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**Proposal of Research Agenda on  
ICT for Sustainable Economic Development**

Recent developments in information and communication technology (ICT) have opened up new possibilities for accelerating the pace of economic progress in developing countries. A number of projects have been initiated all over the world to use ICT to generate employment, provide better education and health care and facilitate micro finance in markets that have been traditionally under-served by technology. Many of these projects innovate not only for emerging markets, but also for the disenfranchised sector. Diffusion of ICT to sustain in these new markets will necessitate investigations that assist adaptation in a rapid manner while creating new markets at the fringes.

Sociology of the market segment, that of the innovators and the market drivers, vary in different lands, cultures and their economies. Adding to this fragmented nature of the market base is the large segment of multi-lingual, semi-literate, traditionally oppressed, economically weak, culturally diverse middle class segments and the disenfranchised segments of the developing world. Each of these attributes of the segment invite transformers that assist through a transition to a more leveling, but wider market where even the "infomediaries" or "digital weavers" form a sizable active segment. Appropriate actions result from continuous formation and reflection of the understanding of the context.

Knowledge of a context is an enabler that facilitates an understanding of a situation, while information about a situation facilitates action. Pattern of actions indicates community knowledge, as they manifest from individual experience based understanding that is hyped by market transformers. In an information society, it is therefore essential that for core-groups to build organizations based on an understanding of a situation, they are knowledgeable of the context.

ICT has emerged in a variety of ways and more shall emerge at a faster rate:

- 1) Connector concepts like the Web, Intranet, Extranet, Emails and list services;
- 2) Infrastructure like the Internet, an Ethernet, WLL, Bluetooth, mobile networks;
- 3) Connection devices such as personal computers, laptops, palms, mobile phones and multimedia devices; and
- 4) Enabling software tools for browsing, publishing, chatting, collaborating, messaging and conferencing.

The information age is, however, in the fringe of its adolescence. ICT is still a novelty in most of the world, not a commodity, thereby creating "teen-age rebels" in traditional "communities of commitment". Many of these adolescent rebels "return home" to accept tradition as they realize that the rebellious action was based on information about a situation, rather than an understanding of it. Assuming that people love what they

understand, a celebration of investigations and inquiries would result in an evolution of commitment towards the ICT market energy.

**Research agenda:** *to further the current investigations by understanding the context, assisting the evolution of commitment, in a community, towards ICT and developing appropriate business models for markets that emerge in these communities of commitment.*

## **Understanding the context and researching the market**

*Observations and Inspirations come from participation in helper organizations in social development sector.*

The entire market can be view as a pyramid of three layers. In order to understand the nuances we consider the pyramid to be form of the penthouse, the middle and the foundation. The words "penthouse" and "foundation" help facilitate an understanding that it is necessary for the penthouse to not only maintain the bottom but also strengthen it, with the help of the middle. This perspective renders a market model for ICT penetration that also includes exploitation of the middle and aid to the bottom.

Peoples of the world, with their deep-rooted traditions along with an enormous disparity in income, are a civilization of cultures. In India we can witness traditional cultures along side with cultures of necessity -- cultures of corruption and culture of silence. The coming out of the caste-system has reduced the number of innovators or "tinkerers". A tinkerer combines knowledge with manual labor, which results in innovation. Traditionally Brahmins were knowledge engineers while Sudras (untouchables) did manual-labor. In the new economy, the middle emerge into a new ambivalent class who aspire to be the "Brahmins" of tomorrow while feeling empowered by hiring "Sudras" below them to solve a problem. This leads to a dichotomy of intellectual thought that prevents them from becoming tinkerers, which involve manual-labor. Much of what we see today in the IT accomplishment of India can be positioned as getting into an illusionary, but coveted, space of knowledge engineers -- unable to create a culture of tinkering. In a culture-based society, an obligation has to become part of a culture before it can become part of a functioning civil society. A law or rule that is external to a culture leads to a subversive adaptation, as seen in a culture of corruption -- whereby manifests culture of silence akin to that seen in a culture of oppression.

One of the sustaining models of business that includes a wide range of the middle and the bottom belong to the culture of religion and spirituality. A religious organization is able to effectively grow into large-scale operations not only by including the local community in their activity but also by garnering their support. Spirituality and salvation certainly appear to be motivators of action across the pyramid. Religious institutions on the other hand are politicized into a religiosity of the state and as a threat to minorities.

A vast collection of tools, techniques and economies of practice are going to assist with the necessary adaptations to create a culture of commitment, by possibly creating

"Learning Webs". A *Learning Web* shall provide what one wants to learn, make it possible to share knowledge and to create opportunities for those who want to present an issue. New business models will not sustain if they disrupt local cultures and lifestyles. An effective combination of local and global knowledge is needed for an evolutionary process to set forth. Sharing, communicating and reinforcing their indigenous knowledge shall distinguish them as knowledge enclaves.

### **Technology assistance towards evolution of communities**

*Action or practice is working closely with an ICT organization which is developing a product for the masses.*

Semantic communities are practitioners committed on a protocol for a purpose. Structuring information during evolution enables such commitment on a protocol. Self-organization enables social and political structuring, leading to communities of commitment.

Research and development of Pantoto Communities software development project started with a mission to bring information architecture and community management tools to the level of common man. Pantoto: meeting a pan community need of information management in toto. Over time, while working in the Indian context to cost-effectively develop the software, a clear identification evolved of the difficulty faced by small organizations in getting software developed for their intranet or Internet needs. Information and community management for small organizations, social development sector and local communities shall catalyze the Learning Webs of tomorrow. For this Pantoto enables them to manage information with out software development dependency. Pantoto model was iteratively developed while working with small and medium user groups. Pantoto over the last year has been deployed in a few places after training a small group on the concepts of information and community management.

Dependency on technical professionals to build community knowledge systems causes delays. The cost of hiring such resources also makes the effort unsustainable. Equitability can arise when organizations can create, maintain and manage information management systems by themselves. Organizations in the social development sector work directly with beneficiaries, capture, create and work intensively with data, information and knowledge. Based on the above, if IT is to be used by organizations in the social development sector, they have to be empowered to:

- Take the design of an information management system for granted (and not depend on IT professionals to create these)
- Redesign or evolve the system based on changing information needs
- Build solutions that are easy-to-use, affordable and quick to deploy
- Use the same process across projects and in different areas, and
- Manage the participatory creation of locally relevant and locally created content

This enables an organic process of continuous evolution of information structures and purpose based sub-community formation. The model uses a Web-community approach to a closed or existing community (e.g. organizations, enterprises or school environments). Conceptually it is an evolutionary model that encourages participation

- to create a closed world semantic web,
- by sharing of meta-information between (sub) communities, while naturally creating an ontology,
- in building simple Web applications,
- in community communication and by facilitating rudimentary workflow, and
- in a individual/sub-community Web presence

The research based on the Pantoto concept can further lead not only to conducting research and development that assists the middle, but also to a network of knowledge communities. Pantoto is also an indication that commonly available technologies can be put together to provide for a large group of community enablers. Some special adaptations are needed, in addition to revisiting and restarting for the masses as necessary. Innovation and adaptation however shall not sustain unless it becomes a convivial atmosphere that celebrates the foundation.

### **Development of appropriate business models**

*Support is provisioning appropriate models developed for effective evolution of commitment in communities.*

Grameen Bank model encourages individual or family unit functioning by provisioning micro-credit to the poor. It also as encouraged collaborative support process among the women in the bottom of the pyramid through self-help groups. Self-help groups have eventually diversified their collaborative effort from collecting back the loan to other income generating activities. Grameen Bank is a sustainable model and enjoys a high rate of return. A comparable model that can be seen in action, in India, is the sachet market. A simple adaptation of packaging technique helps sells the otherwise unaffordable products, in micro-quantities, to a very large number of people.

A complementary model has manifested in the ICT savvy world, where micro productions world over are collected into larger products. This is the world of "open source" software development that got started a couple decades ago by FSF, the Free Software Foundation. While this model came about as a necessity from software developers who could not find or afford tools that help the software development process it is significant that it came out of a community of tinkerers. Size of this open source community is now of an order of magnitude larger than the largest of the corporations, however most of the members are from the developed world.

Most of the energy regarding open source, in the developing world, is expended by open source advocates whose intention is to bring awareness to the free software that is available in the world. Low-cost solutions are a necessity for the ICT sector in the developing world, where most of the computer literacy comes about through pirated

software. Software being easy to transfer across countries has prevented software vendors from pricing the software differently for developing countries. Piracy on the other hand creates necessary advocates for the software in a manner similar to what free open source software does in developed world. Lacking a culture of tinkerers, in the Indian context, has meant that software piracy has empowered the middle to service the top.

A union of micro-producing cultures and the micro-consuming cultures promise a sustainable economic model. However, jump-starting micro-production in the developing world is akin not only to creating a culture of tinkerers but also to organize them into efficient production machines. A market emerges for the top, with the helper community from the middle to help micro-sell and in return collect the micro-productions that can be put together for competing to sustain at the top. A business framework that celebrates the individual creativity, which becomes a contribution, rather than forgotten or stolen or preempted shall sustain creative output and regenerate individual inventive energies.

Policies need to be redressed, shattering the blinders of governmental bodies by creating a force that is large and effective. Legacy policies galore in a culture of politics that prevent technology from reaching masses. A culture of hierarchy blinds a decision-maker into not consulting the younger ICT savvy generation. Examples: restrictions on community radio prevent local broadcasts in villages while the banning of Yahoo Groups handicapped a large number work-groups and communities of digital weavers and infomediaries, without handicapping the targeted "secessionist group".

A supported open source, ICT development model, which gets started in various institutes, through collaboration with a corporate entity can outline a business model for appropriate technologies. A first hand experience of jumping in and working on the core of these issues with groups that indulge and those that doubt is required to understand the nature of the issues. Micro-production, policy redress, amortization of the struggle, community collaborations, appropriate notions of intellectual property can become the foundation of sustainable economic framework for ICT penetration.

It might be the case now that "without MNCs as catalysts, well-intentioned NGOs, communities, local governments, entrepreneurs, and even multilateral development agencies will continue to flounder in their attempts to bring development to the bottom".

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Quotes from Brown, Ilich and Prahalad.