An ICT Solution for Sustainable Tobacco Cultivation in Mysore Region of India

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Abstract. The unpredictability of the climate, inappropriate use of inputs, government policies, lack of necessary and timely information are understood to be the major issues that are leading to flat or decreased yields, increased cost and inappropriate market price realization which finally culminate to hit on the profitability of an Indian farmer. This article focuses on the innovative model of sustainable agriculture frame work with embedded mobile based ICT, Namma Sandesh (in the local vernacular language Kannada; meaning 'Our Information') that ITC Limited – Agri Business Division – ILTD has adopted in Mysore region for Tobacco farmers with regard to the strategy adopted, challenges involved and effectiveness of the solution.

Keywords: ICT, Sustainable agriculture, ITC Limited, tobacco.

1. Introduction

Flue Cured Tobacco in India is produced in 2 provinces in the country – Andhra Pradesh and Karnataka. The province of Karnataka caters to 40% of the total production, in which Mysore owing to its suitability in climatic and soil conditions is home for more than 60,000 Tobacco growers, 200,000 farm labor and 1064 villages exclusively living on tobacco cultivation. These farmers are involved in tobacco production to meet their livelihoods and are characteristically small and marginal with an average land holding of 1.5 Ha. Tobacco cultivation is typically their only source of income.

Owing to their financial background, education is never a priority and the farming community is plagued by illiteracy and lack of information about the current best farming practices, new technologies and other developments in the industry. To address the challenge of sustaining farmer's profitability and welfare, it is highly imperative to have an appropriate strategy for sustainable agriculture and ensure its practice in the farming community. But, in the current capacity of extension worker to farmer's ratio of 1:1000, though an appropriate strategy can be charted, it would have failed at ensuring the reach and adoption of the strategy. The as-is studies showed that progressive farmers in the region were the main source of information followed by radio and TV. These sources have limitations with regard to context, specificity and timeliness of information. And hence, an innovative bi-modal mobile based ICT service has been adopted and the pilot implementation with 10000 farmers has proven to be a successful model that can be easily scaled up. In the wake of not many ICT models achieving the desirable results (R. Saravanan, 2012), the performance of the adopted model in taking sustainable agriculture to the farmers has been impressive.

2. Sustainable Agriculture Framework

2.1. Definition

Sustainable agriculture is defined as an integration of plant and animal production practices having a site specific application that will over long term, satisfy human food and fibre needs; enhance environmental quality and the natural resource base upon which the agricultural economy depends; efficient use of non-

renewable and on farm resources and integrate, where appropriate, natural biological cycles and controls; sustain the economic viability of farm operations; and enhance quality life for farmers and society as a whole.

2.2. Strategy

The strategy is to identify the appropriate and key elements of crop development and sustainability that shall drive farm innovations which address the issue of farmer profitability either by increasing the farm productivity or by decreasing the cost of cultivation and there by ensure farmer profitability.

The elements that have been identified are soil, water, labor, energy, community development and biodiversity with a special focus on crop development.

There are various established initiatives under each element viz. use of green manure crops, silt application, sub-soiling, and site specific nutrient recommendation and also initiatives that are under developmental stage viz., generation of soil fertility maps using RS & GIS etc that can directly or indirectly affect the farmer's net returns. The impact of various initiatives for different elements is presented in table 1.

Table. 1: Sustainability elements and initiatives.

Key Elements	Initiatives	Impact
Soil	Compaction Diagnosis	Increase in productivity
	Sub Soiling	
	Integrated Soil Management	Increase of soil fertility
	Manual STCR Recommendation	Cost optimization and soil health improvement
	Soil Fertility Mapping using RS/GIS	Field specific plots
	High Yielding Varieties	Productivity increase
Water	Water Quality Assessment	Chloride maps
	Rain Water Harvesting	Improving ground water levels
	Solar Pump	Optimal water utilization & electricity conservation
	Drip Tech	
Labor	Float seedling production	Conserve water, labor and inputs
	Agro Machinery Centre	Dissemination of farm mechanization through "Custom Hiring Model".
	Farm Mechanization	Labor saving
Fuel	Paddy Straw Insulation	Energy conservation
	Loose Leaf Barn	Efficient curing technologies
	Box Barn and Rocket barn	Efficient curing technologies
	FC Barn	Efficient curing technologies
	Energy plantations	Agro forestry
Biodiversity	Bio Diversity Park	Risk and opportunity assessment
	BROA	
Community Development	Village Infrastructure Up gradation	Social welfare

The content pertaining to plethora of initiatives needs an extremely powerful communication channel to disseminate to the right user group at the most appropriate time. The next section talks about the mobile based ICT tool Namma Sandesh.

2.3. Namma Sandesh an ICT tool

A number of ICT initiatives have been discussed thoroughly in various forums. The failure of many of the ICT models can be attributed to inappropriate choice of technology. And hence based on the organizational needs, farmer needs, social factors, technology penetration, adoption capability etc (M. Rajesh, 2003) play an important role in choosing of the appropriate technology.

In the current organizational structure in ILTD, a leaf manager heads the unit (Mysore) who is assisted by Marketing Manager (MM). A crop development manger reporting to the MM manages one or more regions coming under TAPs (Tobacco Auction Platforms) who are further assisted by respective field supervisors and field staff. It can be seen that there are multiple levels of information flow which has the limitations with regard to timeliness of exchange and accuracy of the information. And hence after evaluation of various ICT models and communication media along with need assessment surveys and focus group discussions, Namma Sandesh has been developed.

Namma Sandesh currently serves 10000 farmers in Mysore region and has its uniqueness built in the operational model, smart use of Automatic Speech Recognition Technology which together make Namma Sandesh a push and pull blend based information dissemination technology.

Namma Sandesh serves not just as a crop advisory service linked to the various elements of sustainable agriculture but also acts as a powerful tool that reflects on the crop condition and the specific farmer needs. This ensures customized delivery of the value adding information.

The model has been built such that the existing synergy among the various stakeholders viz., Tobacco Board, Central Tobacco Research Institute, ITC, extension workers, Agricultural Department is leveraged to generate the dynamic, authentic, customized and responsive content. The work flow in Namma Sandesh is presented in figure 1.

The diversity of information that the farmer has access to is spread over the entire agricultural supply chain, nursery management, main field management, post harvest product management, market information, other crop market information, subsidies & local news, weather alerts, farmer testimonials, dissemination of innovative local farming techniques which are constantly scouted by the field staff etc..

Namma Sandesh which has voice as the primary medium supports and strengthens the existing agricultural extension framework through farmer engagement using different modes:

- **Information dissemination & retrieval**: A push based service which personalizes the information based on the region, seed variety, and date of transplantation, farmer tags and field properties which are obtained using an "Automatic Speech Recognition" system.
- **Query handling system:** A pull based service that provides specific crop advisory, market information, weather information and query lodging which is handled by the crop development managers.
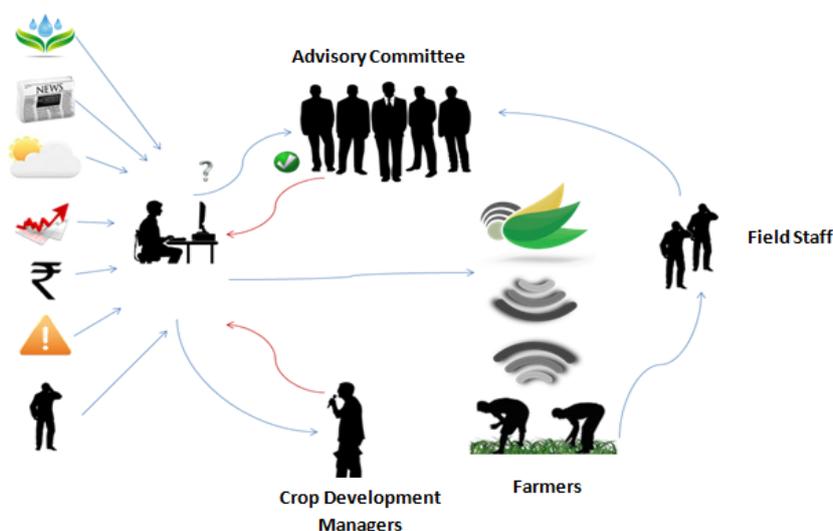

Fig. 1: Namma Sandesh work flow

With reference to the above graphic, one mode of information dissemination is push based information which contains both generic and specific and is understood to be the need of the hour viz., seed sales by tobacco board, announcement of barn registrations, introducing the farmers to new initiatives etc. the other mode of information exchange is the data collection with regard to crop condition, farmer profile which over time facilitates creation of micro segments to completely personalize the disseminated information. The third mode of information exchange is where the farmer lodges a query and a pre-assigned crop development manager gets notified, based on the importance of the query the resolution is either made online or offline. All the operations are handled through an online portal.

The portal (Fig. 2) also facilitates dynamic visualization (Fig. 3) of the call performance, which helps the concerned manager as an immediate feedback on the quality of the message scheduled.
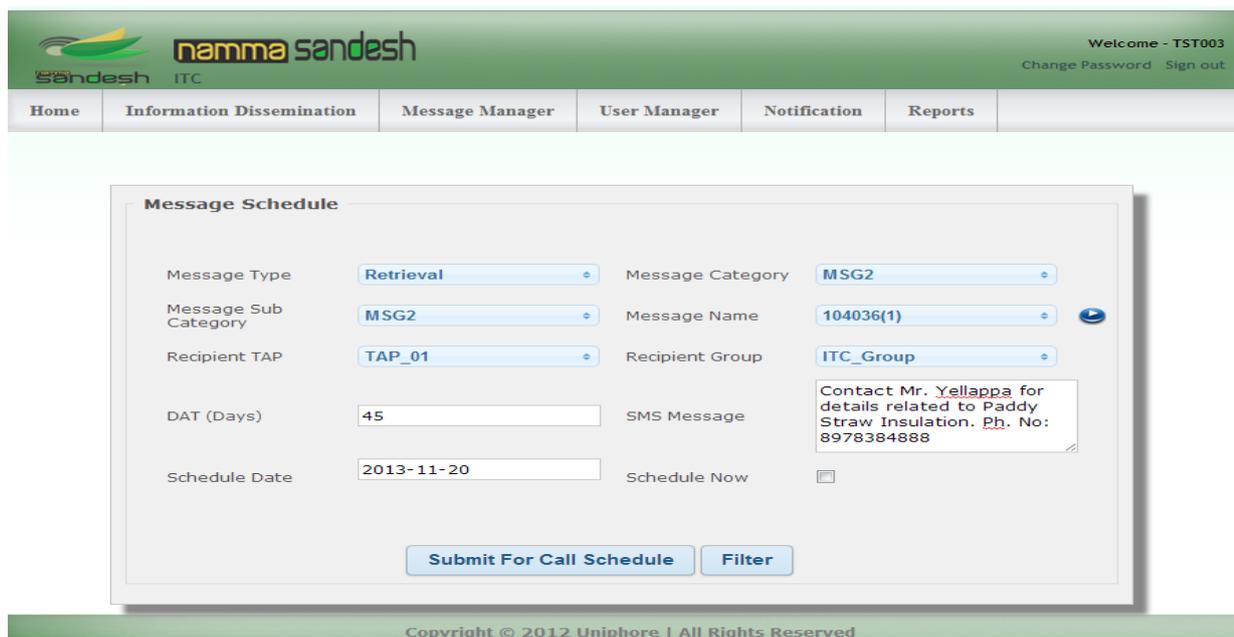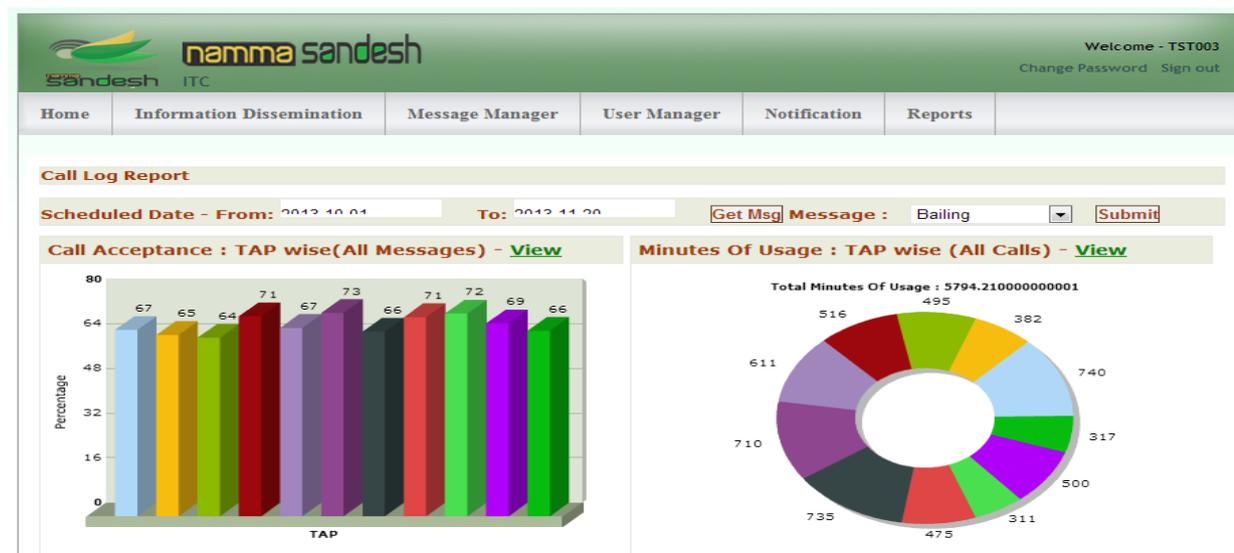

Fig. 2: Call scheduling overview

Fig. 3: Dynamic visualization

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2.4. Uniqueness of Namma Sandesh

Various services on the similar lines, if not the same, do exist (K. Mcnamara et.al., 2011) but the uniqueness of the service lies in the innovative tailoring of the various nodes (content, medium and effective resource utilization) of the fabric of Namma Sandesh.

- **Content network:** The content for Namma Sandesh gets generated at multiple locally relevant sources viz., ITC content development team, scientists from Central Tobacco Research Institute, Tobacco Board officials, local government officials etc. The ITC field staffs generate the requirements and issues during his field visits that are to be addressed through Namma Sandesh. This brings in the real time reflection of the content being disseminated.
- **Smart & Simple:** Smart use of various speech based technologies like "Automatic Speech Recognition (ASR)" and Text To Speech (TTS) are put into use that streamlines the information exchange medium.
- **Special features:** The disadvantage with push based services is that the calls being scheduled at times which are not conducive for the farmers. This has been addressed through introduction of a "Call back facility" where the farmer shall be able to listen to the latest call that has been scheduled. A "missed call based registration" feature ensures near zero registration errors which is critical to ensure right information is disseminated to the right group.

2.5. Challenges & overcoming methodologies

The operating scenario and the farmer background has thrown up a plethora of challenges, each of which has been handled with cost effective process innovations. The various challenges that ITC had to surpass were:

- **Technology adoption -** Given the poor education background the adoption to technology based service of Namma Sandesh has been less, which has been effectively battled out through innovative use of synergy between the various farmer engagement platforms of ITC. SMS service was the earlier approach but owing to poor education background the farmer's information acceptance levels were low, this triggered the need for voice based information diffusion.

- **Mobile Infrastructure** – The major issue of launching a mobile based information dissemination technology is the lack of connectivity in certain parts of the tobacco growing areas and also the lack of superior mobile phone devices, which have the capability to handle sophisticated applications such as automatic data pooling from the internet. The same was overcome by appropriately using the extension workers to concentrate their activities in these areas and also dialogue to farmers on the need and importance of having access to such an initiative.

- **Content personalization and Management** – Identifying the right sources of data were critical to ensure that the information provided was accurate and granular. The requirement was to identify data points which could provide superior and reliable information basing which critical decisions can be taken. Therefore, detailed analysis and comparison of information providers were carried out and the most suitable were identified to assist in setting up the initiative.

2.6. Key achievements or impact of Namma Sandesh

The fact that Namma Sandesh has evolved as an information transfer platform for the farming community is by itself the biggest achievement. The immense popularity and acceptance has resulted in manifold results, some measurable and others beyond measure. The graph below highlights two main parameters 1). Call acceptance percentage 2). Call retention percentage, to judge the wide spread acceptance of Namma Sandesh as a knowledge transfer platform. (The call log data over the past one year has been consolidated). The consistent acceptance and retention percentages across the quarters and category of the messages can be found in the images below (Fig. 4 & Fig. 5)
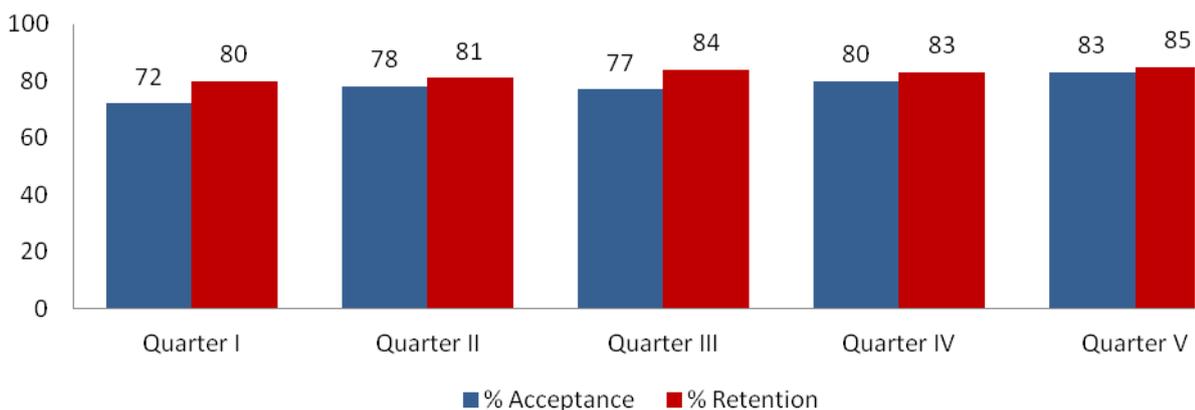
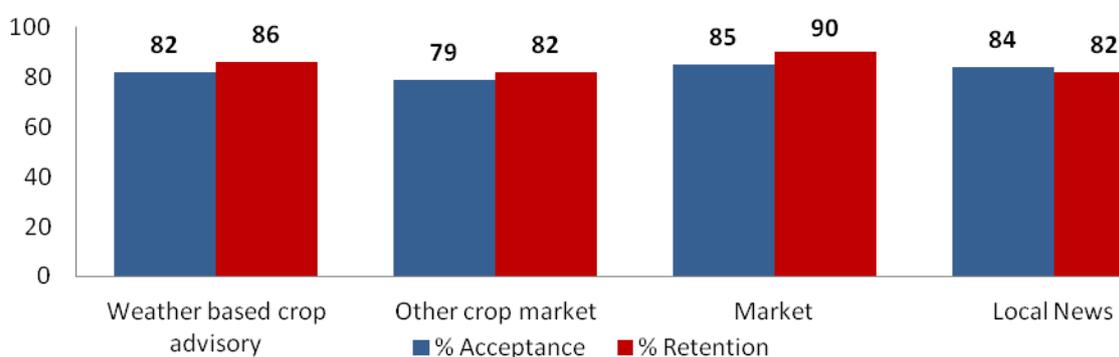Fig. 4: Quarter wise acceptance & retention percentages

Fig. 5: Category wise acceptance and retention percentages

2.7. Benefits attributed to 'Namma Sandesh'

- **Crop saving** - Around 2 million Kg. of crop has been saved by timely dissemination of precautionary measures.
- **Farmer empowerment –** a step towards development of an educated and knowledge endowed farming community. The farmer moves from being just a farmer to a better equipped individual with the information base that he acquires**.**
- Better utilization of the natural resources and awareness.
- The bi-directional communication helps ITC understand the crop throw and production styles in different parts of the growing region.
- **Generation of goodwill from the farmer** – current market information helps the farmer in leveraging market situation, timely information about all preventive measures to be taken during epidemics or other environmental issues, etc.
- **Better control for the industry** – the production of tobacco can be controlled according the requirements of the industry. A need based approach so as to maximize utilization and minimize waste.

3. Conclusions

The integrated framework of sustainable agriculture and ICT has been well accepted by farming community for it not only provides a unique experience to the farmer by empowering him, but also serves as a powerful tool to ensure that the agriculture is done in a sustainable manner. The robust content and an innovative exchange medium have ensured high farmer adoption. Going forward, scaling up of the initiative along with the integration of advanced sustainable agriculture initiatives like optimal fertilizer recommendation based on soil fertility maps, information related to inputs sourcing etc shall be made part of Namma Sandesh. The cost effectiveness (ITC incurs Rs. 100 per farmer per year), robust content generation

network along with focus on sustainable agriculture have been the contributing factors for success of the initiative.

4. Acknowledgements

5. References

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