

**aAqua (almost all question answered), critical success factors
analysis and business model at Pabal and Baramati region.**

Project

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Master of Management

By

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Project approval sheet

Project entitled “**aAqua (almost all question answered) critical success factors analysis and business model at Pabal and Baramati region.**” by **Amit Agrawal (03927807)** has been approved for the award of Master of Management degree from the Indian Institute of Technology, Bombay.

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Abstract

Internet has become a powerful medium of information transaction which in turn results in a profound repository of useful knowledge. We have seen in the recent past with increasing internet penetration and rise in computer density has resulted the impact of net reaching into the rural parts as well. We have seen the success of ITC's e-Choupal model, e-Governance initiatives by various state governments has become a reality. This can be called as an era of digital revolution. However there are numerous such projects which are at present running or are in the pipeline, which raises the question to understand the dynamics that occurs in these project's life cycle.

This particular project on aAqua (almost all question answered) entails the detail study of the aAqua features, its scalability issues, and its field evaluation by field interviews and actual users' feedback

As part of the project, an evaluation of usage and impact of agricultural consultancy through aAqua was made. aAqua ('almost 'All 'questions 'answered) is an online expert Question & Answer based community forum, developed by Media Labs Asia, KReSIT, IIT Bombay, for delivering information to the grass roots of the Indian Community. It is an online, multilingual, multimedia, archived discussion forum accessible using a web browser, allowing members to create, view and manage content in their mother tongue (Hindi, Marathi etc). aAqua has extended the reach of experts at KVK, Baramati and has demonstrated great potential for local content creation by using the powerful medium of internet.. However aAqua suffers from the following limitations: slow rate of content creation and absence of commercial benefit for the kiosk operator in the present model. Scaling up of aAqua would require linking up with a greater number of experts and a commercial model at the kiosk level.

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List of Abbreviation

aAqua	Almost All Questions Answered
ICAR.....	Indian Council of Agricultural Research
ICT.....	Information and Communication Technology
IIT	Indian Institute of Technology
IT	Information Technology
ITC.....	Indian Tobacco Company
KReSIT	Kanwal Rekhi School of Information Technology
KVK.....	Krishi Vigyan Kendra
MIT	Massachusetts Institute of Technology
MLAsia	Media Labs Asia
NGO	Non Governmental Organization
RDES	Rural Development Education System
VIIT	Vidya Pratishthan's Institute of Information Technology
VoIP	Voice over Internet Protocol
WLL.....	Wireless in Local Loop
UN	United Nations

Introduction

Rural India and ICT

Internet has become a very powerful medium of communication and we see it in an ever rising path of growth and higher reach. No single technological revolution has changed the lives of current generations in the way that the Internet has. For example, it took at least a century before the printing press touched 50 million individuals. It took 38 years for radio to reach the same number, and thirteen years for television. The idea of having a world wide network and in turn an insurmountable amount of data, information and knowledge has truly changed the whole way of living and may be to an large extent the way human being could think and act. Never before has a communications revolution spread so rapidly. But at the same time we also see there is a clear divide generating between the internet-haves and internet have nots. Over the course of the last few years, statements affirming the need to close the so-called 'digital divide' between social groups with and without access to the internet have been made through several UN agencies, and at meetings of developmental organizations around the world.

The next wave of development in internet technologies and spread of internet technologies to all its stakeholders has to include the bottom of the pyramid part of the society who can be classified as the internet have-nots. The promise of digital development is that it might have the same reach as the original Internet boom of the mid 1990s – only this time the most deprived communities, those who had missed out on earlier waves of technology, might be able to catch up with their earlier counterpart or might actually overtake them. One of the greatest stumbling block for rural development in specially developing countries is lack of good infrastructure, lack of good human capital to work in this areas, low focus from the governments and administration for eradicating these problems, and this might be obviated by instant access to virtual institutions that provide banking, education, health care, neonatal information, agricultural advice, and so forth.

At the same time, questions are being asked if ICTs are the way to go in developing countries, such as those in South Asia, where most rural populations lack running water

and sanitation systems, electricity is still a scarce and intermittent resource, roads are poor and education a luxury. The value of IT for rural development is accompanied by this dilemma for decision makers and multilateral funding agencies: should the very limited resources for rural development be applied to developing IT capacities, or are they best used for other high priorities such as schools, hospitals, and dispensaries?

1.2 Background of the Project

India boasts of the maximum number of rural ICT projects. There have been a number of models like Gyandoot, ITC e-Choupal, n-Logue, Drishtee etc. A common foundation for many of these projects is setting up an entrepreneurial information kiosk/ Telecenter at the village level. Of these, the rural connectivity project of n-Logue Communications Pvt limited [ref sec for detailed business model] is the most interesting due to the following reasons: -

It is based on WLL corDECT technology touted as the low cost solution for rural connectivity in developing countries.

As on date, n-Logue has maximum number of operational project sites after ITC's e-Choupal.

In the year 2001, n-Logue, after its pilot projects in Chennai, launched two projects in Maharashtra, at Pabal and Baramati. The Local service partners for these projects were Vigyan Ashram, an NGO and VIIT, an IT institute run by Vidya Pratishthan trust of Baramati. The initial set of kiosks was established by subsidies from the Department of Agriculture for providing agricultural consultancy services through these kiosks. Presently, agricultural consultancy is being provided at these project sites through aAqua, a multilingual, multimedia question answer system for delivering information to grassroots Indian community developed by Media Labs Asia, IIT Bombay. Experts at Krishi Vigyan Kendra, Baramati, provide the answers.

A brief introduction to aforementioned agencies, involved in these projects, is as following.

1.2.1 About Vigyan Ashram

Vigyan Ashram was set up by Dr S.S. Kalbag in the year 1983 with a vision to train village school dropouts in rural technology so as to enable them to earn a living in the village itself. Named as RDES (Rural development Education system) the program targets the followings

- The Integration of development with education.
- To stimulate the intellect through physical activities.
- To broaden the horizon of experience of the students.
- To reverse the rural to urban migration and to give a multi-skill base for specialization.

In its present form Vigyan Ashram is developing content for education and the CDs made and distributed by them are extremely popular in Pabal region. Vigyan Ashram has developed CDs in the field of English speaking, MS Office, Internet , basic engineering etc. The system of 'Learning while Doing, in real life situation' adopted by Vigyan Ashram, involves doing community service work in real life as part of education. Thus students learn while doing development work, in sense development works gives the student opportunity to learn. Education and Development have been integrated In December 2001; Dr. Kalbag signed an agreement with n-Logue communications to bring wireless connectivity to Pabal region. As per the agreement Vigyan Ashram became the LSP for n-Logue projects in Khed (Rajgurunagar) and Pabal.

1.2.2 About VIIT

Vidya Pratishthan's Institute of Information Technology was established in February 2000 at Baramati with an aim to provide quality education in the field of Information Technology and Computer Science. The objective of Vidya Pratishthan trust behind opening the IT section is to spread the light of education among the students of rural areas of Baramati. More than 10,000 students have passed out from VIIT and its virtual centers. VIIT is also engaged in rural ICT projects like IVR based "Bazar Bhav" and

Telebanking, Smart Card application for milk Cooperatives, Computer on Wheels by Mobile Van and SETU. In order to augment its work in rural ICTs, VIIT took up the access center business of n-Logue.

1.2.3 **Media Labs Asia (MLAsia), KReSIT, IIT Bombay**

Media Lab Asia is the world's largest academic research program dedicated to bringing the benefits of new technologies to everyone, with a special focus on meeting the grand challenges in learning, health, and economic development.

The role of Media Lab Asia is to facilitate the invention, refinement, and dissemination of innovations that benefit the greatest number possible of the world's neediest people. Media Lab Asia works with industry, NGO's and governments, to take these innovations to various villages in India. Media Lab Asia consists of regional laboratories and participating grassroots communities. Every regional laboratory is formed around several core projects, each involving academic, industrial, and village community partners. Currently, there are three umbrella projects undertaken at Media Lab Asia - IIT Bombay. These are:

Interlingua - This project aims to develop a multilingual meaning based search engine which can take queries in the local language and return results to the same in the language of query. This project was initiated keeping in mind that most of the people in India are denied the huge wealth of information present on the web simply because they do not know English, the lingua franca of the web. Enabling access in local language is important to bridge the digital divide.

Tools being developed under this project: Agro-explorer, aAqua, Bhav Puchiye.

Interfaces for all - This project has been started to focus on design and evaluation of devices and interfaces for computer users. Issues surrounding usability of computers relating to non-computer savvy users and vernacular language computing are some of the first issues being addressed. Several efforts like the Key-lekh keyboard, Bhav-Puchiye (a tool for finding market prices for the agricultural produce for farmers), Tangible user interfaces, etc. are under way. In addition to this, the group also assists other projects in designing appropriate interfaces for their tools.

Tools being developed under this project: Tangible user interfaces, Indian language input devices.

Polysensors - Presently, the purity of water in our increasingly polluted environment can only be tested in laboratories using expensive equipment and highly trained technicians. This project aims at providing a low-cost and easy method of testing the impurities in water, with low-cost, rugged and tropicalized sensors

1.2.4 Krishi Vigyan Kendra (KVK), Baramati

The Krishi Vigyan Kendra is a district level Farm Science Center established by the Indian Council of Agricultural Research (ICAR), New Delhi at Agricultural Development Trust Baramati, District Pune for speedy transfer of technology to the farmer's fields. The operational area of this Krishi Vigyan Kendra comes under the western Maharashtra dry Zone. The aim of Krishi Vigyan Kendra is to reduce the time lag between Generation of technology at the research institutions and its transfer to the farmer's field for increasing production, productivity and income from the agriculture and allied sectors on a sustained basis. At present Dr Kadarbhai is heading the organization and has been one of the primary sources for this project in terms of her views on rural agricultural problems and trends. KVK has been on of the strongest pillar of aAqua as it is the core farm solution provider for aAqua and as well for continuous engagements in developing a farm knowledge repository. KVK has field experts as well academicians who are continuously involved in answering to the queries of farmers through aAqua, via phone, local FM network or personal attention at the center and sometime at the field level as well.

1.3 Project Objectives

The objectives of this project are: -

Evaluate the performance of aAqua, multilingual rural portal developed by Media Labs Asia , understands the users feedback on aAqua , understand its technical features, develop a scalability model and recommendations for the same.

1.4 Project Scope

The evaluation of aAqua is based on: -

- Survey of the kiosks center in Pabal and Baramati region.
- Survey by semi structured interviews of farmers which include both aAqua users as well aAqua non user farmers
- Analysis of 475 posts under the crop diseases, animal diseases and others section of the website

<http://www.projects.mlasia.iitb.ac.in/aquar/forum/index>

- Interaction with the experts at KVK, Baramati and farmer groups in different villages.

Details about aAqua, functioning etc have been taken from the following source:

<http://www.projects.mlasia.iitb.ac.in/docs/aAqua.pdf>

1.5 Methodology

As we intended to find the acceptance of aAqua among the users, the first touch point for users i.e. the Kiosk operators it was most important to interact with them directly. For this we visited the kiosks in Pabal and Baramati areas and also to the farmers in those areas and did thorough interviews with them which on an average lasted for 50 minutes with a

maximum of 2 hours and a minimum of 10 minutes time. The kiosks that we visited are under the access centers of n-Logue in 3 areas Pabal, Baramati and Rajagurunagar

With the help of the field engineers for these areas we obtained the details of these Kiosks and planned visits accordingly. Two sets of questionnaire were developed separately for kiosk operators and the other one for the users to conduct the semi structured interviews.

Before the visits to these areas we had thorough brainstorming sessions with experts in the field of rural ICT program and team dedicated to the aAqua projects at Medialab Asia so as to understand the basic ground on which these projects are running.

Some of the people we interacted for this are

- Dr Krithi Ramamritham , Head , Kanwal Rekhi School of management, IIT Bombay
- Prof Atanu Ghosh ,faculty for Strategy and Marketing at Shailesh J Mehta School of management , IIT Bombay
- Anil Bahuman, Project Manager , MedialabAsia
- Dr Ananth Krishnan , Consultant , Medialab Asia
- Rahul Swami, Field engineer , Pabal
- Shantanu Inamdar , Field engineer ,Pabal

The survey included in depth understanding of the problem faced by end users, facilitators of aAqua services (kiosk operators) , acceptance level of internet as a whole and services like aAqua via internet , technological problem like hardware ,software related problems , level of interests of Kiosk operators to run and propagate these kind of services etc were recorded and after an in-depth study recommendations were made .

During the course of the project we also interacted with the following people who are actively involved in aAqua

Dr Kadarbhai, Krishi Vigyan Kendra, Baramati

Mr. Bhavsare, IT specialist at KVK, Baramati

Mr. Paresh Degaonkar, Zonal Manager, n-Logue

Mr. Rajiv Ranjan, ICT specialist, UNDP

2. Literature Review

The agriculture sector is important for food security, employment generation and economic growth. However, concern has now been expressed on the decline in agricultural growth. Modern agriculture is knowledge-based, in which education at all levels; particularly higher education has an important role. An excessive emphasis on variety in the early stages of 'green revolution' did help in improvement of food grain production, but also became the cause of unsustainable agriculture in the absence of adequate science and knowledge base. Since agriculture is a vital sector in India, the end of isolation of agriculture and agriculture universities is the need of the time to make it interactive with multifaceted universities. The process for this change is discussed.

2.1 *Introduction and spread of technologies in agriculture*

We have seen several technologies spreading in India after independence. There was the introduction of radio and transistor in the fifties and sixties; then came television. There were refrigerators and air conditioners based on refrigeration, and now we see the spread of information technology. The fundamental difference between these technologies and agriculture is the emergence of a service sector for each of these technologies. Despite having several technologies, no independent service sector has developed in agriculture. There could be several reasons for this situation. First, the managers at different levels believe that public sector institutions already provide the necessary services. Could an extension worker from a block help in choice of an appropriate variety of crop according to the time, source of seed material, testing the seed for its germination, vigor and uniformity. Often a farmer depends on a local shop dealer, this can and does have disastrous consequences.

At least fifty grassroots projects are currently using modern ICT for development

in India as supported by Rajora Rajesh[2002]¹. Surprisingly, these projects have rarely been studied. Lessons learned in one project are not transmitted to others. Appropriate technologies are rarely evaluated. Central questions of financial sustainability, scalability and cost recovery are hardly ever addressed. So, opportunities to learn from the diverse, creative Indian experience so far remain almost entirely wasted. The propositions listed below derive from an ongoing study of grassroots ICT projects in India.

2.2 Financial sustainability: The goal of financial sustainability is rarely achieved. Granting that initial start up costs have to be borne by someone, very few projects even plan for long-term sustainability, and even fewer achieve it as proposed by Bedi and Srivastava [2001]².

2.3 Scope of IT: IT should not be simply identified with computers and Internet. Some of the most inventive uses of IT involve radio, television, and embedded chips, potentially useful satellite inventories, etc.

2.4 Grassroots consultation: Starting by consulting at the grassroots is essential. Top-down projects simply do not work. These end up by providing information that people do not really need or use – at an incomprehensible level of technical detail and terminology, or in a literary language that local people do not understand.

2.5 Information uses: The information people initially say they need, may not always be what they end up using. In the M.S. Swami Nathan Pondicherry Project¹³, for example, male farmers originally said they needed information about agriculture. In fact, their largest single usage of village info-kiosks was to get information about government programs.

2.6 Standardization of codes: Bhatnagar and Schware [2000]³ documented that local language content is a prerequisite for any successful project. Much has been spoken and written about the problems of the standardization of codes and fonts for major Indian languages. The bottom line is that, despite many brilliant efforts, and despite widespread awareness of this problem on the part of the Government of India and of many state governments, every major Indian language suffers from multiple schemes of

coding and fonts. Hence, the absence of inter-operability between programs involving distinct Codes.

2.7 Development of locally relevant content: Its essential and the nature of that content vary from region to region. Without accessible, local content that addresses the real problems of local people in their own language, and in terms which they can understand, ICT for the common man projects are bound to fail. There is some evidence that radio programs, especially designed to appeal to ordinary people, may be more effective than computers in reaching people about topics like best agricultural practices, family planning services, etc. Almost 100% of the Indian population has access to radio; perhaps 30% has access to television occasionally, and well under 1% ,Keniston,Kenneth [2001]¹⁴ has access to the Internet and the web. Whatever the mode of communication, the need to present locally relevant information intelligibly both in terms of language and in terms of the level of explanation is imperative.

2.8 e-Governance: Is one of the most promising uses of ICT. In practice, it involves two distinguishable activities

- First is the computerization of government functions itself, as discussed especially by Andhra Pradesh. This proposes connecting the state government headquarters to district officials, computerizes registrations, legal proceedings, land records, state offices, etc. for the benefit of the administrators of the state. This type of e-governance also exists at the level of the central government; some years back, nearly all districts were connected via e-mail to Delhi. As supported by CRISP, NIC Delhi [2003]⁴
- Second as Keniston et al [2002]⁵ says, e-governance may mean government-to-people and people-to-government connections whereby citizens obtain direct access to records, rules, and information about entitlements that they need or want in their daily lives. Both forms of e-governance are difficult and costly to implement. These also run into strong resistance, since such methods eliminate middlemen and others whose jobs and incomes depend upon the relative inaccessibility of government documents.

2.9 e-Commerce: In the sense of customer-to-business on-line buying within India, is probably many years away for a majority of Indians. But the operational, internal computerization of small and medium businesses has already begun in the larger cities, with notable gains in efficiency. At the national level, the computerization of the railroad reservation system and the banking system are notable examples of Indian successes. If small business software packages were available in local languages, some observers believe small and medium size merchants in cities, towns and villages, adoption would be quicker.

2.10 Commercial funding: Commercially funded ICT networks have considerable promise. For example the Warana Project, CRISP, NIC Delhi [2003]⁴, though heavily funded initially by the state of Maharashtra and by Delhi, is currently maintained by the sugarcane cooperative in the area, and offers tangible benefits to sugar producers and to sugarcane growers. The E.I.D. Parry project in Nellikuppam, Tamil Nadu, Howard Sims [2001]¹³, expects advantages in terms of improved information to their producers about best agricultural practices. ITC-IBD has set up a large number of IT Chaupals for soybean; shrimp and coffee farmers with the goal of reducing the costs of production that currently go to middlemen. In such cases, commercial interests may justify the expense of establishing rural info-kiosks, which could in theory also provide much general information in addition to specific product information.

2.11 The limits of ICT: The market for indigenous crafts is a niche market in a few rich countries. Therefore, e-commerce from countries like India to Europe, the United States, or Japan has enormous logistic problems, Lind P [1991]¹⁵. It is not a realistic solution to use IT for total poverty alleviation but a tiny fraction of Indians. For example, the recent claim of one state government that millions of local women are to be involved in the export of local crafts turns out to be a promissory note that is likely never to come due. Furthermore, as Wresch [1996]¹² says if it does turn out that there is a big market in wealthy countries for an indigenous product, local craftsmen are almost always beaten out by industrial producers.

2.11 ICT gains: A successful commercial ICT sector does not necessarily trickle down to ordinary Indians. Proposals by state governments to develop IT Howard and Sims [2001]⁹ for the masses often place primary emphasis on developing software technology parks, improving education at higher levels of information technology, etc. These are laudable and necessary goals if India is to continue its astonishing growth rate in the ICT field. But there is little evidence that the growth of the software industry is reflected in improved living conditions, more schools, greater justice, better health, more jobs, or other benefits for ordinary Indians ,Keniston ,Kenneth [2004]⁶

2.12 Impact of technical decisions: Apparently technical decisions concerning IT regulation, bandwidth allocation, pricing mechanisms, transmission standards, etc,can have profound effects on whether or not information technologies benefit ordinary Indians as proposed by Schaur Thomas[2004].⁷ One case is the requirement that Internet service providers guarantee to cover an entire state. This effectively precluded local entrepreneurs from providing Internet connectivity in small and medium towns, unlike local initiatives that have helped spread satellite television rapidly in rural India. Analysis of the impact of technological decisions on IT for the common man is largely absent.

2.12 The wheel is constantly reinvented: One can identify at least four dozen grassroots projects in India. The people in these projects are not usually in touch with each other, rarely publish or write anything about what they are doing, and – if they are public officials - are constantly transferred. There is little accumulation of knowledge, not even the most preliminary kinds of on-the-site evaluation Sood Aditya [2003].⁸ so, there is little possibility of learning from the successes or failures of other projects.

2.13Credibility: One cannot believe a lot of what he or she is told. A number of projects that are publicized turn out, on a site visit, to have closed, or not yet to be in operation, or to have deteriorated from their stated original goals Schon,Sanyal et al[1999]¹¹. Wiring India: Until the costs of the last mile of basic IT devices, and of local language software are brought down, the goal of wiring India will remain unachieved, Saritha Rai[2001].¹⁰ Low-cost technological solutions alone are of course not solutions to the problems of development, but they are prerequisites for IT in India.

3 aAqua: Almost All Questions Answered

3.1 Introduction

a Aqua ('a'lmost 'A'll 'qu'estions 'a'nswered) is an online expert Question & Answer based community forum, developed by Media Labs Asia, KReSIT, IIT Bombay, for delivering information to the grass roots of the Indian Community. It is an online, multilingual, multimedia, archived discussion forum accessible using a web browser, allowing members to create, view and manage content in their mother tongue (Hindi, Marathi etc). It can be accessed at

www.aAqua.org

IIT Bombay created the software platform out of off-the-shelf open source components for the use of online question and answer service. aAqua has been used in the past to capture crop and animal related Q&As between farmers and experts at multilingual search features. aAqua provides content repositories, pictures, and multimedia, multilingual search and retrieval (almost all Indian languages are supported). Farmers, Kiosk operators and experts' profiles can be stored for transparency and ease of access. MedialabAsia has also developed the off-line version of aAqua which can be updated with the back-end intermittently so as to make optimal use of bandwidth.

3.2 Motivation and goals

Multilingual communication can help spread dissemination of knowledge which is extremely required for progress for all strata especially the bottom of the pyramid.. A large section of the society, particularly the rural populace, does not have access to the huge knowledge base acquired through scientific development through the centuries. There is certainly an urgent need to establish a framework for knowledge exchange between various communities & cultures. aAqua is an endeavor in this direction. The goals of aAqua are as following: -

- To create a multilingual communication framework.

- To provide a language independent knowledge database.
 - To provide an easy to use interface to accommodate even naïve users.
 - To provide easy and fast access to reliable information.
-
- Integrating the agricultural domain of aAqua with the Agro-Explorer group, which uses the UNL/MT* fundamentals for performing "Meaning Based Searches" through the available databases.
-
- This also includes media like voice to text, text to voice, videos, pictures, and images for non-literate or semi-illiterate people.

* Universal Networking Language developed by Professor Aniruddha Joshi, IIT Bombay at Center for Indian Language Translation (CFILT), IIT Bombay.



Fig 1 aAqua Home Page: www.aAqua.org

3.3 Key Enabling Features

3.3.1 Use of Multimedia: The system is designed to cater to the needs of rural users to express themselves to each other as well as to the outer world. Their inability to articulate their thoughts using the input devices commonly available is overcome by use of images instead of text, building on their rich visual vocabularies to communicate.

3.3.2 Users are the consumers as well as producers of the content: aAqua eases the creation of content i.e., text, images, short audio, video and animations, thus helping the users move from being passive consumers to active content creators. This is illustrated in Figure 5.1. The community has created more than 90% of the current English, Hindi and Marathi content of aAqua locally.



Figure 2: An annotated sample screen shot of aAqua

3.3.3 Assistance in creating content for aAqua is provided by kiosk operator. This takes the technology to users who are unfamiliar to computers and often not literate. They can now experience the Internet as well as participate through it. This is a great motivating factor for people as it showcases the benefits of using a computer in their everyday lives. An end user can select the category and the specific forum with which she wants to interact, or from which she wishes to view posts.

3.3.4 Use of Avatar: The user can choose an avatar, either from built-in avatars or upload his/her own avatar (jpg/gif/png). This has been observed to be a very popular feature with the community.

3.3.5 The system uses a Unicode UTF-8 compliant Oracle 9i database, which comprises mainly of tables that include attributes for Member, Category, Forum, Posts, Thread, Watch, Permissions and Attachments.

3.4 Current Status

aAqua has been in operation since the end of 2003.

The repository currently contains questions and answers in the domain of crop and animal diseases and pertains to the hamlet of villages around Pabal. This service is further being extended to the rural community in the Rajgurunagar, Shirur and Haveli Talukas of Pune district.

As on April 25, 2005, aAqua had 475 questions (details in Table 1) under the crop diseases, animal diseases and others forums. KVK, Baramati is providing the expert consultation services with experts in the crop and animal diseases domains.

Summary of aAqua Status

Topic	Number of questions
Crop diseases	323
Animal diseases	33
New techniques, renewable source of energy etc	54
Farmer schemes	15
Market Information	21
KVK recommendations	29
Total	475

Table 1: summary of aAqua question topics

3.5 Process flow of aAqua

aAqua works in a very simple manner in which the users (referred as farmers) are approached by Kiosk Operators or the Field engineers. The field engineer prints the new queries, allocates to experts on the basis of their area of expertise, gets the answers and uploads them on aAqua. After the queries are answered and uploaded on aAqua, the Kiosk operators or the users need to check if it has been answered or any response has been made to their queries. With this the transaction process completes.

The following figure represents the process flow of aAqua.

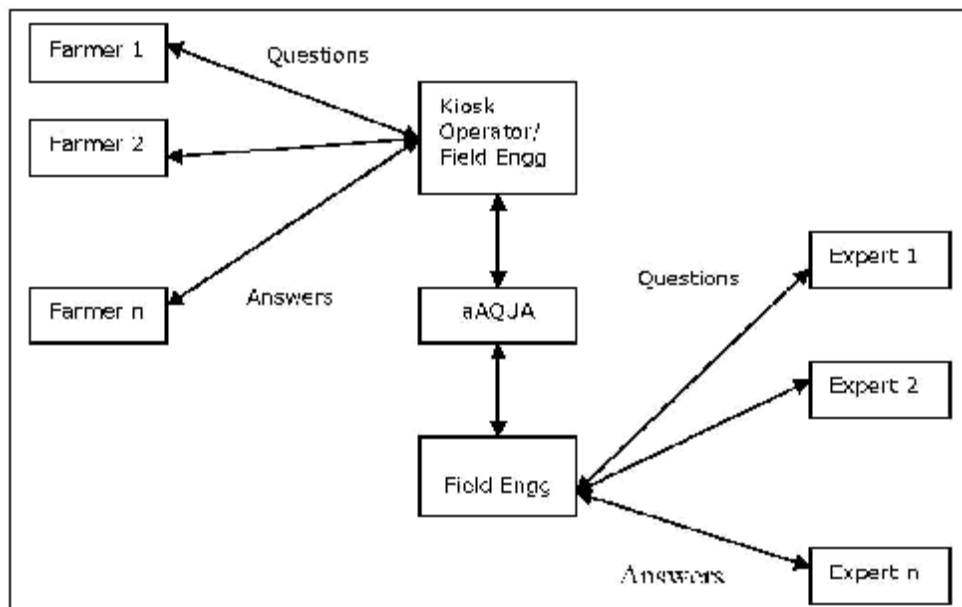


Figure3: The process flow of aAqua.

aAqua caters to the need of farmers by the following ways

- Providing a forum for farmers to pose his/her queries

- Having a panel of experts to view the problem and work out solution for this.
- Answering back the solution for the query over the net
- This in turns help create a repository of questions and answers on various topics
- aAqua allows users to search for archives.
- Allowing common Indian languages and simultaneous keyword searches in Hindi-English-Marathi.

3.6 aAqua users

3.6.1 Farmers

Farmers can

- . Register online at the website and get a unique user id. All the subsequent questions posted will be under this id.
- Post queries into a relevant category
- Upload picture files (GIF, JPG etc) to support their questions. For example a farmer can post a picture of his infected crop to make it easier for the expert to understand the problem and arrive at better solutions
- Read answers posted by experts to his queries as often as possible, the query and the answer are visible on a single HTML web page.
- Go through the archive for other information, if he finds a similar query posted at the archive and an answer has been made to it , then ha may chose not to post any query on it.

3.6.2 Agri-Experts

Experts can

- Register as an expert at the website and obtain a unique user id from the administration team. All answers posted by them will be under this user id. Experts can select one or more categories (forums) depending on their area of expertise.
- They can save their profile along with the contact information. This profile can be modified at a later date.
- Submit answers to queries posted in their area of expertise.
- View a list of queries in their category as well as other categories.
- Upload pictures (GIF, JPG etc) to support their answers. Uploading of pictures is optional
- Include URL links in their answers to other site/web-pages that are relevant to the query being answered.
- Search functionalities are provided so the expert can search the archives for other informational purpose too.

3.6.3 Moderators

Moderators can

- Move individual queries from one category to a different category. Farmers may post queries to a wrong/ inaccurate category. This facility allows moderators to fix those errors. When a query is moved the query id is not changed.
- Monitor and filter out inappropriate content. If certain queries or answers are inappropriate or offensive, the moderator can delete them.
- Intervene in the forums to ensure that the discussion does not go off track
- Modify and delete questions and answers

3.6.4 Administrators

Administrators can:

- Do everything that a moderator can do.
- Create, modify and delete categories (forums)
- Archive queries

3.6.5 Translators

At present, Marathi to English and Marathi to Hindi translation are in progress.

Translators can

- Brows all the forums.
- Be able to post their translations on the forum in the same HTML pages with the original questions.

3.7 *aAqua MVN forum*

3.7.1 General features

1. Based on MVN architecture
2. Built-in database connection pool.
3. Currently running on Tomcat version 5.0, Jsp API 2.0, Servlet API 2.4, JDK 1.4

4. Tested on Internet explorer, Netscape Navigator and Mozilla browsers.
5. Multi-databases(currently supports 6 DBMS: MySQL , Oracle , SQL Server, hsqldb, Interbase/Firebird , SAPDB)
6. Unicode support, at present supports Bengali, Gujrati, Hindi, Kannada. Malayalam, Marathi, Punjabi, Tamil, Telugu, Urdu.
7. Unicode searching and indexing support
8. Internationalization, it supports international languages that are included in the Unicode standard
9. Supports automatic login using cookies
10. Logging system with Jakarta common Logging
11. Recent question listing
12. Users profile on Home page
13. Users interface studied and improved by involving users
14. Content verticals in home page for large forums
15. Forum options can be viewed in English, Hindi , Marathi

3.7.2 Security features in aAqua

1. Personal information and emails available only for users who have logged in (avoid spam and e mail harvest tools)
2. MD5 encrypted passwords for greater security
3. Password Reset via email for forgot password
4. Support IP block to prevent certain IP to access the system.
5. In admin Zone , only show links that user have privilege on them
6. Support realm authentication
7. Support any customized authentication.
8. IP blockings: supports IP range blocking for example (127.0.0.*)

3.7.3 User features

1. Members lists, view profiles.
- 2 Users can move the questions asked into a new forum.
3. Users can check for questions answered and unanswered using the “My Mailbox” view.
4. Users get a list of questions posted by them.
5. Questions from given member can be searched
6. Comprehensive user control panel is present.
7. Who is online allows one to view all users visiting your board.
8. Supports email alerts that may be global, based on category, Forum and/or Thread allowing user to know of questions answered.
9. Support for sorting option when viewing recent threads.
- 10.Supports HTML type tags such as [bold] , [italic],[underline],[size].[font],[colour],[url],[image] and [list].
11. User can choose avatar (a photo that appears wherever one posts) either from built in avatars or by uploading ones own avatar(JPG/GIF/PNG)
12. Dynamic signatures, member title base on number of posts.

3.7.4 Administration features

1. Based on MVC architecture.
2. Comprehensive system information and system diagnosis.
3. Create an unlimited amount of forums
4. Re-order, edit forums at any time.
5. Create an unlimited number of forums
6. Re-order or edit categories at any time.
7. Admin can view the IP of any post including both creation time and last edit time.
8. Forum admin can delete any forums at will.

9. Allow access to the moderation facilities, individual permissions, forum specific permissions.
10. Admin can delete any group at any time.

3.7.5 Search features

1. Search across Indian languages.
2. Customizable web based keyboard for Indian languages
3. Metadata search which search among attachments text (html,txt,rtf) and it's descriptions , file name type etc.
4. Different advanced search features i.e. Search by fields, Proximity, Fuzzy Boolean and wildcard search, term Modifiers, Grouping etc.
5. Query Log which logs the search query asked in aAqua with number of results.
6. Chronological display of answered and unanswered questions of users who have logged in.
7. Find all posts by user name.

3.8. aAqua system architecture

SYSTEM ARCHITECTURE

Figure 3 explains pictorially how aAqua employs the three tier web architecture. aAqua is powered by an open source [7], easy to use, easy to setup discussion forum providing a complete end to end solution built using Java technology (Java Server Pages/Servlet).

Based on the standard MVC (Model View Controller) architecture, aAqua is compatible with any Servlet container which supports JSP1.2 and Servlet2.3. It is currently being deployed within the Servlet container (Catalina) of the Tomcat Web Server.

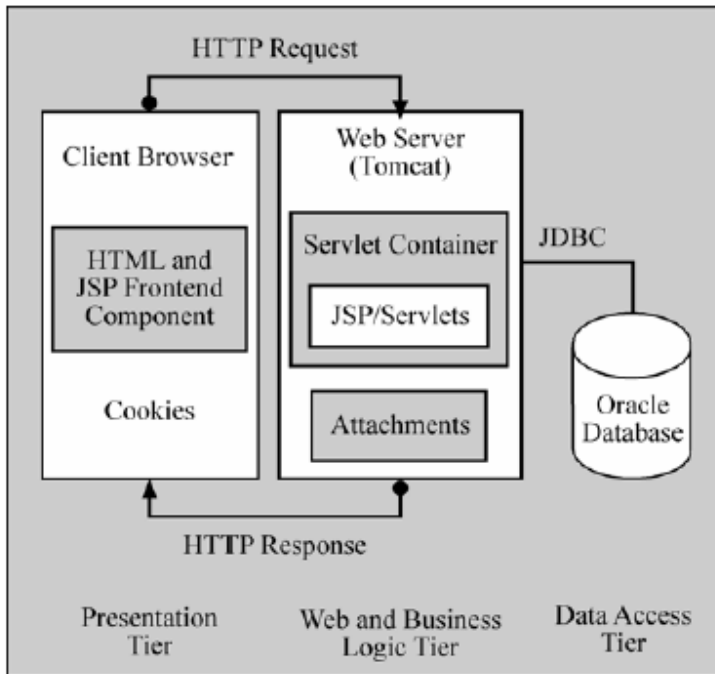


Figure 4 Three Tier Web architecture of aAqua

The system uses a Unicode UTF-8 compliant Oracle 9i database which comprises mainly of tables that include attributes for Member, Category, Forum, Posts, Thread, Watch, Permissions and Attachments. The user inputs for a particular session are also stored in the database to create a user history and profile so that the next time when the same person logs in, information most pertinent to the person can be displayed.

3.8 Observations and Analysis

Table 2 speaks about the various evaluation parameters for aAqua service like No of questions asked, average response time, maximum and minimum response time, forum wise questions, number of questions unanswered, images and attachments in questions.

aAqua Status quo

aAqua Q&A status Jan 2005-			
	Jan	Feb	March
Forum name			
Crop	44	12	4
Animal	2	2	2
Others	2	1	3
Market info	2	1	0
Farmers Scheme		2	3
total	50	18	12
Posted by			
field Eng	4	4	2
Kiosk operator	31	2	2
Users	15	12	8
total	50	18	12
Time taken (days)			
Avg. Response Time	2.68	2.2722	3.675
Min Response Time	10 mins	4 mins	1.27 hrs
Max Response Time	17 days	7 days	9 days
Images in Questions	2	4	3
Images in Answers	4	0	0
Total No of Images	6	4	3
Total No of Attachments	11	0	1
Total No of Unanswered	3	2	4

Table 2: Details of January to March 2005.

aAqua year end status quo

	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	4-Nov	4-Dec
Forum name													
Crop	17	19	5	10	4	7	10	13	12	25	45	31	32
Animal	2	2	3	1	2	0	2	2	2	3	0	0	0
Others	9	1	1	2	2	0	7	2	1	1	5	2	1
total	28	22	9	13	8	7	19	17	15	29	50	33	33
Posted by													
field Eng	21	15	0	4	7	1	11	10	4	4	15	7	5
Kiosk operator	2	6	5	7	0	6	2	6	9	12	18	16	18
Users	5	1	4	2	1	0	6	1	2	13	17	10	9
total	28	22	9	13	8	7	19	17	15	29	50	33	33
Time taken (days)													
Avg. Response Time	56	22	32	9	8	2	2.2	2.2	2.5	3.6	2.37	2.1818	3.8793
Min Response Time	31	4	8	20 min	3	2.5 hrs	8 min	7 min	20 hrs	2 hrs	9 mins	2 hrs	1 hr
Max Response Time	145	110	85	70	19	4	6	5	6	16	22 days	14 days	51 days
Images in Questions												7	11
Images in Answers												0	1
Total No of Images												7	12
Total No of Attachments												0	2

Table3: aAqua Q&A status Dec 2003 to Dec 2004

3.8.1 Analysis and observations

Based on the above two tables showing the details about the status of aAqua , we can reach to the following observations. Further conclusions and recommendations are suggested in the later part of the report in separate section of Recommendation.

Decrease in number of questions asked 50 (January 2005) to 12 (march-2005) can be attributed to the fact that January is the time that most of the crop related problem arises.

Increase in average response time from 2.68 days to 3.675 days can not be ascertained as we did not get any reasons either from KVK or the field engineers. If we look at the last year for the same quarter there has been a significant increase in number of question asked from 44 (Jan to mar 2004) to 80 (Jan to mar 2005) which is an indication of the rising popularity of the service but at the same time we can also have a view that the base on which aAqua is growing itself is small so it needs to be monitored for some more time to come to some robust conclusions. Crop is still a major area in which questions are being asked but aAqua to grow needs to increase the base to other areas like animal husbandry, market info etc.

3.8.2 Future planned features

- Advanced search Interface where user can directly search for required information.
- Displaying search results by images, threads.
- Web-based Editor with HTML facility in synchronization with standard as well as web based keyboard testing phase.
- Adding more information in index listing of Q&As.
- Integration of stemmers for English, Marathi, Hindi allowing searching on root of the word fast faster fastest type.
- Integration of query expansion techniques i.e. Multilingual Keyword search(Onion-Kanda-Pyaaz) spell checkers(English , Hindi)
- Keyword suggestion based on the frequency of words.
- Farmer ID features to identify farmers uniquely even when using Kiosk operator login.
- Converting aAqua text to voice automatically.

- Porting to Mobile devices like Encore Mobilus and Simputer
- aAqua computer translation between English and Hindi
- Context aware retrieval system i.e. paying attention to users' location, time, preferences, languages, activity and device.

Other tools that can be linked to aAqua

- Digital library software for content residing in huge number of documents.
- Search assistant for customized Google searches.
- Bhav –puchiye – optimal interface for a human to process data in tables like agricultural commodity prices
- Agro-explorer – customizable search engine for Indian languages.

4 Observation and analysis of Pabal and Baramati region

The main focus of ICT in agriculture is meeting the farmers' needs for information. The project studied was designed to meet these needs in their target population, according to their individual mandates and the agenda they had established. An attempt was therefore made to find out what agricultural development information the farmers really considered relevant to their needs. An exhaustive list of information requirements, as voiced by the respondent farmers, was prepared.

The following are the observation and analysis of the two area in terms of farmers and Kiosk Operators need for farm related services.

4.1 Marketing information

The farmers perceived market information, including daily updates on the prices of agricultural commodities in the markets of the surrounding district, as one of the most relevant ICT services. This was seen as 'most appropriate' by 90% of farmers, enabling them to sell at those markets where their goods would command the best prices.

These same farmers perceived getting information on the latest agricultural commodity prices in the local markets as very relevant.

4.2 Facilitating access to land records/ Online registration

. In all, the farmers perceived this information as relevant to their needs. However it may not be possible for a private company network to provide government revenue records on land as the issue of authentication and administration rights will come up , nonetheless this is still one option that can be evaluated in future and may be the government can look into developing some model for it.

4.3 Question-and-answer service

This need refers to any crop, animal husbandry queries that farmer have and which can be answered by the experts. this is of prime importance and we find that aAqua has been very popular as a brand in this area.

4.4 Weather forecasting

Information on rainfall, temperature and humidity was considered important to them still most of the farmers surveyed did not have an direct idea how it can impact them

Approximately 70% of farmers considered the provision of information on best practices for cultivating vegetables and onions as valuable, in the hope that they might save their crops despite the longstanding water problem in the Pabal region. They were also looking forward to receiving information regarding drought-resistant varieties. In the *Baramati* region, farmers felt that information regarding the best packages of practices for various crops cultivated in the area, particularly sugarcane, was most appropriate.

4.5 Post-harvest technology

Information on post-harvest technology, particularly storage, can be one area that has to be looked upon for agricultural developments. It may be that the farmers do not seek out this information because they are unaware of the value added of food processing. .

4.6 General agricultural news

Farmers were able to obtain general information and news of various agricultural events in their districts. Farmers felt this information was important to them in getting to know what changes in crop rotation they can think of in future.

4.7 Information on crop insurance

Detailed information on crop insurance schemes, the type of damage covered and compensation offered, premiums to be paid, etc. were felt to be information of value by large farmers. However the small farmers (land acreage less than 5 acres) were unsure how it can help them as they felt the premium could be very high.. This latter group

perhaps regards crop insurance as irrelevant because it has been fortunate enough not to experience its necessity over the last few years.

4.8 Farm business and management information

This is one area that can be looked upon as this could be a complete set of farm consulting that can be provided to farmers. We did see in one of the Kiosk operator at Pimplijagtap is engaged in a similar kind of activity where he charges around Rs 500/acre to provide information about seeds, variety of crop, soil testing, fertilizers and pesticide information, post harvesting selling etc.

4.9 Input prices and availability

Information relating to the availability of agricultural inputs and prices can also be one important part of farm solutions that farmers can look forward to. The Baramati farmers, however, operating in an agriculturally prosperous area where inputs are always in demand, regarded it as crucial as compared to farmers in Pabal region.

4.10 Early warning and management of diseases and pests

Early warning systems about outbreaks of disease and pest infestation, and information about how to manage such outbreaks, are felt to be very important by about 70% of the farmers. In a period of unbroken drought the farmers felt that pests and diseases did not pose a major threat. However, early warning systems, particularly in the case of sugarcane, were perceived as relevant by farmers who have always demanded timely information about disease or pest outbreaks. KVK Baramati has been working in putting field sensors in the area to map some basic characteristics and then predict the chances of

pest attacks and other disease problems. AAqua can incorporate this as a disseminating medium.

4.11 Soil testing and soil sampling Information

This service farmers perceived it as important, naturally enough in a project focused on agricultural development, in which soil sampling is very useful.

In general it can be concluded that the farmers involved in Pabal and Baramati area considered the following as the main services they would be looking forwards and as well are important in terms of the view of the Kiosk Operators

1. Market information,
2. Facilitation of access to land records,
3. Question-and-answer service (similar to the existing aAqua service)
- 4 Detailed information on the government's rural development programmes
5. Soil testing
6. Information about rural development Programmes and subsidies

5. Conclusion and Recommendations

5.1 Key leanings

5.1.1 Rural ICT needs

- Efforts should be made to incorporate ICT in all endeavors related to agricultural development.
- The organizations and departments concerned with agricultural development need to realise the potential of ICT for the speedy dissemination of information to farmers.
- Government at national and state level in India has to reorient agricultural policies so that a fully-fledged strategy is formed to harness ICT's potential for assisting overall agricultural development. As part of this process policy makers should utilize the analysis of the ICT projects in this study, to become acquainted with how such projects function.

5.1.2 aAqua specific learning

- In the case of well endowed areas where cooperative setups are prevalent, ICT initiatives should focus on providing services such as question-and-answer sessions, cooperative-related accounting methods, market information, input prices/availability and early warning systems for disease and pest problems.
- In drought-prone and less endowed areas, future ICT initiatives provide information services such as facilitation of access to land records, question-and-answer services, information on rural development programmes, weather forecasting, marketing information, best package of practices for dry land agriculture, information on crop Insurance and post-harvest technology.
- Further scaling up would need linking to a greater number of experts from

a variety of institutions like agricultural colleges/ universities/ practitioners etc.

- The efforts for content generation have to be increased. One way is to put the local queries handled by KVK experts on aAqua; anyways the field engineer at experts' end is an underutilized resource.
- Training the experts to use computers and digital cameras etc themselves, thus reducing the dependence on field engineer.
- A key success factor for aAqua would be the motivation of individual kiosk operators to run the service. This implies having a commercial model for aAqua.
- The problem of batch processing of questions occurs at the experts' end. The field engineer prints the new queries, allocates to experts on the basis of their area of expertise, gets the answers and uploads them on aAqua. The field engineer at experts' end is a bottleneck resource. However at current level of questions/ threads on aAqua, the field engineer at experts' end is an underutilized resource. Problem will occur when aAqua scales up and the number of queries increases.
- The current sources of information for farmers are fertilizer/ pesticide shops, agricultural officers or other farmers. When a farmer discovers a crop disease, it has already spread to a part of the cultivation. Thus the farmer needs a solution very urgently. This implies that the response time for aAqua advice should be 12 hrs-1 business day.
- The farmer needs a quick solution and therefore goes to the medicine shop. The medicine shop gives a package of 2-3 pesticides. Although the pesticides are costly and the farmers know that they are paying more by not having exact solution, the farmers have expressed satisfaction with this current way of solving problems. According to the farmers interviewed, the solution recommended by medicine shop works 60-70% of the times.
- Farmers who employ modern techniques of cultivation generally seek information on these. They refer to magazines like Bali raja and Krishi Udyog. Such information if available on aAqua would evoke interest in the farmers.

- The agricultural CDs provided by the department of agriculture have been found to be very nominal in terms of the content. After initial few visits, no farmers have come back to see them.
- Problems cited by farmers (on the basis evaluation of randomly selected queries from aAqua): -
 - Most of the answers were rated as very good, esp. very practical and useful.
 - In some cases, the pesticide chemical to be used is given. However, the name of commercially available pesticide containing that chemical should be given.
 - The solution corresponds to a different stage in the farming cycle, for e.g. which seed variety would be resistant to the pest is given, while the solution to prevent infection is required.
- The experts at KVK feel that they are handicapped by absence of knowledge of actual field conditions. If the problems were supplemented by visuals, the expert advice would be much more effective and relevant. Problems should also detail parameters like approximate temperature, humidity/ irrigation, area under infection etc.
- The kiosk operators are the most important link in aAqua. Kiosk operator survey yields following observations on aAqua: -
 - aAqua does not offer financial benefits to kiosk operators.
 - Slow response time on aAqua has discouraged farmers and kiosk operators. Farmers generally come back after a day to inquire about their problems.
 - Marketing support for aAqua, doubts about what can be posted or not on aAqua.
 - One of the concerns of the kiosk operators is that aAqua is only an experiment and it might be discontinued.
- Overall most kiosk operators feel that aAqua can be successful provided the response times could be improved. Following are the kiosk operators' suggestions for content on aAqua: -

- Yellow pages or an Agricultural directory of agro-input shops
- Information on new methods of cultivation, new seed varieties, animal breeds.
- Weather forecasts and water release schedules of dams in the area.
- Jobs and employment.
- Website hosting of local institutions.
- Matrimonial services

5..2 Scope of future work

Apart from these services as a futuristic view we can also seek to find if aAqua can do the following as well

1. Can aAqua work as a Village Information Center where complete rural information need can be met.
2. Information about other areas like Water, Sanitation & Personal Hygiene be provided via aAqua.
3. Study the farmer profiles by how many have used aAqua how many never types.
4. Local server and related database synchronization issues

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Appendix A: Kiosk Operators questionnaire

Name	
Organization	
Address	
	Pin :
Phone number	
Email address	
Kiosk start date	

- **Area Of Coverage**

No of villages	
Target population(Approx)	
Describe the area	

- **User Profile for aAqua**

User Profiles	Sex	Typical Service requests
Senior Citizens		
Adults (40-60)		
Adults (30-40)		
Adults (20-30)		
Students		

- **Operator's Perception of different services under aAqua
(Benefit Rating 1: Poor, 5: Excellent, NA)**

Service	Time	Cost	Computer, usage convenience	Language comfort	Accessibility

- **How much time usually it takes to answer a query by aAqua?(
in hrs)**

- **What are the services or content that can be posted on
aAqua?(other than existing)**

Sl no	Services
1	
2	
3	
4	
5	

- Do you think farmers in your area accept the software service like aAqua? Give reasons for both yes or no.

--

What you find best in aAqua?

Crop related suggestions
Animal
Interaction among farmers
Farmer scheme related info

- Do you see any problems in aAqua? If yes please mention

Content	
----------------	--

Technical	
Others	

- **Are the supports from KVK adequate? If not what could be done?**

- **Adequate training for aAqua usage is done for the Kiosk Operators?**

Score in scale of 1 to 5 where 1 is poor and 5 is excellent

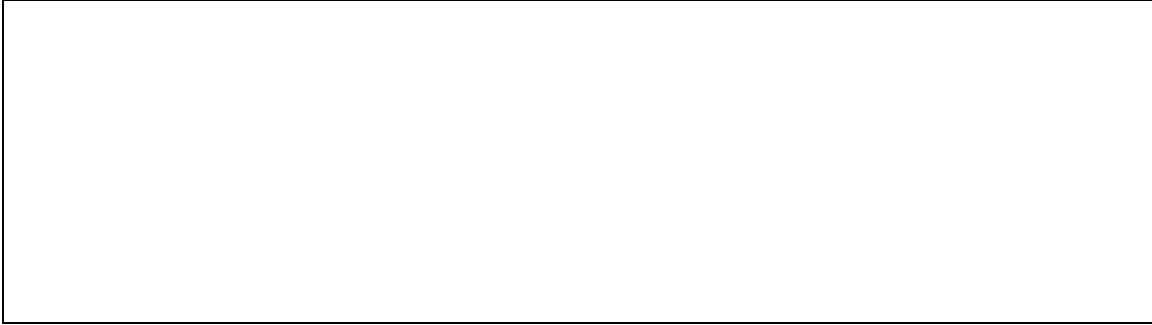
Poor	1	2	3	4	5	Excellent
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Reasons /Suggestions

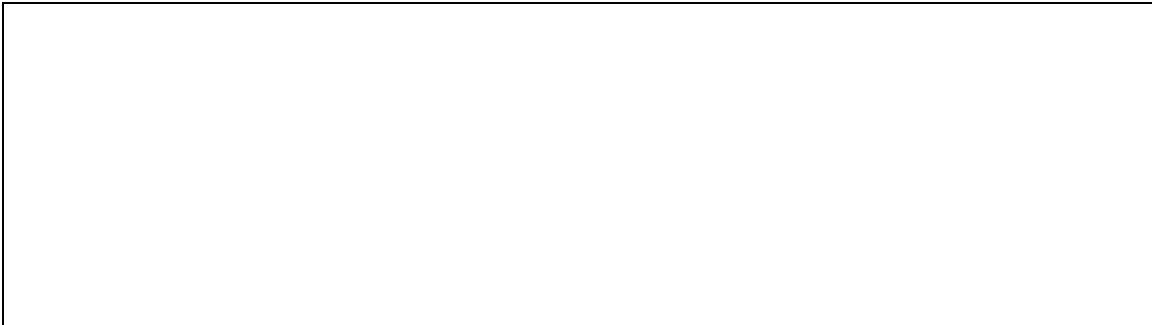
- **Field engineers support is satisfactory?**

Poor	1	2	3	4	5	Excellent
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Reasons/Suggestions



- **What marketing support for aAqua is done?**



- **Any other recommendation?**

Survey conducted by

Amit Agrawal, SJMSOM, IIT Bombay, amitagrawal@iitb.ac.in Mobile: 9819788869

Appendix B : Questionnaire for aAqua Users

Survey form for Users

A. Personal Profile

<i>Name</i>		<i>Sex</i>	
Village		Age	
Community		Marital Status	
Literacy		Caste	
Occupation		APL/ BPL	
Earning		Kiosk Awareness	

B. Family Profile

Members

Name	Sex	Age	Literacy	Occupation	Residence

Assets Owned

Name of Asset	Owned	Size/ No.s	Ancestral/ Newly Bought

Land Holding			
Livestock			
Vehicles			

Economic Level

Sources of Income	Income before kiosk	Income after kiosk
1.		
2.		
Total Income		

- **Any scheme availed in recent past? Give details**

--

Types of crops/ vegetables growing

Type	No of Acres
Rice	
Wheat	

Arrangement for farm inputs

Cash (%)	
Credit (%)	

For Non-Users of aAqua

- **aAqua, sources of awareness.**

Posters/Banners	
Public talk/ Farmer meets/Seminar	
Word of Mouth	
Others (specify)	

- **Reasons of not going to kiosk.**

Location (Far from the place)	
Do not believe it will benefit	
Never opened when I visit.	
High service charges.	
Lack of reading/ writing skills.	
Lack of computer literacy.	
Inconvenient timings of the kiosk	
Do not need the services.	
Perception of barrier because of caste/ sex.	
Behavior of kiosk operator	

Others, specify	
------------------------	--

Factors, which will motivate you to visit the kiosk.

Location of kiosk should be favorable.	
Change of kiosk operator.	
Introducing more services like.	
Removing caste/ sex barriers.	
Decrease in prices of the services.	
Not interested at all.	
Others, specify	

What services would you like to avail at the kiosk?

--

E. For Users of aAqua

Source of awareness

Publicity materials like poster.	
Public talk, seminar etc	
Word of Mouth	
Others, specify	

- **Distance of Kiosk from** **residence.**

Behavior of Kiosk operator

Helpful	
Polite	
Active	
Rude	
Not-encouraging	
Other , Specify	

Overall Experience of aAqua (Benefit rating on a scale of 1 to 5, 1= Poor, 5= Excellent.

Poor	1	2	3	4	5	Excellent
-------------	----------	----------	----------	----------	----------	------------------

Is Kiosk open whenever you visit it?

- Always**
- Most of the time**
- Sometimes**
- Never**

What are the timings convenient to you?

- Morning (Up to 12)**
- Afternoon (12-4)**
- Early Evening (4-6)**
- Evening (After 6)**

Use of Services

Service	Charge	Number of Service Requests					
		This month		This quarter		Year-to-date	

User's Perception of aAqua (Benefit Rating 1: Poor, 5: Excellent, NA)

Service	Time	Cost	Convenience	Reliability	Accessibility
Crops					
Animal					
Market info					
Farmer scheme					
Others					

User's perception of services unavailable as of now

Nature of Service	Reason for selection	Service Benefits

What problems you face?

Crops	
--------------	--

Animal	
Others	

- **Suggestions for popularizing the service.**

--

- **User's perception of impact of aAqua**

--

- **Any other recommendations**

Survey conducted by

Amit Agrawal, SJMSOM, IIT Bombay, amitagrawal@iitb.ac.in Mobile: 9819788869

Appendix C: aAqua a case study

aAqua ('a'lmost 'A'll 'qu'estions 'a'nswered) is an online expert Question & Answer based community forum, developed by Media Labs Asia, KReSIT, IIT Bombay, for delivering information to the grass roots of the Indian Community. It is an online, multilingual, multimedia, archived discussion forum accessible using a web browser, allowing members to create, view and manage content in their mother tongue (Hindi, Marathi etc). It can be accessed at

www.aAqua.org

Motivation and goals

Multilingual communication can help spread dissemination of knowledge which is extremely required for progress for all strata especially the bottom of the pyramid.. A large section of the society, particularly the rural populace, does not have access to the huge knowledge base acquired through scientific development through the centuries. There is certainly an urgent need to establish a framework for knowledge exchange between various communities & cultures. aAqua is an endeavor in this direction. The goals of aAqua are as following: -

- To create a multilingual communication framework.
- To provide a language independent knowledge database.
- To provide an easy to use interface to accommodate even naïve users.
- To provide easy and fast access to reliable information.
- Integrating the agricultural domain of aAqua with the Agro-Explorer group, which uses the UNL/MT* fundamentals for performing "Meaning Based Searches" through the available databases. This also includes media like voice to text, text to voice, videos, pictures, and images for non-literate or semi-illiterate people.

* Universal Networking Language developed by Professor Aniruddha Joshi, IIT Bombay at Center for Indian Language Translation (CFILT), IIT Bombay.

Key Enabling Features

- **Use of Multimedia:** The system is designed to cater to the needs of rural users to express themselves to each other as well as to the outer world. Their inability to articulate their thoughts using the input devices commonly available is overcome by use of images instead of text, building on their rich visual vocabularies to communicate.
- Users are the consumers as well as producers of the content: aAqua eases the creation of content i.e., text, images, short audio, video and animations, thus helping the users move from being passive consumers to active content creators. This is illustrated in Figure 5.1. The community has created more than 90% of the current English, Hindi and Marathi content of aAqua locally.
- **Assistance in creating content** for aAqua is provided by kiosk operator. This takes the technology to users who are unfamiliar to computers and often not literate. They can now experience the Internet as well as participate through it. This is a great motivating factor for people as it showcases the benefits of using a computer in their everyday lives. An end user can select the category and the specific forum with which she wants to interact, or from which she wishes to view posts.
- **Use of Avatar:** The user can choose an avatar, either from built-in avatars or upload his/her own avatar (jpg/gif/png). This has been observed to be a very popular feature with the community.
- The system uses a Unicode UTF-8 compliant Oracle 9i database, which comprises mainly of tables that include attributes for Member, Category, Forum, Posts, Thread, Watch, Permissions and Attachments.

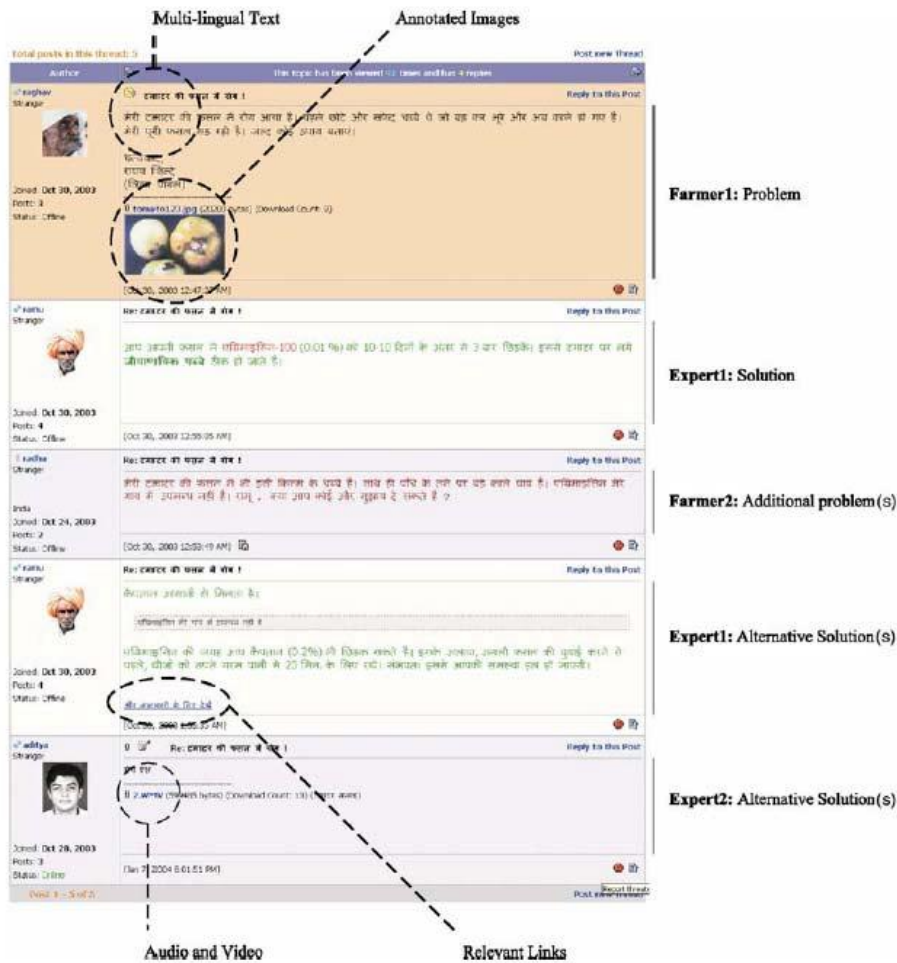


Figure 5.1: An annotated sample screen shot of aAqua

Current Status

aAqua has been in operation since the end of 2003.

The repository currently contains questions and answers in the domain of crop and animal diseases and pertains to the hamlet of villages around Pabal. This service is further being extended to the rural community in the Rajgurunagar, Shirur and Haveli Talukas of Pune district. As on April 25, 2005, aAqua had 475 questions (details in Table 1) under the crop diseases, animal diseases and others forums. KVK, Baramati is providing the expert consultation services with experts in the crop and animal diseases domains.

aAqua Status summary

Topic	Number of questions
Crop diseases	323
Animal diseases	33
New techniques, renewable source of energy etc	54
Farmer schemes	15
Market Information	21
KVK recommendations	29
Total	475

Process flow of aAqua

aAqua works in a very simple manner in which the users (referred as farmers) are approached by Kiosk Operators or the Field engineers. The field engineer prints the new queries, allocates to experts on the basis of their area of expertise, gets the answers and uploads them on aAqua. After the queries are answered and uploaded on aAqua, the Kiosk operators or the users need to check if it has been answered or any response has been made to their queries. With this the transaction process completes.

The following figure represents the process flow of aAqua.

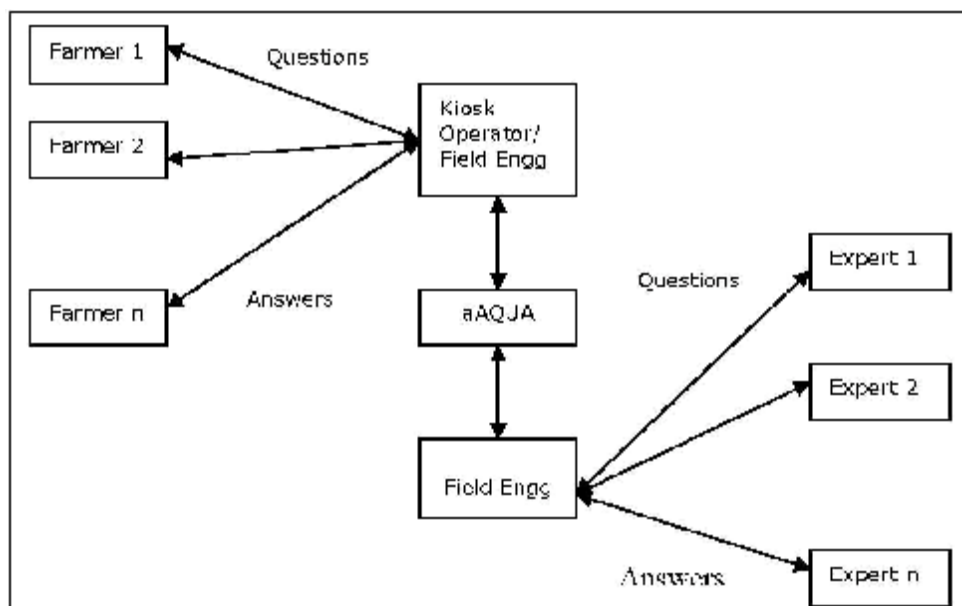


Figure5: The process flow of aAqua

aAqua users

Farmers

Farmers can

- 1 Register online at the website and get a unique user id. All the subsequent questions posted will be under this id.
- 2 post queries into a relevant category
3. Upload picture files (GIF, JPG etc) to support their questions. For example a farmer can post a picture of his infected crop to make it easier for the expert to understand the problem and arrive at better solutions
4. Read answers posted by experts to his queries as often as possible, the query and the answer are visible on a single HTML webpage.
5. Go through the archive for other information, if he finds a similar query posted at the archive and an answer has been made to it, then ha may chose not to post any query on it.

Agri-Experts

Experts can

1. Register as an expert at the website and obtain a unique user id from the administration team. All answers posted by them will be under this user id. Experts can select one or more categories (forums) depending on their area of expertise.
2. They can save their profile along with the contact information. This profile can be modified at a later date.
3. Submit answers to queries posted in their area of expertise.
4. View a list of queries in their category as well as other categories.
5. Upload pictures (GIF, JPG etc) to support their answers. Uploading of pictures is optional
6. Include URL links in their answers to other site/web-pages that are relevant to the query being answered.
7. Search functionalities are provided so the expert can search the archives for other informational purpose too.

Moderators

Moderators can

1. Move individual queries from one category to a different category. Farmers may post queries to a wrong/ inaccurate category. This facility allows moderators to fix those errors. When a query is moved the query id is not changed.
2. Monitor and filter out inappropriate content. If certain queries or answers are inappropriate or offensive, the moderator can delete them.
3. Intervene in the forums to ensure that the discussion does not go off track
4. Modify and delete questions and answers

Administrators

Administrators can:

- 1 Do everything that a moderator can do.
2. Create, modify and delete categories (forums)
3. Archive queries

Translators

At present, Marathi to English and Marathi to Hindi translation are in progress.

Translators can

1. Brows all the forums.
2. Be able to post their translations on the forum in the same HTML pages with the original questions.

Observations and Analysis

Table 2 speaks about the various evaluation parameters for aAqua service like

No of questions asked, average response time, maximum and minimum response time, forum wise questions, number of questions unanswered, images and attachments in questions.

aAqua Status quo

aAqua Q&A status Jan 2005-			
	Jan	Feb	March
Forum name			
Crop	44	12	4
Animal	2	2	2
Others	2	1	3
Market info	2	1	0
Farmers Scheme		2	3
total	50	18	12
Posted by			
field Eng	4	4	2
Kiosk operator	31	2	2
Users	15	12	8
total	50	18	12
Time taken (days)			
Avg. Response Time	2.68	2.2722	3.675
Min Response Time	10 mins	4 mins	1.27 hrs
Max Response Time	17 days	7 days	9 days
Images in Questions	2	4	3
Images in Answers	4	0	0
Total No of Images	6	4	3
Total No of Attachments	11	0	1
Total No of Unanswered	3	2	4

Table 2: Details of January to March 2005

Detail Status quo from Dec 2003 to Dec 2004

	Dec	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	4-Nov	4-Dec
Forum name													
Crop	17	19	5	10	4	7	10	13	12	25	45	31	32
Animal	2	2	3	1	2	0	2	2	2	3	0	0	0
Others	9	1	1	2	2	0	7	2	1	1	5	2	1
total	28	22	9	13	8	7	19	17	15	29	50	33	33
Posted by													
field Eng	21	15	0	4	7	1	11	10	4	4	15	7	5
Kiosk operator	2	6	5	7	0	6	2	6	9	12	18	16	18
Users	5	1	4	2	1	0	6	1	2	13	17	10	9
total	28	22	9	13	8	7	19	17	15	29	50	33	33
Time taken (days)													
Avg. Response Time	56	22	32	9	8	2	2.2	2.2	2.5	3.6	2.37	2.1818	3.8793
Min Response Time	31	4	8	20 min	3	2.5 hrs	8 min	7 min	20 hrs	2 hrs	9 mins	2 hrs	1 hr
Max Response Time	145	110	85	70	19	4	6	5	6	16	22 days	14 days	51 days
Images in Questions												7	11
Images in Answers												0	1
Total No of Images												7	12
Total No of Attachments												0	2

Table3: aAqua Q&A status Dec 2003 to Dec 2004

Analysis and observations

Based on the above two tables showing the details about the status of aAqua, we can reach to the following observations. Further conclusions and recommendations are suggested in the later part of the report in separate section of Recommendation.

- Decrease in number of questions asked 50 (January 2005) to 12 (march-2005) can be attributed to the fact that January is the time that most of the crop related problem arises.

- Increase in average response time from 2.68 days to 3.675 days can not be ascertained as we did not get any reasons either from KVK or the field engineers.
- If we look at the last year for the same quarter there has been a significant increase in number of question asked from 44 (Jan to mar 2004) to 80 (Jan to mar 2005) which is an indication of the rising popularity of the service but at the same time we can also have a view that the base on which aAqua is growing itself is small so it needs to be monitored for some more time to come to some robust conclusions.
- Crop is still a major area in which questions are being asked but aAqua to grow needs to increase the base to other areas like animal husbandry, market info etc.

Future planned features

1. Advanced search Interface where user can directly search for required information.
2. Displaying search results by images, threads.
3. Web-based Editor with HTML facility in synchronization with standard as well as web based keyboard testing phase.
4. Adding more information in index listing of Q&As.
5. Integration of stemmers for English, Marathi, Hindi allowing searching on root of the word fast faster fastest type.
6. Integration of query expansion techniques i.e. Multilingual Keyword search(Onion-Kanda-Pyaaz) spell checkers(English , Hindi)
7. Keyword suggestion based on the frequency of words.
8. Farmer ID features to identify farmers uniquely even when using Kiosk operator login.
9. Converting aAqua text to voice automatically.
10. Porting to Mobile devices like Encore Mobilus and Simputer

11. aAqua computer translation between English and Hindi
12. Context aware retrieval system i.e. paying attention to users' location, time, preferences, languages, activity and device.

Other tools that can be linked to aAqua

1. Digital library software for content residing in huge number of documents.
2. Search assistant for customized Google searches.
3. Bhav –puchiye – optimal interface for a human to process data in tables like agricultural commodity prices
4. Agro-explorer – customizable search engine for Indian languages.