An Assessment of Information and Communication Technology (ICT) based Knowledge Management project opportunity in India

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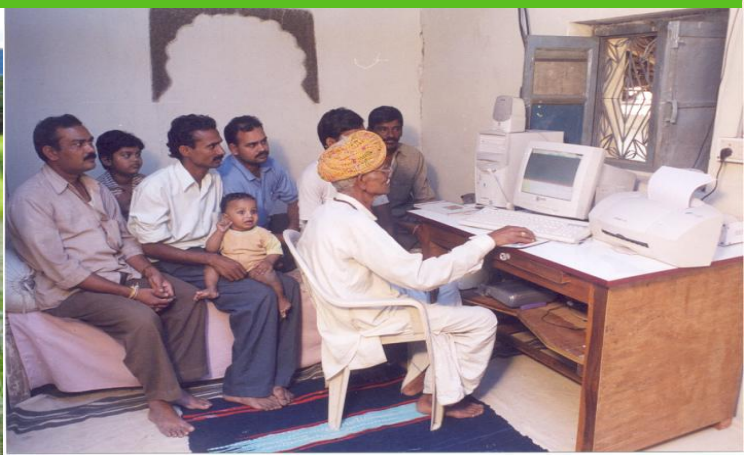

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A brief background of Agriculture in India

Agriculture contributes 25 per cent to the GDP of the country and is a key sector of the Indian economy, providing food security to the population, major employment opportunities to the rural population and consequently, a large domestic market for manufactured goods. This sector also accounts for 13 per cent of India's exports. Initially agricultural activity was confined to the production of food grains and a few cash crops such as cotton, sugarcane and jute. In recent years there has been a remarkable change in the agricultural scene, including increasing diversity in a range of products and greater sophistication with the creation of critical infrastructural facilities like cold storage, refrigerated transportation, packaging, quality control etc. This sector is now poised for a leap with the introduction of new technology like IT and biotechnology.

The regional spread

Distribution of major crops across the states provides a useful guide to the dynamics of Indian agriculture and the potential of the rural sector.

Food crops:

West Bengal, Uttar Pradesh, Andhra Pradesh and Punjab are the major producers of rice. Uttar Pradesh and Punjab together constitute around 50 per cent of the total output of wheat. Rajasthan, Gujarat, Maharashtra and Karnataka are the biggest producers of millet.

Cash crops:
Madhya Pradesh, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka and Uttar Pradesh are the leading producers of oil seeds. Uttar Pradesh is the largest producer of sugarcane and West Bengal produces more than three quarters of the jute. Tamil Nadu has the largest number of tea gardens, followed by Assam. The largest contributor to milk production is Gujarat, while floriculture and horticulture are dispersed widely across the states. On the whole, Uttar Pradesh is the largest contributor to the agricultural GDP followed by West Bengal, Andhra Pradesh, Maharashtra, Karnataka and Punjab.

India - A brief perspective

- ☑ India is the second largest producer of rice and wheat in the world; first in pulses and fourth in coarse grains. India is also one of the largest producers of cotton, sugar, sugarcane, peanuts, jute, tea and an assortment of spices
- ☑ In terms of the real value added, the Indian agriculture sector ranks third, after China and the United States
- ☑ The share of agriculture in the total value added to the economy, at around 25 per cent, is still quite high. This implies that agriculture is likely to remain a priority, both for policy makers as well as businesses, in the foreseeable future and any move to ramp up the sector calls for a multi-pronged strategy
- ☑ In recent years, there has been a considerable emphasis on crop diversification towards horticulture (fruits, vegetables, ornamental crops, medicinal & aromatic plants and spices), plantation crops (coconut, cashew nuts and cocoa) and allied activities
- ☑ Creation of critical infrastructure for cold storage, refrigerated transportation, rapid transit, grading, processing, packaging and quality control measures open major opportunities for investment.

A brief background of ICT projects in India:

Since 1993, around 70 ICT projects have been targeted towards meeting the needs of rural development and agriculture, with 16 projects started during 1993-2000 and 54 projects started during 2001-2008. It is easy to see therefore the growth in the number of projects started during 10th and 11th 5-year plans. This clearly shows growing interest and importance of ICT as a key development tool.

Of total 70 ICT projects, 20 are exclusively sponsored by corporate sector. Of the remaining 50, 29 are government sponsored and 21 are through International development agencies and private public partnership.

Hence there is a strong commitment and interest in the corporate sectors for ICT projects in agriculture sector.

The application of information technology (IT) in agriculture is usually associated with markets in developed countries and capital intensive methods of production. However, its relevance to the rural economy in a country like India cannot be overlooked. ICTs can effectively be used to disseminate technology, streamline the supply chain for food processing and other agro-industries, leading to better price realisation by farmers. There are many efforts underway which demonstrate the concrete benefits of ICTs for rural populations and the sector as a whole.

e-Choupals - the ITC experiment (www.echoupal.com)

An example of the successful application of IT is the e-Choupal experiment kicked off by ITC. ITC has designed and set up Internet kiosks called e-Choupals to support its agricultural product supply chain. The e-Choupals are totally owned and set up by ITC with the operators not having any investment or risk of their own. There are four kinds of e-Choupals tailored very specifically for four different products: shrimps, coffee, wheat and soybeans. The first two involve large commercial farmers and the focus is on creating Internet access to global market information in order to guide production and supply decisions. There are a few dozen of these e-Choupals at present. In the case of wheat and soyabean, since there are many small farmers, over 2,000 e-Choupals have been set up in several states. Soya e-Choupals, for instance, are used as registry points for procurement. Actual procurement is done at the factory and warehouse hubs but the initial logging in is done through the e-Choupal, which provides price information and thus price certainty. In fact, the e-Choupal price acts as a floor price for procurement, while the factory or warehouse price can be higher. e-Choupals can provide access to both local and global market prices on soyabeans and derivative products. In addition, they get access to operational information developed by ITC experts pertaining to cropping, seeds, fertilisers etc.The initial benefits of the ITC effort include a substantial reduction in transaction costs from 8 per cent to just 2 per cent. These gains are shared almost equally between ITC and individual farmers. The longer-term goal is to use e-Choupals as sales points for soyabean oil, tractors and eventually a range of ITC produced consumer goods. The use of IT is just a

> “Rural India accounts for a market worth $27 billion. No wonder even MNC-s have cottoned on to the idea of a resurgent rural India.”

Corporate India and Agriculture

A survey by the National Council for Applied Economic Research, India's premier economic research entity, recently confirmed that rise in rural incomes is keeping pace with urban incomes. From 55 to 58 per cent of the average urban income in 1994-95, the average rural income has gone up to 63 to 64 per cent by 2001-02 and touched almost 66 per cent in 2004-05. The rural middle class is growing at 12 per cent against the 13 per cent growth of its urban counterpart. Even better, the upper income class — those with household incomes of over Rs one million [$22,700] per annum — is projected to go up to 21 million by 2009-10 from four million in 2001-02. It will have a 22 to 23 per cent rural component.

All this potential has got India's big business houses rushing to enter and expand rural businesses. Telecom czar Sunil Mittal, chairman of the $2 billion mobile telephony major Bharti Tele-Ventures, is an unabashed flag-bearer of the 'go rural' strategy. He is confident that the next 'explosive' phase of demand for cellular connections is going to come from the villages. In an interesting business diversification, he has tied up with the legendary Rothschild’s of Europe for a $51 million food processing venture and export of fruits and vegetables. “We can replicate our pre-eminence in IT outsourcing in agriculture and transform the country into a global food basket,” he points out. Mittal's initial investments include an agriculture research centre and model farm in Punjab.

The $17 billion Tata group has consolidated its rural operations. The group's two companies, Tata Chemicals and Rallis India, ran separate rural initiatives till 2003. Tata Chemicals ran a chain called Tata Kisan Kendra, which offered farmers a host of products and services ranging from agro inputs to financing to advisory services. Rallis, on the other hand, was partnering ICICI Bank and Hindustan Lever in offering deals to farmers that covered operations from the pre-harvest to post-harvest stage. In 2004, the two operations were merged and Tata Kisan Sansar, a network of one-stop shops providing everything from inputs to know-how to loans, was launched. Today, the Tata Kisan Sansar has 421 franchisee-run

centres in three states and reaches out to over 3.6 million farmers.

Like the Tatas, the $2.6 billion Mahindra group has successfully established a synergy between its current businesses and the planned rural forays Its retailing arm, Mahindra Krishi Vihar,has been instrumental in increasing the yield in Rajasthan & Maharashtra. Almost 80 per cent of the farmers registered with Mahindra have less than five acres land. We are making farming an attractive proposition through three basic guiding steps — growing what the market requires, improving the crop yield and decreasing the cost of crop production. The activities of Mahindra Shubhlabh Services have attracted the attention of the International Finance Corporation, the financial arm of the World Bank, which recently picked up a 27 per cent stake in the company.

The $1 billion Godrej group entered agri-business through a small animal feeds sub-division 30 years ago. Currently, it is a $227 million business

The $16 billion Reliance Industries Ltd, India's largest private sector company. Starting with a modest 200-acre medicinal and herbal plants garden in Navsari, Gujarat, the group plans to integrate this business with its bio-tech venture under the brand name ReliCare. Chairman Mukesh Ambani, according to reports, is now readying to get into agribusiness in a major way — with a reported war chest of $227 million — through large-scale contract farming of fruits and vegetables

Airtel has tied up with Indian Farmers Fertiliser Cooperative Limited (IFFCO) to reach farmers directly. Farmers will receive free voice messages twice daily on farming techniques, weather forecasts, dairy farming, rural health initiatives, fertilizer availability, loan information and market rates. Additionally, farmers can also call a dedicated helpline, manned by experts from various fields, to get answers to their queries.

Synopsis of research done in 2007-2008

The following ICT projects were visited by Sadie Rhodes, Barbara J. Ritchie (CABI UK, Egham), Sharbendu Banerjee and Lalit Saini (CABI South Asia-India, New Delhi) during 2007 & 2008

Name of Organisation/ Project (type of organisation)	**Principal Point of Contact**	**Title**	**Location of Office Visited/ Contacted**	**Area of Operation of Project**
National informatics Centre (NIC) (national government)	Dr BK Gairola	Director General	Delhi	Throughout India
TARAhaat (NGO/private company)	Satish Chohan Kunal Tyagi	Chief Operating Officer (COO) Brand Manager	Delhi	Northern and Central India
TATA Chemicals Limited (private company)	Laxman S Rathore Sanjay Naithani	COO (Agribusiness) Assistant Manager – Marketing Service	Delhi	Northern India
Green Foundation (NGO)	Dr SB Nadagouda	Project Director	Bangalore	Karnataka and Tamil Nadu (States)
Media Lab Asia (not for profit company)	Dr GV Ramaraju	Principal Research Director	Delhi	Andhra Pradesh (State)

Another organization, MS Swaminathan Research Foundation, was also contacted.

Outcome of the personal visits and meetings in 07-08

The NIC, TARAhaat, Tata Chemicals, the Green Foundation and the MSSRF all appeared keen to work in some way in order to enhance the information that they are currently providing, although links will need to be developed through further consultation.

Only some of the TARAhaat TKs provide agricultural information, and so this information could potentially be expanded upon and also disseminated to further centres. As TKs have computers (with or without internet connectivity) a stand-

alone package, potentially with the possibility of upgrading over the internet, for use by the farmers themselves, would probably be of most benefit.

The Tata TKVKs and TKSs do not have computers for the farmers to use themselves and so a package for use by those running the centres and by their agronomists and agricultural advisors may be of most benefit.

The Digital Green Project provides a lot of information regarding agricultural practices but pest and disease information appeared to be lacking. Once again, the farmers do not have access to computers and so a package for those running the project may be of most benefit. It may also be of benefit to the organisations to know more about other CABI services and products currently in existence, such as the Global Plant Clinic and the Crop Protection Compendium.

Outcome of the visit to MS Swaminathan Foundation in July 2008;
The localization of content through translation is most important because firstly that's the only possible way the foundation can disseminates content to the target audience and secondly for this most critical and perhaps herculean task, they solely depend on the well wishers. This point has been specially highlighted by Dr. Senthilkumar and Dr. Thiagarajan, many times and hence should be critical consideration factor in implementing any partnership program with MSSRF.
MSSRF has a very effective and well managed Knowledge dissemination system up and running for some 10 years now. They have very good practical knowledge and wisdom on how to manage and operate such system, which they have developed over the years. For any project implementation in ICT, this shall be a critical factor for success.

The compendia and the GPC concept have been very much appreciated by both the senior level and the grass root level members of MSSRF. In fact the people at VRC & VKC were quite exited thinking that such thing shall be implemented in near future. The GPC concept can also be implemented as a self sustainable model where people will be trained to be a 'Certified Plant Doctor' (by CABI) and then they can run their own clinics in the villages as any other doctor or paramedic. MSSRF has already started experiment in this line by training up village youths in to cryogenic insemination and other high priority vet applications. I think combining all these, there might be completely new profession evolve for the rural people in India.

Proposed theme areas for further development

A. **Information Centre model**: Physical village centres are developed to get the target audience; usually rural farmers, on a common platform and disseminate various information, organize skill enhancement programs, share experience etc. This is a reinvention of Krishi Vikas kendra's run by government, but with broader scope and objective. The key strength in this model is that actual contact between farm and lab can be established and farmers can be trained in various skill sets. However, because of its human resource and capital intensive nature, long term self sustainability of the centres are still a question.

B. **Mobile Telephony based knowledge dissemination Model**: This concept is riding on the huge 300 million mobile subscriber bases in India out of which around 40 million is rural subscriber, and they are growing at a CAGR of 47%. Hence most wireless service providers have some vested interest in this model as to have a competitive advantage in capturing the large untapped rural population of India. Basically these kind of projects offers three services; text message based news and alert services, multimedia based agro-advisory service and call centres to answer farmers' queries.

C. **Social Entrepreneurship model (Self Sustaining franchisee):** Here the brick and mortar infrastructure is being provided by a village entrepreneur and the objective is to generate income for the entrepreneur apart from social service. The services offered here is multi-dimensional, agro-advisory being a part of it. The franchisor company, which is generally into agri-business as well, provides the technology, mentorship and in some cases marketing support.

Business opportunity

In a study by Dr. P. Chandrasekara, Deputy Director (Agricultural Extension), National Institute of Agricultural Extension Management, Hyderabad-India, some revealing statistics points out to the growing interest and inclination among the various stakeholders in Extension System in India, towards privatization and for profit operations;

☑ **Attitude and preferences of scientists**

Good number of scientists (50 percent) had favourable and 22.5 percent had most favourable attitude towards privatization. The favourable attitude of higher proportion of scientists is attributed mainly to the following positive aspects of privatization. Scientists felt that going privatization is expected to ease the financial burden of government, enhance the over all efficiency of Agricultural extension system, provides need based advisory services and farmers are more committed to the services (Shivalinga Gowda and Saravanan, 2000). The findings are also supported by the outcome of the study conducted by venkatkumar et al (2000).

☑ **Attitude and preferences of extension workers**

42.8 percent of the extension workers preferred privatization of all crops (Venkat Kumar et al, 2000). Majority of the extension personnel (66.67 percent) were convinced about the advantages of privatization of extension services (Hanchinal et al, 2000).

☑ **Attitude and preferences of farmers**

Most of the farmers (76.59 percent) had favourable attitude towards privatization. The seed production activity of Agri-business firms changed the socio-economic conditions of the farmers in the study area and this fact influenced the farmer's attitude towards privatization. Large majority of the farmers were willing to pay for the technical services rendered in the area of seed production (89.92 percent) followed by irrigation technology (56.67 percent), flowers (56.67 percent), fruit crops (55 percent) and vegetables (52.08 percent) (Hanchinal et al, 2000).

An interesting study conducted by Sulaiman and Sadamate (2000) in three states indicated the following results.

1. Input dealers, relatives / friends of farmers, newspapers and farm magazines are the important source of information consulted by farmers for making decisions in Agriculture out of 22 sources existed.

2. **Almost half of the farmers expressed their willingness to pay for extension services. The reasons may be**:
a. Farmers are shifting from food crops to non-food crops.
b. Non-food crops involved high investment and needs information which majority of the time not available in Department of Agriculture. Farmer look for other agencies and ready to purchase information, which is vital to make profit.

The various extension systems currently operational in India are;
- ☑ First-Line Extension Education System (ICAR/SAUs)
- ☑ National Agricultural Extension Service-Krishi Vigyan Kendra
- ☑ Special Extension Programme on specific crops
- ☑ Rural Development Programmes and Extension Programme of Non-Governmental Organizations, each having its own mandate on poverty eradication (MSSRF, TARAHaat)
- ☑ Extension Service provided by commercial organization as a Forward Integration of their business (TATA Chemicals) or backward integration (ITC , DCM Shriram, MCX, Hindustan Unilevers)
- ☑ Extension service as a for profit business venture IFFCO Kisan Sanchar (IFFCO Airtel JV), Reuters Market Light (Thompson Reuters.)

Among these public and private extension systems the following limitations have been discovered in the public extension system;
1. The extension worker: farmer ratio is very wide in India i.e. 1: 1000. The ratio further widens due to;
a. At least, 25 percent of extension workers are administrations / supervisors who are not directly in touch with farmers.
b. With remaining extension workers, at least 50 percent of the time goes for administrative work, official correspondence, reports and travel to reach villages.
c. Excluding the leave period, holidays, an extension worker attends office for about 250 days in a year.

2. Educational background and professional expertise of village level extension worker (VLW) – There are many qualified persons employed in different positions in agriculture and other line departments, but the person who is in direct touch with farmer is VLW. The ICAR (1998) report states that out of 110,000 extension staff, only around 20 percent are graduates. In this context, transferring the emerging technologies to the poor and illiterate farmer at village level is a challenging task.

3. At present the role of VLW is confined to providing advisory to the process of production. But, the fate of the farmer is decided later i.e. in processing and marketing in which VLW has limited role. Advisory is confined to recommendation of technologies but about of inputs, information on price and infrastructure for storing, processing is left to the farmer, which is more crucial. The VLW is responsible to provide information but not accountable to the consequences. Due to lack of accountability, the farmer owns responsibility to his fate. To that extent the importance of extension worker is reduced in the eyes of the farmer.
Hence there is a growing interest among farmers for paid service from private for profit extensions and considering the fast growing rural economy of India, this is indeed a lucrative business opportunity.

A study by NCAP in 2000 reveals the following statistics on various services for which they are willing to pay;

SL. No	Services for which farmers are willing to pay	% Positive Response
1	**Advice to solve specific problems in the field**	**53.6%**
2	**Advice on plant protection measures**	**22%**
3	**Training programmes / study classes**	**23%**

These shows two opportunity areas have maximum potential for “for profit” venture in extension service.

1. **Technical Capacity building in production and post harvest management**
2. **On demand information dissemination. Farmer’s Query Answering service**

The NACP Study also have some interesting statistics on how much the farmers are willing to pay for advisory fee;

Amount in INR, farmers are willing to pay	% of farmers willing to pay
10	**27.3%**
20	**11.2%**
25	**30.2%**
50	**21.0%**
100	**10.3%**

So the majority of the farmers are willing to pay INR10 to INR25 (31p. approx.). Considering average land holding as 10 ha/farmer, the cost per ha farmers willing to pay is 3.1p.

India has some 200 million ha of agriculture land and 70% of this is marginal to small holding. Let's assume that this segment is the most prospective consumer for agro-advisory service. Existing agro-advisory services like BT life line or Reuter's market light receive on an average 1.64 instances of utilization of service per farmer/per month. The trend is nevertheless fast growing as the services are getting spread over and its utilities are being realized by the farmers.

However even with the present average of 1.64 no. of services/farmer/month, the market size works out to be £85.41 million per annum and with 2 no. of services/farmer/month it will be £ 104 million per annum. The market will grow as the farmers will use the service more.

In the past 2 decades, there have been significant improvements in the R&D facilities of the State and Central Agriculture Universities as well as ICAR research centres. The World bank funded National Agriculture Technology Program (NATP) has been catalyst to this development. Hence India's dependence on external scientific talent to conduct field-research has been and would be continuously decreasing. On the other hand, during 10th and 11th 5 year plan, significant emphasis has been given on digitalization of knowledge, bridging the rural digital divide and developing effective last mile communication. The Government of India would be spending some £765 million in National e-Governance Plan (NEGP) to develop single window information centres in 600,000 villages through PPP. These centres will evolve as the centre of knowledge dissemination for rural population and would bridge the rural digital divide.

A further £667 million will be spent on the National Mission in Education through ICT, which will focus on digitalization of educational resources and networking of education institution.

Considering these facts, the business development opportunities occur in the areas of;

- ☑ Digital Content Development (agriculture extension)
- ☑ E-learning
- ☑ FFS (Plant Doctors' Training Course)

Digital Content Development:

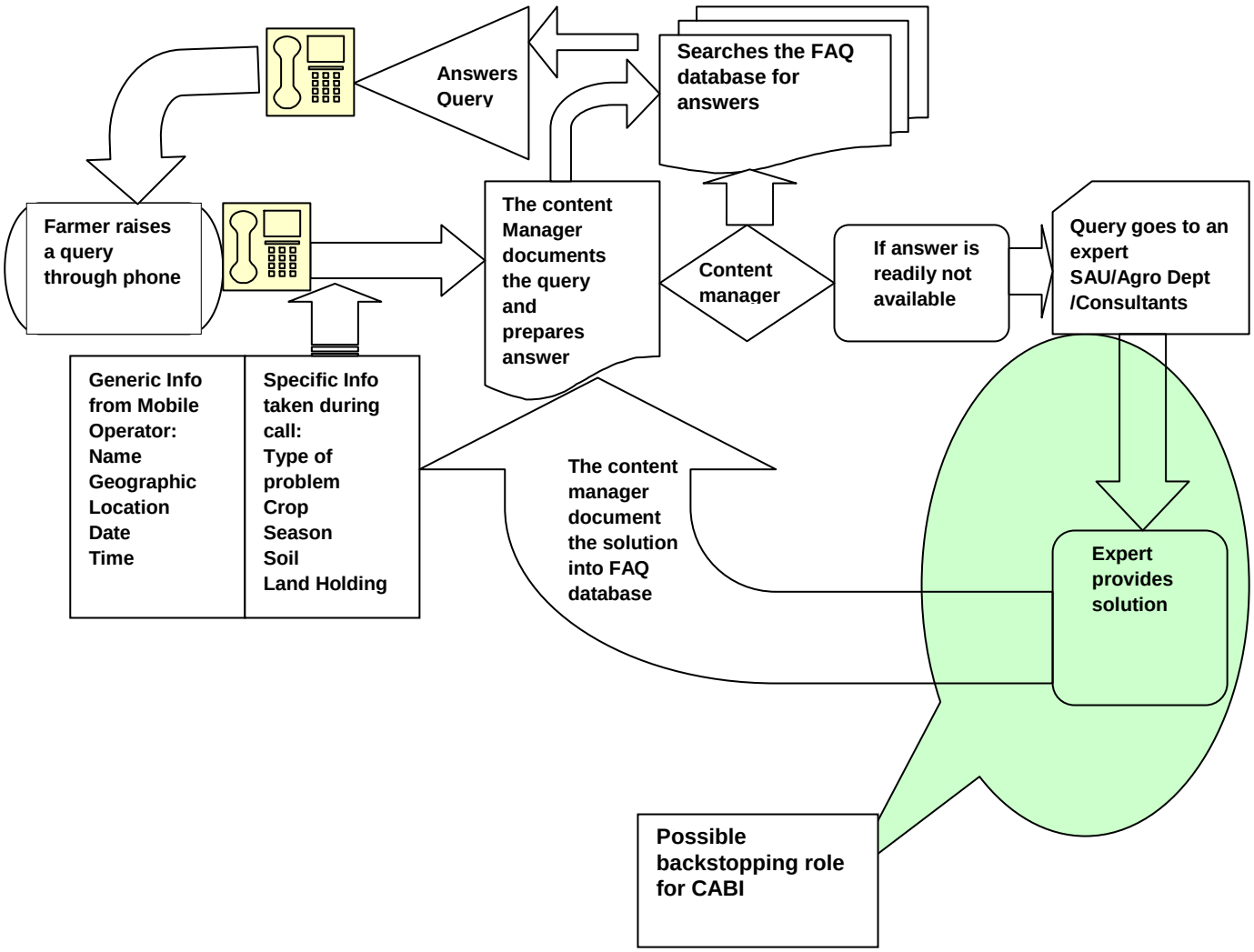
The £105 million market for agro-advisory service has two components;

1. Capacity building at extension level
2. Farmer's query answering

The second component is the easier to implement and has been found by the commercial organizations most lucrative. The reason is that;

1. Farmers do not always have access to internet
2. Mobile telephone penetration in rural India is high and fast growing. Hence it gives the widest reach to the service
3. Farmers may not be comfortable or knowledgeable in using internet, but using mobile phone to register a voice query is easy.
4. Mobile telephone can be used for voice, text or picture (even video clip) transmission making it a multipurpose tool.
5. ARPU is continuously decreasing as competition among telephone companies are increasing. The only way to improve ARPU is by improving Value Added Services usage by customer and for rural customers the most attractive and necessary Value addition is agro advisory.
6. As the mobile telephone infrastructure is well developed across the length and breadth of the country, scaling up services is very easy.

A typical Mobile Telephone based agro-advisory service network diagram:



Possible role for CABI:

Backstopping expert advisor for the content managers.

1. Help content manager to develop natural language searchable FAQ database for the farmers' queries
2. Answer the unresolved queries
3. Prepare pests and diseases alerts for farmers
4. Provide global best practices and success stories to content manager for further dissemination as snippets.
5. Build pest and diseases maps from the farmers' queries and geographical, meteorological data.

Target Partners:

1. **IFFCO Kisan Sanchar Limited**: Already shown interest to start a pilot project
2. **Reuters Market Light**: Contact established and a concept note has been sent.
3. **Vodafone India**: A concept note has been sent to CSR department
4. **e-Krishi project by Tata Consultancy Services**. Contact established and a concept note has been sent.
5. **Life Line India (BT & One World SA)**. Currently obtaining expert advisory services from ISAP, but may switch to us if get a better result.
6. **Reliance Communication Infrastructure Limited**; The largest CDMA technology mobile service provider.

FFS - Plant Doctors' Training Course

The second most important choice of the farmers' regarding paid up extension service is Training programs/study classes. However historically, the FFS has been a not so successful activity. Hence the effort is now not to bring the farmer to classroom but to take the class room to field that is to crate many agro-clinics.

The NABARD, MANAGE and DAC coordinated agro-clinic and agro-business project, is promoting this idea by providing bank loans to agriculture graduates up to £62,000 at a subsidized interest rate.

One of the off-shoot of NeGP project is also the agro-clinics since, agro-advisory has been perceived as one of the major source of revenue for the CSC-s created in NeGP.

Also, private sector seeds and pesticide manufacturing businesses have their interest in creating agro-clinics as the referral base for the products.

Currently, there are 50 official agro-clinic training institutes authorized by National Institute of Agricultural Extension Management, the apex body under GOI.

CABI could support these initiatives through developing a standardized, high quality training module for the agro-clinicians, in line of the Plant Doctors' Certificate Course. Partnership with agriculture universities or the National Institute of Agricultural Extension Management could provide certification of completion of these courses.

Target Customers

1. **SPANCO Telesystems**: This Company has already shown interest to start Plant Doctor's training course for the Common Service Centre franchises appointed by them.
2. **Welingkar Institute of Management Development & Research**, a premium private business management institute has shown interest in developing e-learning module for the Diploma in Agri-Business Management (DABM) course.

3. **MSSwaminathan Research Foundation:** MSSRF has already implemented a pilot in training rural youth I basic vet med practices. (ref Improving Income Generation in Rural India: ICT-trained veterinarians assist small farmers with livestock production, by Mark West Northwestern University, Center for Information & Society University of Washington, June 2008) They are interested to further expand this type of training activities to increase and empower village level knowledge workers through their own village centre network and **Jamsetji Tata National Virtual Academy for Rural Prosperity.**

4. **Grameen Suvidha Kendra (Multi Commodity Exchange of India and Indian Post joint Venture);** A concept note have been sent to them and they have shown interest for further talk.

5. **IFFCO Kisan Sanchar Limited:** They have shown interest to start a pilot project in West Bengal.

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