 is being implemented through four technology hubs located at Urulikanchan in Pune district, Ralegaon in Yavatmal district, Pandharpur in Solapur district and Jawhar in Palghar district. Pandharpur hub sees a convergence of activities of Mahanetra and SVERI/RHRDF. The project now has a participant base of 2200 households in 60 villages

around these hubs covering a total of 1100 acres for demonstration of improved crop varieties combined with collective procurement and a package of practices.

The programme components include; demonstrations covering soil testing, improved crop varieties, improved grain/seed storage, water lifting using renewable energy, livestock development, nursery development, solar drying, water boxx, water harvesting, solar fencing, solar insect trap and cotton picking bags; skill development and promotional & extension activities. A revenue model has been built in for various services to farmers to ensure sustainability of the programme and more importantly to instill a sense of ownership. Participants pay for inputs / products / services. The contributions so made go towards a sustainability fund to be utilized subsequently for community welfare and post project maintenance. Other elements of sustainability strategies include community involvement and institutional linkages.

While CILLAGE/AKRUTI experiment would facilitate learning in the context of linkage between education and development, MAHANETRA would enable understanding of the sustainability issues linked to technology enabled development. Together they should enable us to move towards a sustainable modern society in rural India that confidently engages the new age world. An important aspect of this approach is the ongoing engagement with the society. This should allow the all important socio-cultural engagement for the students and the faculty involved. Backed by adequate level of humanities content in their curriculum, one should expect right value system to be inculcated among them even as their feet get firmly anchored to the Indian soil through their development oriented engagement with the neighborhood.

Closing remarks

Since one of the most significant attributes of development is about wealth generation and enhanced livelihood particularly at the base of the economic pyramid, it should be possible to implement development programmes through a viable revenue model. Sustained engagement with technology and knowledge inputs should make such efforts even more viable with assured long term sustainability.

A set of five projects all directed towards the use of new and advanced technologies for rural development have been deployed for this purpose. Projects include

(i) 'Shikshan Pandhari' leading to Param School (Meta School open to all students) led by MKF, Pune; (ii) Teacher Education through a two-year *PG Diploma in e-Education and Digital Society* (PG-DEEDS) led by YCMOU, MKCL & I-CONSENT; (iii) Rural Human and Resource Development Faculty (RHRDF, Pandharpur) led by SVERI and BARC; (iv) MAHANETRA, led by BAIF, Pune for taking latest sustainable rural technologies to the villagers; and (v) NKN networking with hub at SVERI and spokes at village institutions (footprint covers nearly 20 km area around SVERI) in the Pandharpur Block. These projects together would hopefully lead to a model of sustainable development through a zero marginal cost open access and a service based model of financial self-sufficiency. Socially supportive sustainable nature is being developed by forming communities of providers and learners of education, social development, value creation and social transformation. Current programme is an experiment to assess such a possibility. It will of course need some time to see tangible results emerge from this experiment.

Thus this model in my opinion is of value not only in the context of bridging urban rural divide in today's society but also to prepare our society for the new age. We consider that the Cillage is a New-Age settlement in rural villages of the digital society.

Acknowledgements:

This lecture is based on inputs from several colleagues and institutions that are participating in this effort. Inputs from SVERI, BAIF, MKF as also from Prof. Takwale and Shri Patankar are gratefully acknowledged.