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Youth and ICTs for Agricultural Development

Suchiradipta Bhattacharjee¹ and R. Saravanan²

ABSTRACT: *The 21st century has been named by some as the ‘Age of Information’. Truly, if we look around our self or ponder over our activities, we will find that in whatever we do, how best we do it depends upon how well we are informed. But when that's the reality and most of the fields has been working on it, why not agriculture? Caught in the whirlwind of changing times, the farmers of the developing countries are moving in directions they are clueless about. The young people are not anymore interested to join farming or take up agriculture as a career option and neither are their parents. But who is to be blamed for this? Is it the mindset of the youth or the non-remunerative agricultural practices or the extension system not taking care of youth? Every problem come with its own solutions - all we need to do is find it and work accordingly. In this case there are two answers complementing each other – the Youth and Information and Communication Technologies (ICTs). In one hand, the youth can best employ ICTs in agriculture whereas; the ICTs can make agriculture ‘modern’ and attract them towards it. For this, we don’t need tech-savvy youth but the ones with ability to think out-of-the box. This synergy should be utilized properly and a symbiotic relationship should be established to reap its optimum benefits. But all said and done, technology is ultimately something that man defines and not the other way round.*

INTRODUCTION

"Young people should be at the forefront of global change and innovation. Empowered, they can be key agents for development and peace.” -Kofi Annan (www.e-agriculture.org)

Dominant sector of the country’s economy, lion’s share in country’s GDP, maximum of the rural work force, maximum export potential – all answers are agriculture and more importantly, it is the story of mostly all the developing nations of the world. But with changing times and changing needs, agriculture is also having changed priorities. To feed the whopping 7 billion people around the world, agriculture needs to be highly specialised as with increasing population, there is a continuous decrease in arable land and other resources, especially non-renewable ones. The production of staple food grains has been found to be less in the year 2010-2011 than that predicted by FAO. Global wheat supplies for 2011-12 are lowered 0.5 million tons as reductions in beginning stocks for a number of countries more than offset a 0.3-million-ton increase in global production. Production for 2011-12 is raised for Syria, Pakistan, and South Africa, more than offsetting reductions for Egypt and Iran (USDA, 2012).

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As rural populations decrease, so does the agricultural work force. In Europe and North America, agriculture now represents about 5% of the work force. In Africa and Asia, it is expected that the number of agricultural workers will have decreased from nearly 70% of the population in the 1980s to barely 50% by 2015 (Crop life International, 2010). The events of the past few years have highlighted the vulnerability of global food security to major shocks – both in the global agricultural markets and in the world economy. The food price crisis and the ensuing economic crisis reduced the purchasing power of large segments of the population in many developing countries, severely curtailing their access to food and thus undermining their food security. “We estimate that in 2012 there will be over a million children suffering from severe acute malnutrition – what’s important to know is that malnutrition can kill,” UNICEF’s Director of Emergency Programmes, Louis-Georges Arsenault, said in a news release. “We need more resources to really scale up our response before it becomes too late and too many lives are lost.” Sahel and other regions in the Horn of Africa are facing severe food crisis (UN, 2012). In such a condition, to feed the hungry mouths of the world, agriculture needs to be more modern and decisions should be information and knowledge based and not instinct-based. Information and communication technology has a great role to play here.

The term ‘Information and Communication Technology’, simply put, is communication by electronic means. It refers to hardware, software, networks and media for collection, storage, processing, transmission and presentation of information in the formats of voice, data, text and images (World Bank ICT Glossary Guide). ICTs are a range of electronic technologies which when converged in new configurations are flexible, adaptable, enabling and capable of transforming organizations and redefining social relations (Ahuja, 2011). Though the idea of ICTs is not something new, but in the field of agriculture, or for that matter agricultural extension, it is particularly novel. All throughout the world, especially in the developing countries, agriculture has been the profession of the poor and the backward with majority of the farming community living in the villages and spending their life in obscurity. In such a situation, ICTs are a breath of fresh air in the traditional farming methods having a ‘cool and modern’ air around it.

In this context, the youth has a significant role to play. One may ask the question ‘why youth?’ But before that we shall discuss who the youths are? All those between the ages of 15 to 24 are the youths according to the United Nations General Assembly (Wikipedia, 2012). Again, the National Youth Policy 2003 of India classifies youth in the age range of 13 to 35 years (National Youth Policy, 2003). Nearly half of the world's population (almost 3 billion people) is under the age of 25 and about 85 per cent of the world's youth live in developing countries (WFP, 2012). With a very radiant and enthusiastic mindset, they are the harbinger of change in any society. Moreover, the youth these days have a greater exposure to the world’s developments along with better education facilities than their forefathers. They have a better understanding of development for themselves as well as others thanks to their constant interaction with the changing world through ICTs - TV, Radio, Newspapers and in some cases the internet. This makes them a better judge of their situations and the remedies offered to

have a better life altogether. And because of that it is the youth who hold the potential in changing the agricultural scenario of the world for good.

At present in the developing world, youth and ICTs are complementary ideas. It is not just the youth that brings technological innovation in agriculture but it is also the other way round. The present generation has lost its interest in agriculture because of its non-remunerative nature. The age old methods are not proving to be very economic in this present situation of drastic climate change, volatile market price and many other adverse factors. Only timely information can make the farmers take informed decision thus paving the way for a desirable change in agriculture. This and only this will be able to turn the face of the young people to agriculture again and encourage them to put their venturesome ideas in agriculture to make it an attractive and profitable career option.

ICTs IN AGRICULTURE

ICT in agriculture is an emerging field that involves application of innovative ways to use Information & Communication Technologies (ICT) in the rural domain. The advancements in ICT can be utilised for providing accurate, timely, relevant information and services to the farmers, thereby facilitating an environment for more remunerative agriculture. But there is a need to understand as to how far the ICT initiatives are able to address the farmers need so that better solutions can be developed to address those unmet needs (NAIP, 2011). A good number of ICTs for agricultural extension projects, innovations and experiences from 28 countries are well documented in the publication edited by Saravanan (2010) and also Indian case studies by Saravanan *et al.*, 2011.

Importance of ICTs in Agriculture: Traditional methods of agricultural practices and extension have been followed in the developing countries for years. Development has been there but information gap has also been huge. Information and Communication Technology with its potential of getting vast array of information to the farming community and stakeholders in a more timely, comprehensive and cost effective manner has got its own advantages –

- **Easier Access:** The ICTs are easily accessible by the farming community compared to traditional methods of contacting the extension personnel. It is also important to keep the extension mechanism updated all the time about the recent developments in agricultural fields.
- **Decision-making process:** Sound decision making is based on availability of comprehensive, timely and up-to-date information which can be transmitted best using ICTs.
- **Efficient feedback system:** The feedback from the end user becomes more efficient through the ICTs – be it mobiles, computers and internet or other inventive concepts like innovative radio programmes and also community radio initiatives. It is a two-way system of knowledge sharing ensuring a vast knowledge resource.
- **Decentralised extension:** The extension system will be more effective, efficient, sustainable and decentralized with the ICTs.

- **Convergent and stronger linkage:** ICTs form a convergent system assimilating all the ideas, knowledge and information from the researchers, frontline workers and farmers at one place making them accessible anywhere 24X7 by anyone and initiating a stronger linkage between them.
- **Cost effective process:** The ICTs are cost effective both for the farming community and the extension system. Large amount of information can be disseminated in a faster and cost effective way thus making it more efficient.
- **Bridging the gap:** Through a proficient information flow, the rural-urban information gap can be bridged. The gender gap in information access can also be reduced to a large extent in rural areas.
- **Employment generation:** By establishing rural information centres, ICTs can create employment opportunities in rural areas by engaging tele-centre managers, information managers, facilitators, Subject Matter Specialists, translators and IT technicians.
- **Last mile connectivity:** ICTs have the potential to penetrate the under-served areas and enhance knowledge, facilitate development and faster delivery of information and technical assistance. Internet and mobile services can enable the remotest village to access regular and reliable information.

Constraints in use of ICTs in Agriculture developing nations:

- **Cost of Technology:** Even though mobiles have gained a large acceptance, computers and internet connections are still considered to be costly items in the rural households of developing countries.
- **Lack of awareness:** The importance of ICTs in modern day agriculture still cannot be gauged by the rural youth. Even among the field level agricultural extension personnel, the awareness is very low.
- **Effective participation of communities:** ICTs are for communities and not just individuals. But community adoption of ICTs is very rare in rural areas of developing countries which hold back its wider reach.
- **Inadequate computer literacy:** This is a big drawback in spreading of ICTs. Though tools like mobile phones, TV, radio, etc. have gained popularity, internet and computer are still an unknown territory to rural communities in South-East Asia and Sub-Saharan Africa.
- **Content language:** Most of the information provided by ICTs in rural areas is in English which is a foreign language to the people in rural areas. Deciphering their utility thus becomes difficult.
- **Lack of physical and human resource infrastructure:** Human resource with full knowledge of ICTs is not sufficient and hence cannot utilize fully the advantages ICTs has to offer.
- **Too much Innovation:** Too much innovation can be an obstacle by blocking the use of older technologies which can often be effective. Moreover, when the farmers are superimposed with too many technologies, it is difficult for them to understand each one of them leading to a lot of confusion.
- **Lack of leadership:** there are few examples setting youths in the rural areas who have taken up ICTs beating up all odds. Though ICTs can prove to be very useful but lack of proper knowledge is preventing them to take up the chances.

- Lack of political will: Large scale campaigns in the rural areas about benefits of ICTs from the Govt. side have been negligible. There are not enough policies or programmes implementing ICTs in farming from can prove to be really useful. Since rural people are mostly dependent on the public extension system, lack of political will is making its implementation difficult.
- Sustainability: Lack of coordination among donors, lack of funding and start-up support are the bottlenecks in implementing the ICT projects. Finding funding agencies are difficult; even if the project is started funds become a serious constraint once the project period is over.

Pattern of use of ICTs in Agriculture in developed and developing countries: Developing countries have much to gain from the internet revolution in communication and information access. In contrast to the situation in the developed world, where communications infrastructures for delivery of both physical goods and information services are well established, the alternatives available within developing countries are generally slow, expensive, or nonexistent. To date, e-mail is the predominant and most important use of the Internet in developing countries. In Bangladesh, 82% of Internet use is attributed to e-mail, vis-à-vis 5% in the United States. The Web accounts for about 70% of Internet use in the U.S. (Wikibooks, 2007)

This is due to the relatively high Internet access costs in most developing countries. In developing countries, information poverty is one of the more significant and insidious obstacles to effective exploitation of information processing and other types of technology (Sadowsky, 1996).

There are several ways in which information and communication technologies can address the problems of agriculture at the local and global level. ICTs are used by many international organizations for mapping and monitoring world food supplies, early warning systems, and to respond when disasters strike. But the information need and utilization pattern of ICTs in developed and developing countries are quite different.

In developed countries, ubiquitous sensor networks and radio-frequency identification applications are leaving the university and research labs to be deployed in the fields and food supply chains. Standards for the better design and implementation of USN using wired and wireless sensor networks could increase ICT use in agriculture. To lessen the risk of unsafe food, RFID tags and further standardization in this area can heighten compatibility between tags in different countries, which would ensure an effective global use of the tags for food tracking.

In developing countries, the use of ICTs by farmers and the rural population to overcome hunger and food security remains in early stages. The mobile phone revolution, especially the growth of mobile penetration in developing countries, offers new opportunities to benefit farmers and agricultural production. Better access to weather, market and price information can have an impact on the incomes of farmers and fishermen. However, the full potential of ICTs to address agricultural problems has yet to be realized (International Telecommunication Union, 2009).

The use or pattern of information need of the farmers also change along with the cropping season and so should the information provided. Of the range of information required, it is generally found that

small farmers prioritise weather, plant protection (disease/pest control), seed information and market prices as the most important (Mittal *et al.*, 2010.)

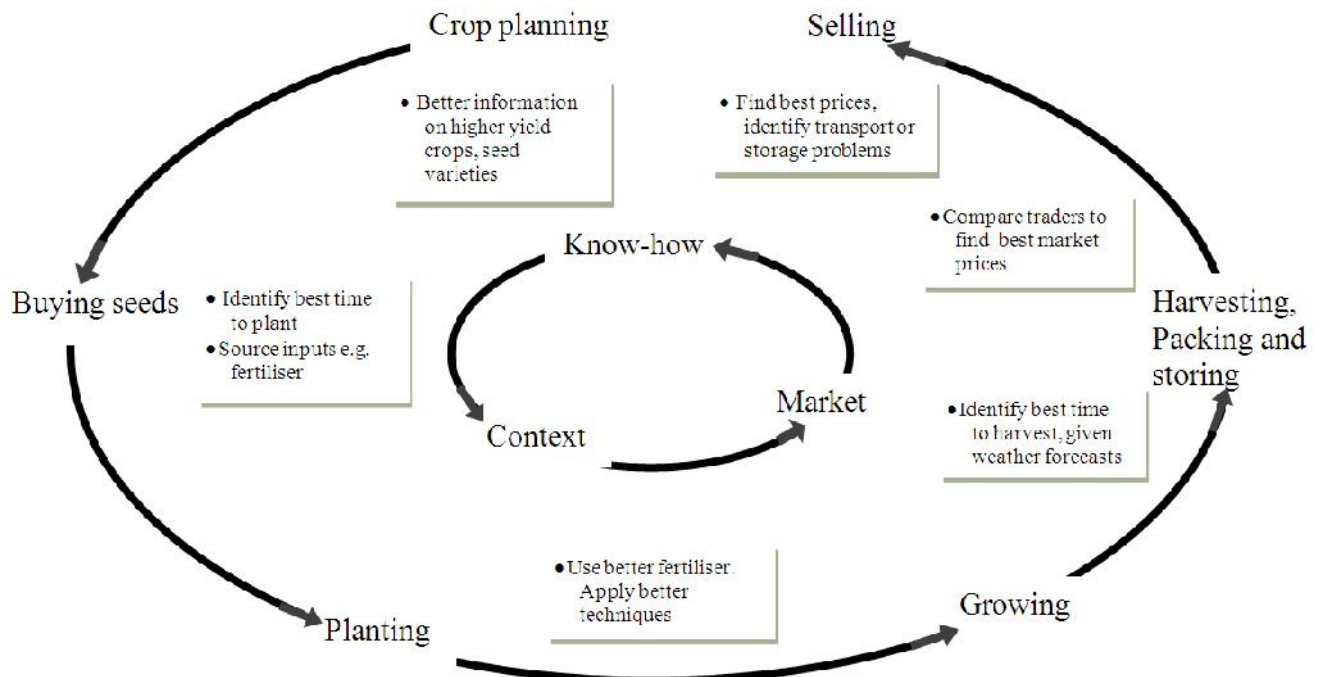


Figure 1: Information need of farmers in India through the agricultural cycle (Mittal *et al.*, 2010)

Scope of ICTs in agriculture: ICTs can change agriculture in a number of ways and many a times, these changes come from unexpected quarters. Agriculture and its allied sectors are continuously being benefitted from the technological innovations brought into the sector and even though the numbers are few, the youth has been setting up examples all over the world. ICTs, brought into the following fields, can bring about a paradigm shift in the sector – extension mechanism, crop production, crop protection, disaster management, market information, market participation, financial institutes and information, Natural Resource Management, fishery – wave heights, location of fish shoals, *etc.*, weather information, e-Governance, land administration, ARD interventions, livestock management, food security, forestry, sericulture, input management, input availability. ICTs have opened new scopes in agriculture. But along with that, it has also made the farmers more aware and informed about their rights. It is giving voice to their thoughts and Web 2.0 is bringing them together, if not always physically than virtually to come up together and work for a common goal. The Facebook is one such platform that has empowered the turmeric growers of India and done more than solving their problems.

Facebook: An innovative solution for farmers in India: The turmeric farmers in Maharashtra State came up with a solution after seeing the prices drop because of oversupply. They created a group on **Facebook** where they invited farmers from the region to join and decide together how much to produce to maintain the demand for turmeric.

They have also used Facebook to get in contact with farmers in other regions and plan boycotts when they feel the prices in certain markets are not right. Given that there are more **mobile phones** than computers in India, most of the farmers use their smart phones to connect to Facebook.

As we can see agriculture is transforming with the use of technologies that allow farmers to connect to each other and share information. **Facebook group 'Turmeric Farmers Council of India':** <http://on.fb.me/yHaCYP> (Flota, 2012).

Mobile phones are doing wonders in every sphere and with the innovative ideas-turned-into-reality by youths, agriculture is also benefited. Nano Ganesh technology is one such innovation. Nano Ganesh is a remote control system for controlling water pumps by mobile phone. Santosh Ostwal, the Pune-based founder of Ossian Agro Automation which developed the gadget that is revolutionising irrigation in farms across India, was motivated to make it seeing his one-legged grandfather travel more than a mile every day to irrigate his fields (Prasad, 2009).

'This afternoon, the excitement in Anand's Sojitra, a village cluster, about 30 km east of Ahmedabad, is palpable. The farmers are all assembled at the home of one Bhavesh Patel, who just made a call from his Nokia E-75, but said nothing and hung up. "Will it come?" asks one of the villagers. We are told they are waiting for water to flow into their fields from a reservoir 10 km away. Patel has activated the pump set at the site by making the call. Now, the wait has begun..... The wait ended in Sojitra. Water flowed into the fields and farmers hugged each other. They also congratulated Santosh Ostwal who was standing by. What's next? Ostwal says he is now working on new ideas. The mobile modem which he developed to control the pump set can be used in other useful applications too, such as alerting users when their water tanks overflow, or in case of a fire or break-in at homes' (Prasad, 2009).

The fishermen of the coastal regions of India does not have to wait for a clear weather to venture to the sea and earn their living based on their instincts, thanks to M.S Swaminathan Research Foundation. The mobile based service called 'Fisher Friend' is benefitting the thousands of fishermen in the rural areas.

Evaluating sea conditions using traditional methods, the small-medium fishermen of Koyalam village, Pondicherry judged that fishing would be poor on this day and did not venture out to sea.

One of the fisherman, A. Alphonse, who was part of the fisher friend programme, chose to rely on the optimal fishing zone information delivered to his mobile and discovered a large pool of fish. He immediately called a friend on land with his mobile and the news spread among the villagers. This prompted the fishermen to venture out to sea, resulting in an overall haul worth Rs.2500,000 for the village (Mittal *et al.* 2010.)

YOUTH IN AGRICULTURE

Why is agriculture unattractive to the youth?

Agriculture does not attract the youth anymore. Those with good education facilities do not want to take up agriculture for technical or higher studies. In most of the schools, agriculture is not being taught with much importance or to be the first career option. Most students come to agriculture not from interest but from compulsion. The youth in the villages do not want to take up agriculture as they see their fathers and forefathers struggle to make both ends meet. Low productivity and resulting poverty is pushing them away from this sector. Even their parents and family members do not want them to take up their traditional occupation. Moreover, it is never an easy choice of career. With lots of risk and physical labour involved, no wonder the youth mostly divert to other job opportunities in the cities increasing the number of migrations and unemployed each year. Dr K Narayana Gowda, Vice-Chancellor of the University of Agricultural Sciences (UAS), Bangalore recently indicated that “In China, the percentage of youth moving out of the agriculture sector increased to 90 per cent in 2011-12 compared to 20 per cent in 2001. This is a dangerous scenario and the issue is equally important as the same trend is seen here (in India). The Indian Government will allot separate funds in the 12th Five Year Plan for the development of youth in the farming sector” (Express news group, 2012)

The major challenges that are holding back the youth from joining agriculture are – access to land, financing, climate change, interest, market, sustainability, education and training, facility, policy and programmes, top-down approach and low service quality. Many youth like John Njue of Kenya are drawn away from the sector because of its age-old non-remunerative ways and lack of interest among the elders to change their ways and make farming an interest and not just livelihood.

John Njue is the field officer at the Maarifa Centre (tele-centre) at Kyuso, a dry part of eastern Kenya, where the centre “acts as a referral point for people interested in developmental content. He is not directly involved in any agricultural enterprise. “I admire farming, but not the kind our forefathers practised. The reason why I don’t farm is because my parents and neighbours would not listen to my views about the need to practice more modern farming techniques, and trying to farm as a business.” According to him, most young people don’t engage in agriculture because of a lack of support from the people around them. He feels that it would be beneficial if the government employed young agricultural extension officers. This would make it easier to communicate to young farmers and help them start an agricultural business, rather than continuing to see and practice farming as a subsistence activity. He also observes that many extension officers do not use modern technologies in their training, and thinks that this is a deterrent to youth participation (Mugo and Vermeulen, 2012)

Making agriculture attractive: But then again, there had been many examples of youth doing fair in agriculture just by being innovative and making informed decisions. They have shown that agriculture is no more the last choice for a career. But to increase the number of these young people, some steps have to be taken to make agriculture remunerative and attractive at the same time.

- *Including agriculture in school curriculum:* Not just including but making it a compulsory subject is very important to get back the attention of the youth in agriculture. It should be given a much importance as a career option as is given to medical, engineering, law or management.
- *Programmes and projects:* The stakeholders should employ enough programmes, projects and pilot studies including the youths in them to make them realise the importance of agriculture. But this should be done in an innovative manner as to gain their interest and attention.
- *Making youth open-minded:* The youth should be made open-minded to accept any innovation in agriculture but at the same time critical enough to judge properly their applicability in their own situation.
- *Role of colleges:* The colleges involved in agricultural studies must focus their resources on the needs of youth development and concentrate on giving a positive picture of agriculture to the youth.
- *Doing it the 'youth' way:* The approaches should be made not on the basis of what the policy-makers think but what the youth think of their situation. The young people can contribute a lot in the sector if they find it interesting and for that it should first be their way of thinking that has to be realised.
- *Encouraging entrepreneurs:* Entrepreneurs in agriculture or agripreneurs should be encouraged as they not only inspire others to join agriculture but also open new possibilities in the job sector in rural areas.
- *Youth innovations:* The youth should be encouraged to come up with innovations that can make the nearly stagnant growth of agriculture to be accelerated. These should be practically applied to showcase their applicability. These will motivate the youth in agriculture and its development.
- *Training in agriculture and allied activities:* when unemployment is a burning issue all over the world, especially in the developing countries, providing vocational skills to rural unemployed youth would positively increase their self-confidence and also the condition of the agricultural sector.
- *Utilizing the Web 2.0:* The “new web” or web 2.0 indicates second generation of web applications. This includes web tools such as blog, wikis, facebook, youtube, podcasting and social bookmarking. This can be a great tool for the youth to share their ideas and influence each other to contribute in the agriculture sector learning from each other’s experience.
- *Digital assistance:* Digital assistance should be provided to the farmers in agriculture and allied sectors not only to enhance the productivity and efficiency of agriculture but also to attract the attention and interest of the youth to these high end tools and to agriculture.

But all these should be done in an innovative way as discussed earlier and here comes the practical utility of ICTs. Nearly all the people in the developing countries have a mobile phone and it is the youth who use them most. Many of the youth know how to surf the internet for information but don’t know what to search for. These potentials should be utilized properly to attract the youth to agriculture. With all the proper and timely information, anyone can do wonders in agriculture if they are determined and hard working enough. These youths should be taught what great amount of information these devices hold and how their correct utilization can make them their own boss.

Mr Bernard K. Wopata has a degree in Business Administration and Management. However, unlike many young men who rush to look for jobs in financial organisations like banks, micro-finance institutions and insurance companies, Bernard decided to start a Poultry farm which he named (+VALUE Farm) with the “+” representing “Positive”. With 250 chicks (Layers), Bernard set off from Kampala to Masindi district about 280Km towards Northern part of Uganda where he was going to start this challenging venture. He had never received any formal training on how to breed and take care of layers from infancy to maturity. He was ready for the challenge if that’s what could bring him money and save him the burden of job hunting.

He lost a few birds during the first weeks and four months later lost over 100 birds that died as a result of delayed vaccination. At the end of the 6th month he only had 45 birds left. He almost lost all the hope because he had struggled buying their feeds, vaccines and hiring a couple of youth to help him out with some work. Despite all these challenges, Bernard managed to reap out of the few birds that remained and later sold them off before acknowledging that he needed basic training on poultry farming.

Bernard realised that for Agribusiness, all he needed was to learn how to use more of ICTs to link up with fellow farmers and learn best practices from them. He had been offered a place to attend the web 2.0 training Learning opportunity by CTA at NARO in Uganda <http://www.web2fordev.net/component/content/article/1-latest-news/132-web2lo-naro-uga>. He believes that it will be a breakthrough for him as he will learn how to use web 2.0 for development, which development to him is “Agricultural Development”. This is what Bernard firmly believes “the future of the youth in Africa is in Agriculture so the earlier they realize this, the better for them” (Agena, 2011).

YOUTH AND ICTs

Many a revolutions in the world – be it on the humanitarian, political, societal or other fronts have been brought upon by the youths. They are always open for change and in many cases are not hesitant to have a rendezvous with the new. The hundreds of studies conducted in the field of diffusion of innovations around the world has already characterised the ‘innovators’ (the first to adopt an innovation in a social system) to be young and venturesome. But along with the desire to change there should be the way to change which has been provided by the Information and Communication Technology. Because of an open mind and better ability for understanding and adaptation, they are no longer afraid to explore the virtual world of information and innovations and the electronic mouse has been a true friend guiding them through it. Use of ICTs in agriculture does not necessarily need tech-savvy youth but those who can think out-of-the-box with a dash of creativity.

Mode of access to ICTs by the youth: Information and communication technologies (ICT) play a critical role in global development, and venues such as libraries, Village Resource Centres, Community Information Centres, Village Knowledge Centres, tele-centres and cybercafés, which offer public access to ICT, can make ICT accessible to broader sectors of the population. This broader access to ICT can have positive consequences to the social and economic development of marginalized and underserved populations and help bridge the so-called digital divide (Barzilai-Nahon et al., 2009, Warschauer, 2003). It has been reported that in the developing countries, the use of public

access venues by youth has been found to be an important mode of accessing ICTs. The venues may be tele-centres, community centres, public libraries, cyber cafes or e-centres. These centres have been found to be mostly concentrated in the urban and semi-urban areas. The centres are primarily accessed by the youths who are ‘naturally close’ to the ICTs rather than the older population who are more removed from these sources of information. (Gomez and Camach, 2009).

Another mode of access of information in developing countries is the mobile phones. Some have called 2011 the “year of the mobile”. As an affordable and accessible means of communication, rural communities and development workers are realizing the potential of mobile telephony to create economic opportunities and strengthen social networks (Farming First. 2012). Its access, use and ownership are increasing rapidly in the developing countries, especially in South-east Asia and Sub-Saharan Africa. According to a study carried out by the Centre for Economic Policy Research and Vodafone, it is estimated that a staggering 97% of the population are able to access a mobile phone. The growing number of people using mobile phones has led to optimism and speculation regarding its effect on economic and social development. Expectations from mobile phones are high and it has already been coined as Africa’s PC (Rodrigo, 2011)

Content matters: Access to information does not define itself only in terms of access to different technologies and media, but must take into account the nature and type of information youth need for full participation in society (UNESCO, 2011). Information related to weather forecasts, package of practices, technological innovations, varieties released, market prices, *etc.* are mostly coveted by the farming community. But just providing Information is of no use. Content validity in farmer’s own condition is also very important. Localised information is more welcome in the field condition, specifically in rural areas and to the small and marginal farmers who dominate the agricultural scenario in the developing countries. And for that reason, ‘community managed location specific’ information services should be started. The information in the web portals should have a very good feedback mechanism so that the users, specially the farmers can give their views and also share their knowledge through the Content Management System (CMS) which will be validated by the concerned personnel. In case of the mobile based services, the feedback of farmers should be taken immediately and after an interval of a week or fortnight to know the utility of information provided and valid suggestions should be updated in the database which would help the other stakeholders. Moreover, in this way the farming community will develop a sense of belonging for the ICTs and utilize them better.

One good example in this context is the India Development Gateway (InDG) web portal. Supported by the Department of Information Technology, Ministry of Communication and Information Technology, Government of India and implemented by Centre for Development of Advanced Computing, Hyderabad, the portal gives information about agriculture, health, primary education, social welfare, rural energy and e-Governance in ten Indian languages. The content of the portal can

be updated by any registered user and is validated by the concerned experts. Such a system makes locally significant information easily available and attracts the farmers towards the ICTs.

Even in the far-flung corners of India, ICTs are doing wonders with the help of the rural youths. One of the remotest parts of the least developed North East India has seen computers and touch screen kiosks deliver agriculture related information where the people hardly had access to even electricity. Projects like e-Arik, e-AgriKiosk and e-Village has solved much problems of the farming by using rural tribal youth as intermediaries along with ICTs and project also attracted considerable number of youth towards the modern agriculture (www.earik.in).

“In North-East India, Jhum cultivation (Slash and Burn Agriculture) is the most predominant form of agriculture. Prevalence of number of tribal dialects makes communication difficult for change agents. Hence, considering the farming situation and difficulty in communication of appropriate farm information, an e-extension project (e-Arik) was initiated since 2007 in East Siang district of Arunachal Pradesh state. To overcome communication difficulty and also to motivate rural farm youth and others to take up profitable farming activities, four educated tribal farm youth were used as ‘farmer facilitators’ along with ICTs. They were given advanced farm technological training at the constituent college of the Central Agricultural University (CAU) and KVK. The farm youth helped to create general agricultural and rural development awareness among tribal farmers, facilitated eco-friendly and sustainable farm technology dissemination, developed vocational efficiency among farmers, formed farmer groups for self-help, facilitated use of local resources, helped to make timely decisions by the farmers themselves and suggested alternative ways to solve farming and other rural problems in twelve selected villages. By the efforts of farm youth facilitators by following ‘farmer to farmer communication’ approach and using ICT tools, 44 percent and 92 percent of farmers adopted the information on climate smart practices on Paddy (*Oriza sativa*) and Khasi Mandarin (*Citrus reticulata*) crops respectively. After three years of project initiation, 55 percent of farmers developed new Khasi Mandarin orchards in their Jhum field, which means they are permanently moving from age old Slash and Burn agriculture to settled cultivation. Even after the completion of the project, trained farm youth are serving as a link between agricultural development departments and tribal farmers for facilitating advanced farm trainings and advisory services and they become ‘local knowledge managers’ to foster agricultural development in the remote tribal villages” (Saravanan, 2011a & b).

ICTs FOR YOUTH (ICT4Y)

The ICTs and the youth can prove to be great catalyst in agriculture. ICTs are the developmental tool kit to empower the rural youth to fight against the odds of poverty, backwardness and illiteracy and come out victorious from their agricultural fields. It is not a mere technological innovation to come and go but application of ICTs in agriculture is a permanent solution to the problems of the sector in developing countries. It will also bridge the gap between the present and the past and make the young people the catalyst for the change in their peers. Moreover, forming an opportunity of employment for the rural youth do not only help them but save the society from many odds. ICTs empower the rural youth and channel their energy in a desired direction.

Of the other direct impact of ICTs on youth in agriculture are forming virtual peer groups to share their experience. The youths from various parts of the world with the Web 2.0 can gain exposure to what is happening in the agricultural front in other parts of the world and thus gain a better

understanding of their own situation. This helps them to take better decisions in their own condition. It also gives them the opportunity to give their voice in the policy making process.

ICTs increase the productivity and inspire the youth to venture in agripreneurship. ICTs also increase the social status of the farmers and the need of social recognition attracts others to the use of technology in their conditions also. It also increases the negotiating power of the farmers and makes them more informed for not to be cheated by others.

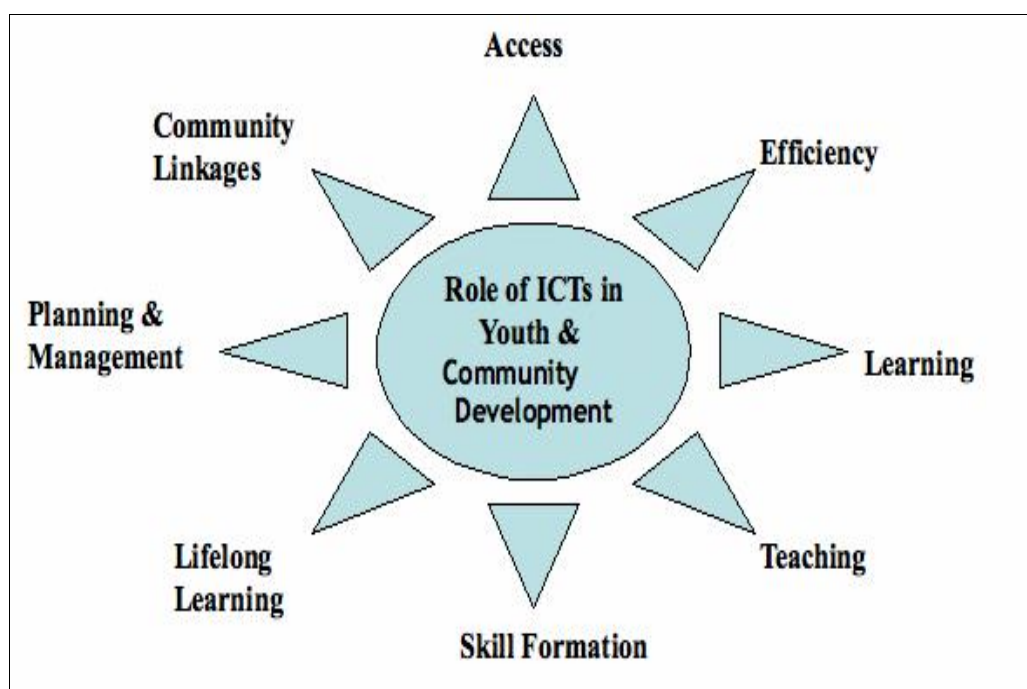


Figure 2: Potential of ICTs in Youth and Community Development (Haddad, 2007)

The role of ICTs, thus, can be felt in every sphere of the youth in agriculture. As shown in the figure 2, it is a lifelong process of learning from their own experiences, from others in the community (both actual and virtual) or from access to the worldwide knowledge repository and also passing that knowledge to those who need it. Not only that, it also helps in their skill formation and proper planning and management of their investments thus ensuring an inclusive individual and community development.

In many countries, mobile phones have reduced many a work of the farmers which they can devote in other works. They don't have to walk long distances in order to transfer money from the bank or getting information about the market price. It has also inspired the farm youth to take up entrepreneurial steps in innovative ways making agriculture remunerative and reduce the drudgery involved.

YOUTH FOR ICTs (Y4ICT)

All the discussions till now have been on how the ICTs can revolutionize agriculture. But like all other technologies, it needs a career to take it forward and implement it. ICTs are powerful only as long as they are used to their right potential. The youth who form a major portion of the developing world can get the best of them because of their natural affinity to technology. It is important for the young people to participate in the ICT initiatives and their implementation as they know best what the need of their community and themselves is. It also adds the bottom-up approach to the project implementation making it more realistic and fruitful. The youth can play a big role in bridging the digital divide that exist in developed and developing countries and also the rural and urban areas. They can not only help themselves but also the other community members to get the best out of their land.

POLICY RECOMMENDATIONS

All being said and done, we have to admit that though ICTs and the youth can be the driving forces to change the agricultural situation of the world, none of these are utilised to their full potential. Some of the ways by which their full potential can be realised are discussed below:

- *Implementations from where people are:* The implementation of ICT projects and their contents should be at par with the local condition. Information needed and not thought-to-be-needed should be provided for its social acceptance.
- *Sustainable projects are welcome:* Most of the ICT projects adopted are not financially sustainable due to cost of technology tools and lack of cost recovery and so exist only for the project period. After that implementers goes back to their report writing and the farmers to their own old but non-remunerative method.
- *Partnership:* The projects should be on Public-Private-Partnership (PPP) mode for higher involvement of stakeholders, greater sustainability and fulfilment of common interest of all beneficiaries.
- *Appropriate for small holders:* As most of the farmers of developing countries are small and marginal. So the contents should be developed keeping them in mind.
- *Strengthening information services:* The information provided should be based on the staple crop situation of the area. Market price information when paddy is at tillering stage is of no importance to the farmer. He needs it before planting to decide which crop to grow or when harvesting to know where to sell and for how much.
- *Basic infrastructure:* To get the best out of the ICTs basic infrastructure should be provided first to the community. A locality which gets electricity for twenty four hours in a week hardly has any use for computers and internet. The farmers who can't even go to the next village for lack of transportation has no use for market prices in the cities even if it is very profitable.
- *Youth involvement:* The youth are the first to adopt any technological innovation in a social system. So their involvement in planning and implementation is very important for overall success of the projects.

- *Market access:* Market information is most sought in developing countries. So the service providers should keep that in mind before implementing any ICTs.
- *Accessible infrastructure:* The rural youth should be made familiar with the ICT tools like laptops, mobiles, i-pods, *etc.* for their better understanding of the technology and gaining interest.
- *Dissemination of local achievements:* Local achievements should be disseminated through ICTs to share knowledge and inspire the youths with the success stories
- *Climate change:* ICTs can be an effective tool to make the youth aware of the hazards of climate change and inform them about climate-smart agricultural practices.
- *Policy framework:* Effective policies should be implemented and the Govt. should take more interest in involving and connecting the youth and ICTs for effectiveness of the initiatives implemented.

CONCLUSION

With around 50 percent of the world's population being youth and more in the developing countries, the future of the world depends much on what they choose to say – or do for that matter. The world is practically theirs to decide how they want to live and let others live. Agriculture has been feeding the world population but its ways are not doing that anymore as we can see from the increasing number of hungry people. As it is the best way of providing food if done properly and with no other options, the youth has to come up with how to make the most of it and ICTs are a great path to tread on.

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