Round Table on

"Leveraging ICT to Accelerate Indian Agriculture"

ICT India Working Paper #27

Abhishek Beriya

April 2020

Center for Sustainable Development
EARTH INSTITUTE | COLUMBIA UNIVERSITY

Abstract

A roundtable was held in January 2019, as a beginning to a project on the use of ICTs in Agriculture to spur innovation and growth for Indian small farmers. This paper summarises the discussions and lists the important aspects which were identified through the discussions in the roundtable. The roundable was attented by representatives from farmers, startups, industry, academia and agricultural experts. Specific conclusions that emerged include the need for a platform to bring siloed initiatives, specially in the startup space, together so that collaboration is effected for scale and impact; the need for a national level AgriStack,i.e., a dynamic, public (with individual privacy protected) and open database of farm, farmer and crop grown, to spur innovation, further broad-base inclusion and enhance transparency in the subsidies, public finance and information aspects of Indian Agriculture. Our project, it emerged, in this sense, is timely and has the potential to contribute positively to the above goals and enhance farmer incomes.

Introduction:

Columbia University in partnership with The Energy and Resources Institute (TERI) is undertaking a multi-year and multi-sector project titled: "A New Indian Model of ICT-led Growth and Development." This three-year project will help bring together cutting-edge technologists, macroeconomists, sectoral experts in agriculture (along with in the sectors: public health, education and urbanization), private sector leaders and public officials to examine the potential for a new Information and Communication Technologies-led model of growth and development in India. The project's objective is to better understand the role of ICTs in India's future economic growth and to make recommendations for India to continue to leapfrog the development process using ICTs in the key sectors: agriculture, health, education and infrastructure among others. We believe that India's new growth model of ICT-led development can, with the help of new IT-based tools and a solid ICT strategy, spur India's development currently characterized by high levels of poverty and low levels of social and economic development. As a starting point to this project, with respect to Indian Agriculture, we organised a 2-day Round Table (list of participants in Appendix 1) on January 16 and 17, 2019. The idea behind the 2 day program was to understand how ICT is being used in the Indian Agricultural sector currently and how the speed and range of the same can be expanded to take Indian agriculture to the next level, enabling and strengthening all parts of the sector. Various experts and stakeholders from the farm sector, some of whom are also directly engaged in implementation of ICT initiatives in agriculture were invited to understand the current status and gaps in the entire chain. Our focus was more on understanding the needs of the small farmers and less on structural issues.

The Round Table was divided into 4 sessions with the following agenda points:

Session 1: ICT and Agriculture in India: A Broad Overview

The session looked at a high altitude view of Indian agriculture in general and the impact that ICT has brought in or can offer to improve things for the sector, especially the smallholder farmer. We wanted to take a look at both macro trends and micro issues that Indian farmers are facing. Our focus was on initiatives in the sector which our speakers pointed out and equally importantly on those aspects which are currently not being tackled enough. The idea of this session was essentially to have a clear roadmap of the needs of the sector, avoid duplication of efforts and identify gaps.

Session 2: ICT in Insurance, Finance, Remote Sensing, Weather Prediction etc.

It is a fact that Indian agriculture is heavily dependent on monsoons and as such accuracy in weather forecasts can go a long way in decision support systems not only about sowing and crop selection but also for decisions like agriculture insurance and financing. Recent technological developments like remote sensing open a lot of possibilities for data gathering

without manual and on-site visits. Taken together, these offer substantial possibilities given the scale of the agricultural sector in India. This session, hence, explored some novel initiatives in the areas of weather updates, financing and insurance options available for farmers and discussed the current limitations and possible solutions in this respect.

Session 3: ICT in Empowering farmers through better communication and knowledge sharing

The small fragmented Indian farmlands have been a stumbling block in being able to provide inputs that are very specific to a farmer. However, over the last few years, several new ideas are being implemented that look at getting the farmers to supply some of the data relevant to a specific farmland, and using that to generate recommendations accordingly. There have also been attempts to build and analyse big data to lead to models that can help move to precision farming. Getting across reliable information to farmers in the form of crop advisory, fertilisers, weed and pest management, opportune time for harvesting based on prevailing market conditions can improve both productivity and profitability and minimise losses for the farmers. At the same time, owing to legacy issues, it is a difficult proposition to communicate information to farmers effectively and collect accurate data from/about them (and their agriculture). In this session, we explored some initiatives that have succeeded in reaching farmers through the use of technology-aided media and tried to understand the challenges involved.

Session 4: ICT in improving efficiency of the Ag Supply Chain, market access for farm inputs and post-harvest to benefit farmers

The entire food chain from the field to our plate is a long one. This is also true for the farm inputs which are needed by the farmers. As someone put it aptly, the farmers buy all their inputs from a retailer at retail prices individually while sells the produce, also individually, at wholesale prices. Thus, there is ample scope for improving the market dynamics for a better deal for the farmer. A lot of initiatives are harnessing technology to solve this issue for farmers; this session explored the possibilities in this area and the challenges involved.

In this paper, we first list the summary of the discussions across the sessions and then conclude with salient points that emerged from the discussions.

Summary of the discussions:

While there were 4 sessions which were based on identified themes, over the course of the roundtable discussions, it was observed that there is a lot of interconnectedness in agriculture issues across the themes and thus the discussions in all sessions also encompassed views cross-

cutting the themes. Hence, the summary of these discussions across the 4 sessions is presented in this section.

It was agreed at the beginning of discussions that ICT reduces transaction costs both in terms of time and money and thus it is a worthwhile exercise to try and understand/implement ICT solutions in agriculture wherever and in any manner possible. At the same time, to ensure sustainability of these solutions, business models have to be developed. But as far as agriculture extension is concerned, it is still considered as a state responsibility to be available free of cost and consequently, development of business models which would require farmers to pay is an extremely uphill task.

So far as farmer needs go, videos, community radio and Kisan Call Centre (KCC) are enabling extension activities in some regions. Except the Kisan Call Centre, these initiatives, however, are in specific geographical regions and are championed by non state organisations and serve limited farmers. KCC model, where the farmers call a telephone helpline number, is the largest such model in the world and thus, need and demand for information is established. But till now, given the size of the exercise, appropriate analysis of farmer queries to further sharpen the focus of the exercise is missing. In this context, models that forecast disease/fungal infestation probability depending on weather conditions are required but not available; for example, sulphur deficiency is widespread and related input availability is also lacking. Due to above mentioned factors, it follows that extension and input availability is also not correlated. As far as Soil health cards (SHC) re concerned, soil health data is available based on grid-basis but the processes are still evolving towards reliability. Particular mention was made of widespread micronutrient deficiency, but there is deficiency of data on micronutrients at individual level and SHCs don't cover such specific micronutrient data at the individual plot level. Thus, generation of specific advisory at a plot level becomes difficult and no scope for a business model exists. This is because farmer can be motivated to pay for demand driven extension; farmers will pay if they get specific and expert advice for their farm/crop but won't pay for generic stuff. Relevant ministries of the government operate portals that provide advisory and information services on administrative unit basis like the District level and generally upto block level. Thus, farmers don't generally directly access/benefit from these portals; the extension agents and KCC executives access these portals more frequently to answer farmer queries. One of the suggested course of action for public extension in this matter was the need to re-train extension staff so they are also cognizant of micronutrient status along with the widespread and more common NPK approach.

Weather forecasts are very important for farmers but still now good quality weather forecasts that are local enough are still not available. Frequent queries in the KCC system include queries on short term weather forecasts (next 2-3 days), and hence it establishes the point noted above about importance of accurate weather forecasts. Fully automated and localised (at Gram panchayat level) weather data collection and forecast dissemination through ICT (sms, website,

call centre) in Karnataka by Karnataka State Natural Disaster Monitoring Centre (KSNDMC) is a notable example in this regard.

Certain startups, having business-to-business models, that participated in the discussions shared their experiences stating how difficult it is to convince farmers to pay for 'soft services' like agronomic advisory/ data based advisory. In fact, it is especially difficult to get farmers to punch in data required for analytics. Further, it is extremely challenging to make farmers act on advice even if they receive advice. It is quite a gradual process, and hence difficult for a startup to remain invested in such initiatives for the long gestation periods given the huge economic implications. To add to the complexity of the situation, digital information generated so far from available tools don't lead to generation of specific agronomic advisory which can be effective for individual plot level in the Indian context of extremely fragmented holdings. Thus, individual farmer level diagnostics tools are not possible to be generated only through sheer digital data and this remains an area where much more work is required.

As we have already observed, targeting an individual farmer in the context of agri-advisory services is a challenge. To bypass such issues, platforms are developed to serve groupings of farmer like Farmer Producer Organisations/Companies (FPOs/FPCs) to harness the benefits of economies of scale. Data collection is also eased when dealing with a medium, which then deals on its own with individual farmers. Satellite imagers and available technology can aggregate geographical clusters like a village and give some macro and generic information but plot specific and crop specific information that is accurate and usable is still limited through such technology. For more specific and higher resolution images, cost is still prohibitively high. At the same time, it was also pointed that FPOs will not have much traction in MSP crops/ areas. Also FPOs are smaller in size, for really scalable interventions, working with cooperatives is a must given their large member-base, uniformity in spread and the data available with them.

Some organisations working in technology-aided extension admitted that productivity had gone up due to the dissemination of improved package of practices but in spite of the increased productivity, farmer incomes were not going up. They attributed this to the fact that while their intervention targeted aspects of package of practices and the production practices, they were not covering the marketing side, i.e., post-production aspects. They informed that their organisations then had to design interventions on the marketing side to address the income aspect.

In the insurance sector, Kharif 2018 onwards, Pradhan Mantri Fasal Bima Yojna (PMFBY), the flagship agriculture insurance scheme in the country has transitioned to a fully digital platform as far as enrolment of farmers for the scheme is concerned. It is now also possible for rural insurance brokers to instantly onboard farmers for PMFBY even on the farmer's plot or more frequently in the village itself and receive payment , provide them payment receipt and proof of their enrolment. These players are working on analytics of the data thus generated to

arrive at risk profiles of individual farmers and assigning credit score to them individually. The business model in this process involves sharing with financial agencies the credit score of farmers for a quick assessment of the credit worthiness of the farmer to advance loans and other financial products. Again, given that agriculture insurance sector is regulated, there is little in terms of data that is available for such product development and the complexity is increased because financial data is involved. Further, resistance of organisations to new technologies, which may require them to adopt new processes, is another factor that hinders the progress of such initiatives. Another related challenge here is that organisations are not ready to substantially collaborate to the extent that requires them to trust each other specially with respect to emerging technologies.

Along with the above, as already mentioned, marketing aspects in agriculture remain a critical weak link to ensuring farmer prosperity. The post-harvest value chain remains long and the farmers often do not get a fair share of the value paid by the end consumer. Despite increased procurement by state and central government agencies and private sector players, the vast majority of the farmer finds himself at the short end of the stick. Ensuring a fair share of the value to the growers will also ensure that govt efforts to improve their lot, does not require special efforts to identify tenant farmers to subsidise; all current efforts go into subsidising land owners even if they do not cultivate and only collect rent. Thus, naturally a lot of the discussions focused on procurement of produce from the farmers and it was identified as an area where it was strongly advised to initiate ICT interventions to make things transparent and more convenient for farmers. In the discussions, procurement implied and included value addition, grading, sorting, assaying so that farmers receive an increased price, and was not confined to procurement undertaken by the government under the assured minimum support prices (MSP) only.

Another important thread of discussion was around participation of farmers and factors affecting their motivation to engage with ICT initiatives. It was highlighted that farmers are receptive to technology and market trends if they perceive economic benefit to themselves; given the crisis situation in agriculture today, it is not realistic to expect the farmer to engage or bear costs in any manner for which tangible economic benefits cannot be expected in a time bound manner; for example, it is not practical to expect a farmer to change his package of practices just to prevent climate change. If tangible economic interest of the farmer is assured via either lower input cost, higher realisations or any such initiative, farmers will welcome it wholeheartedly. It was pointed that in some cases, online/app based solutions were generally positioned to sell inputs to farmers so that they receive genuine quality at better prices or to buy from the farmer again assuring some improved prices. In a sense, this is different from an approach in which the farmers are active participants and stakeholders and making decisions as per given conditions using data and analytics. Herein comes the role of human interaction and the trust factor in initiatives. Thus, hybrid models of physical human intervention alongside digital, which are being practiced, were also highlighted but the economic sustainability of

such models is again work in progress. The discussions agreed that some human interface enhances the trust factor, acceptability and is thus essential for dealing with farmers and hence purely digital only interventions have so far had limited impact. Digital only media like sms, ivrs, work well as reinforcement mechanism towards pre-existing communication, which involved human interface.

Institutional challenges in Indian agriculture were also discussed. It was expressed that technological solutions cannot be very successful if they are not preceded by institutional solutions. Such institutional changes can actually place the agriculture sector in a state of readiness to embrace technology. The most common and an easy manifestation of institutional challenges is the lack of a key and foundational database with details of Farm Identification, Farmer Identification and mapping of the crops grown by the farmers (an Indian AgriStack). In fact, even at the state level, only very few states like Karnataka have a database of all land records identifying land ownership at an individual level and are trying to build on it through efforts to map the crop being sown etc. and providing individualized best practices etc., as possible, through ICT tools. In fact, Karnataka K-GIS project Parihara (combined with their Bhoomi land records portal and the Sujala[1] watersheds project) makes a close to full range of data collection and data organization and could serve as a template for other entities to emulate.

These institutional bottlenecks coupled with an unabashedly political lens have harmed Indian agriculture and stalled much needed reforms so that Agriculture can leverage capital, and hence technology, and also markets. The lack of robust databases hinders any serious reforms on the subsidies, financing and information through ICT. However, it was also pointed out that the call to double farmers' income at the highest levels of the government provides a benchmark to measure interventions and hence is likely to spur creation of robust databases. Such databases can spur innovation, increase efficacy as well as efficiency of agricultural processes, contribute in the development of scientific decision support systems for farmers and also help with better market intelligence for production planning. But even considering that all the above are achieved, some aspects, like the issue of land leasing are not amenable to easy solutions in India, and hence ICT solutions are not feasible due to the associated history and the structure of laws in India, in such matters.

[1] The State of Karnataka developed a landowners' database under its Bhoomi Project, over a decade ago. It is now implementing a Land Resource Inventory (LRI) for site-specific planning and development of watersheds on scientific basis, under Sujala-III project sponsored by the Watershed Development Department of Karnataka and funded by the World Bank, in 11 districts covering 9.66 lakh ha across 2531 microwatersheds covering 7.02 lakh households in the state.

Conclusion:

There are a lot of pilots addressing the issues given above but are limited to pockets of the country and show a lot of duplication of efforts by the various parties involved (like input suppliers, govt., insurance companies etc.) and much of the data is suspect. Around 500 startups are working on different aspects of the agricultural value chain including horticulture. However, these startups being technology savvy, they are bringing more process structure and orientation to the sector as compared to core agriculture knowledge. Moreover, present business models of startups are addressing high value, exotic, export oriented crops where there are higher returns. The conclusion that emerges from these aspects as and which was articulated directly during the discussions is the need for an entity/ initiative/ platform that brings them all together, in a sense, for knowledge sharing, collaboration and co-operation which breaks the present silos in which these standalone initiatives find themselves. The platform can help in building of credible databases, facilitate making these databases open and transparent that will spur innovation and save costs. There was however, some disagreement on the role of the government towards this particular grouping/ platform; some participants favoured an active government role but an overwhelming majority expressed that government should limit itself to funding and policy space and not venture into controlling the startup and innovation space in the agriculture sector.

For data issues, there was complete unanimity in the need for an AgriStack on the lines of IndiaStack, an open and public database (of course with adequate individual privacy protection) that covers Farm, Farmer and Crop level data so that ICT initiatives can take off in a meaningful sense and save costs, include the deserving but hitherto unincluded farmers and thus benefit all farmers in the Indian agriculture sector.

India is now a food surplus nation and efforts to improve yields need to be supplanted by efforts to reduce cost of cultivation to improve returns to farmers. ICT can help to reduce transaction costs throughout the value chain. A project like ours, it emerged during the discussions, is timely and well poised to steer initiatives that are needed in this respect.

Appendix 1

List of participants (in alphabetical order of first name of the participant):

1. Mr Abhilekh Paul, Precision Agriculture for Development (PAD)
2. Mr Abhishek Beriya, TERI
3. Mr Ajay Jakhar, Chairman, Bharat Krishak Samaj
4. Dr Baskar Reddy, Syngenta Foundation India
5. Dr G S Srinivasa Reddy , Director, Karnataka SNDMC
6. Mr Gagan Pal, EM3 Agriservices
7. Dr Ganesh Shrotriya, Green TV India
8. Mr Gaurav Vats, ISAP
9. Mr Girish Aivilli, Intellolabs
10. Mr Hemendra Mathur, BIF
11. Dr Nirupam Bajpai, Columbia University
12. Mr Nitin Puri, Yes Bank
13. Dr P K Bhattacharrya, TERI
14. Mr Pravesh Sharma, Kamatan (Sabjiwala)
15. Mr Raghav Batra, Farmguide
16. Dr Ram Fishman, Tel Aviv University (through video conferencing)
17. Mr Ravinkumar S , TCS
18. Mr Rishabh Garg, Gramcover
19. Mr Rohtash Mal, EM3 Agriservices
20. Mr Saurabh Sharma, Cropin
21. Mr Shalabh Nigam, InfoEdge India Limited
22. Dr Shantanu Ganguly, TERI
23. Mr Sudarshan Suryavanshi, ISAP
24. Dr Vijay Modi, Columbia University
25. Mr Vinay Kumar, Digital Green
26. Ms V N Saroja, Agriwatch and Consultant to the project