

Improving the Performance of Loan Recovery and Financial Inclusion for Rural Financial Services with eSaguTM¹

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Abstract: *The eSaguTM system is a personalized agro-advisory system. In this system, the agricultural expert provides expert advice to each farm once in a week based on the digital photographs. In Andhra Pradesh, the eSaguTM prototype has been implemented for 8000 farms of 16 major crops in 100 villages since 2004. The results indicate that the farmers have realized considerable monetary benefits by reducing the fertilizers and pesticide sprays, and getting the additional yield. It is also a scalable and cost-effective system. In this paper we explain how eSaguTM can be used to improve the performance of rural financial services. It can be noted that the Government of India has been successful in pumping the formal credit into the rural areas through various institutions such as Scheduled Commercial Banks (SCBs), Regional Rural Banks (RRBs), Primary Agricultural Credit Societies (PACS) and Micro Finance Institutions (MFIs). However, rural financial institutions are suffering from both loan recovery and financial inclusion problems. On the other side, the farmers are also facing severe crisis in clearing debts due to several factors including speculative nature of farming and unscientific practices. Also, several poor and marginal farmers are yet to be included in the loaning process. In this context, the eSaguTM system provides opportunity to improve the performance of rural financial services regarding loan recovery and financial inclusion. The performance of loan recovery can be improved as eSaguTM improves the probability of crop success by making agriculture a deterministic activity and enabling the farmer to get the maximum gain from the given piece of land. The eSaguTM system also maintains a weekly record of each farm. This information helps in finding the credit requirement, timely credit lending, post-sanction follow-up and recovery. It also improves financial inclusion, as the farm records information enables to extend the benefit of financial services by identifying poor and marginal farmers by estimating the credit requirement and potential productivity.*

Keywords: *eSaguTM, personalized agro-advisory, ICTs for agriculture, ICTs for financial services, ICTs for rural development, rural financial services, rural credit, crop insurance.*

1. Introduction

India is reckoned as one of the largest rural banking systems in the world where agriculture has not only been the prime income generating activity but also the major source of employment. Farm sector needs huge capital investment each season for sustained agricultural production. The need for institutional credit to the impoverished farmers was strongly advocated even by the British Government hundred years ago to keep them away from the usurious private money lenders in the rural areas. By and large, the Government of India has been successful in pumping the formal credit into the rural areas through various institutions such as Scheduled Commercial Banks (SCBs), Regional Rural Banks (RRBs), Primary Agricultural Credit Societies (PACS) and Micro Finance Institutions (MFIs). However, the loan recovery performance of these institutions except MFIs was found to be poor what ever the reasons might be. On the other side, the farmers are also facing severe crisis [1,2,3] in clearing debts due to several factors including speculative nature of farming and unscientific practices [1,4]. Also, several poor and marginal farmers are yet to be included in the loaning process [3]. In this scenario, the Reserve Bank of India (RBI)

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and the National Bank for Agriculture and Rural Development (NABARD) are making relentless efforts to bring the under privileged rural masses into the mainstream banking through innovative credit modules. Among them, the Information and Communication Technology based systems are proved to be the most effective in terms of increased outreach and reduced overheads. In this context, we explain how an IT-based system like eSagu™ has a potential to improve the performance of rural financial institutions regarding loan recovery and financial inclusion at the same time benefiting the farming community.

The eSagu™ system [5,7,8,9,10] is a personalized agro-advisory system. In this system, the agricultural expert provides expert advice to each farm once in a week based on the digital photographs. In Andhra Pradesh, the eSagu™ prototype has been implemented for 8000 farms of 16 major crops in 100 villages since 2004. The results show that the additional benefit to the farmers comes to about Rs.3,820/- per acre [6] due to reduced inputs (fertilizers and pesticide sprays) and increased yield. It is also a scalable and cost-effective system.

The eSagu™ system provides opportunity to improve the performance of rural financial services regarding loan recovery and financial inclusion. The performance of loan recovery can be improved as eSagu™ improves the probability of crop success by making agriculture a deterministic activity and enabling the farmer to get the maximum gain from the given piece of land. The eSagu™ system also maintains a weekly record of each farm. This information helps in finding the credit requirement, timely credit lending, post-sanction follow-up and recovery. It also improves the performance of financial inclusion, as the farm records information enables to extend the benefit of financial services by identifying poor and marginal farmers by estimating the credit requirement and potential productivity.

In the next section, we discuss the major problems faced by the rural financial services vis-à-vis outreach and loan recovery. In section 3, after giving the overview of eSagu™ system, we explain its implementation, results and advantages. In section 4, we explain how eSagu™ will be helpful to improve the performance of rural financial services. The last section contains conclusions.

2.0 Problems of Banking System in Rural Areas

There are two major issues related to rural banking system, the first being how to reach the last customer in the remote villages and second being how to solve the problem of mounting over dues especially in rural areas.

2.1 Financial inclusion

The main players in the field of agricultural credit in the formal sector include the commercial banks, the regional rural banks and the rural cooperatives. The cooperatives once dominated the rural credit market in the institutional segment are in an impaired state now for various reasons. Data for the past decade indicates a fall in the share of cooperatives in the rural credit market from around 62 per cent in 1992-93 to about 34 per cent in 2002-03 [14]. But the PACS have deep roots in rural India with experience of financing large numbers of small and marginal farmers for over a century. According to the NAFSCOB compilation, there are 1,12,309 PACS which works out to roughly one PACS for every six villages in the country where the total membership of the PACS is reported to be around Rs. 12 crore. On the grounds of strong presence and penetration, the Government of India's decision to revive the cooperative sector is a welcome phenomenon to the Indian farmers. On the other hand, the scheduled commercial banks including the regional rural banks are having 48 per cent of their total branches (32,303) in the rural areas covering only 18.4 per cent of rural population through savings/deposit accounts and even lower percentage (17.2%) of the rural households by way of loan accounts [12]. However, the number of rural branches of commercial banks are going down as a part of the branch rationalization programme. Moreover, the RRBs, while meeting their targets of lending to the priority sector are gradually moving towards the bigger customers leaving behind the poor and the marginal. The latest trends in the corporate business circles are indicating a strategic move towards tapping the vast potential at the bottom of the pyramid where rural credit is no exception. It is, therefore, imperative that the vast numbers of small and marginal farmers who possesses little or no productive assets must be brought into the mainstream banking. Forget not, these rural masses need capacity building, handholding, nurturing and empowering individuals and groups besides continuous follow-up which is outside the ambit of the formal banking system. As first step towards capturing the untapped rural credit market, the Indian banking system has contemplated some of the innovative credit modules involving the Civil Society Organizations (CSOs), the most

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recent being the “Business Facilitator” model for non-financial support services and “Business Correspondent” model for financial services as ‘pass through’ agents [12].

2.2 Loan recovery:

The staggering overdue position among all the credit institutions in the formal sector viz. commercial banks, regional rural banks and cooperatives has seriously hampered the expansion of agricultural credit. The poor recovery performance [14] which is averaging near 50 per cent is seriously threatening the basic viability of these institutions causing grave concern to the Government. The reasons for poor loan recovery were largely attributed to lack of sufficient field staff to ensure follow-up after the sanction of loan, reluctance of staff to work in the rural and tribal areas and absence of statutory powers to induce prompt repayment by the borrowers as far as the banks are concerned. In addition, the Government’s populist policy of waiving of loans has created mass psychology in the rural areas to withhold repayment and wait for some type of loan waiver programme to come to their rescue. More importantly, the reasons for non-payment of the loan amount by the borrowers were, frequent crop failures, diversion of loan amount for purposes other than agriculture, farm investment turning out to be unproductive (NPA), the income from the crop yields was not sufficient to repay the loan while maintaining their families and priority given to the repayment of loans borrowed from the private money lenders. Some of the suggestions for prompt recovery of loans include continuous supervision and follow-up action after the loan is dispersed, realistic assessment of loan requirement and providing technical support to the farmers to increase the productivity which will ensure better repayment by the borrowers. The *eSaguTM* system has the potential to resolve some of the key issues confronted by the rural credit institutions regarding both loan disbursement and loan recovery.

3.0 Overview of *eSaguTM*, results and advantages

We first explain the basic idea, architecture and operation of *eSaguTM*. Next, we explain the implementation details, results and advantages.

3.1 Basic Idea

The main objective of *eSaguTM* is to deliver a personalized expert advice in a timely manner to each individual farm at regular intervals (for example, once in a week/two weeks) from the sowing stage to the harvesting stage to each farmer’s door-step without farmer asking a question. Normally, agriculture expert should visit the farm for delivering the expert advice of high quality. To build an effective personalized agriculture advisory system, we should make agricultural expert to visit each individual farm by person. In such a system, the agricultural scientist spends most of the time on traveling rather than being in the farms. As a result, one agricultural scientist can only cover few farms in a day, hence it is difficult to build and operate a scalable and personalized agricultural advisory system.

In *eSaguTM* [9,10], instead of agricultural expert visiting the farm, the farm situation is brought to him/her in the form of both digital photographs and text. The agricultural expert delivers the expert advice based on digital photographs and other information. Two options exist for sending the photographs. The first method is, the farmers themselves can send the photographs of his/her own farms. The other method is, instead of farmers, educated and experienced farmers of the village can be brought-in as mediators (we call them as coordinators) who will capture and send the photographs of a group of farms. In developing countries like India, the majorities of farmers are either illiterate or have a low level of education. It is difficult for them to send the crop situation to agricultural experts. So we preferred to have the second option; i.e., assigning the work of capturing and sending the photographs by the coordinators.

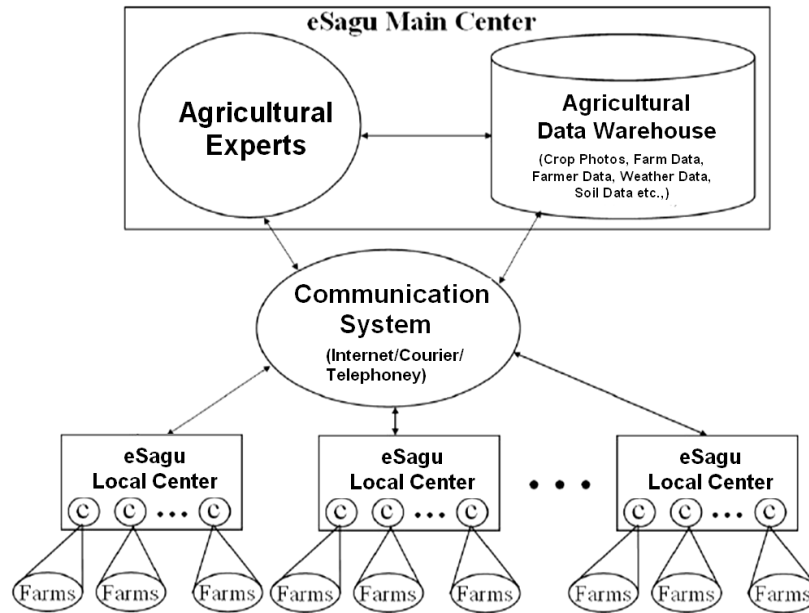


Figure 1. The parts of eSagu system. Here, 'C' indicates coordinator. A double arrow indicates information flow.

3.2 Architecture

The following are the parts of *eSagu*TM (Figure 1): (i) Farms (ii) *eSagu*TM local center (iii) Coordinators (iv) *eSagu*TM main center (v) Agricultural experts (vi) Agricultural data warehouse and (vii) Communication system. These parts are explained briefly.

- (i) *Farms (farmers)*: Farmers own farms and are the end-users of the system. The farmers could be illiterate. They are not expected to use the system directly. However, if they are educated and have Internet connection, they can use the system themselves.
- (ii) *eSagu*TM *Local Center*: One *eSagu*TM local center is established for about 10 to 20 villages. It contains a few computers, printer and dial-up internet connection and managed by a computer operator.
- (iii) *Coordinators*: The coordinator possesses agricultural experience besides the basic literary skills (reading and writing in the local language).
- (iv) *eSagu*TM *Main Center*: Normally it is situated in the city. In this center, a team of agricultural experts with diverse background of agricultural related academic disciplines interact with agriculture information system to deliver expert advice.
- (v) *Agricultural experts (AEs)*: AEs possess a university degree in agriculture and are qualified to provide expert advice.
- (vi) *Agricultural data warehouse*: It is a computer information system which contains all the related information. It contains the crop observation photographs and text. Also, from the available agricultural technology, the package of practices' information for each crop (such as the level of pest resistance, requirement of water, and so on) are maintained. It also contains farmer registration data, farm registration data and weather data.
- (vii) *Communication System*: It is a mechanism to transmit the farm situation to the agricultural experts and corresponding expert advice from the *eSagu*TM main center to the *eSagu*TM local centers. Transmission of digital photographs from the field to the *eSagu*TM main center requires a considerable bandwidth. If enough bandwidth is unavailable, information can be written onto compact disks and sent through a courier service. However, the expert advice (which is a text) is transmitted from the *eSagu*TM main center to the *eSagu*TM local center through a dial-up Internet facility.

3.3 Operation of *eSagu*TM

The operation of *eSagu*TM is as follows. A team of agriculture experts work at the *eSagu*TM Main Center supported by agricultural data warehouse. One small computer center (few computers and one computer operator) is established for a group of about 10 villages. Appropriate number of coordinators are selected from the villages. Depending on the type of crop, each coordinator is assigned with appropriate number of farms. At the beginning of a crop, the coordinator collects the registration details of the farms under him/her including soil data, water resources and so on, and sends the information to the *eSagu*TM main center. Every day, the coordinator visits a fixed number of farms and takes four to five problematic photographs for each farm. The coordinator also fills-in a feedback form with the levels of pest incidence and indicating the impact of previous advice to that farm. (Note that the coordinator visits and takes the crop photographs at regular intervals irrespective of the problem; i.e., once in a week or two weeks depending on the type of crop.) The data (the photographs and other information) is burnt onto compact disk and transported to the main system by a regular parcel service. The agricultural experts at the *eSagu*TM main center prepare the farm specific advice in the local language by analyzing the crop situation by observing the crop photographs and the photograph of crop observation form. While preparing the expert advice, the agricultural experts also consider the soil, weather, and agronomic practices information. The advice is downloaded at the *eSagu*TM local center electronically through a dial-up Internet connection. The coordinator collects the advice and delivers it to the concerned farmer. In this way, each farm gets the expert advice at the regular intervals starting from pre-sowing operations to post-harvest precautions.

3.4 Implementation

The development of *eSagu*TM was started in March 2004 [6]. The *eSagu*TM main center was built at IIT-H, Hyderabad. During 2004-05, we have developed the system for 1051 cotton farms. During 2005-06, a scaled-up version of *eSagu*TM for 5000 farms had been implemented for Cotton, Chilies, Rice, Groundnut, Castor, Groundnut and Redgram crops. During 2006-07, we have implemented *eSagu* on 3000 farms covering 40 villages for major crops including vegetables and fish. A revenue model has been implemented to provide agri-inputs and crop loans along with agro-advisory. Advices had been delivered to farmers in the local language. The courier/postal system were used to transmit crop photographs from the *eSagu*TM local center to the *eSagu*TM main center. The expert advice was transmitted from *eSagu*TM main center to the *eSagu*TM local center through a dial-up Internet connection.

3.5 Results

The main results of *eSagu*TM implementation are summarized as follows.[6]

It is demonstrated that the agricultural expert can provide the expert advice based on the crop photographs and other information available in agricultural data warehouse.

It has been found that the expert advice helping the farmers to improve input efficiency by encouraging integrated pest management (IPM) methods, judicious use of pesticides and fertilizers by avoiding their indiscriminate usage.

The impact study for 2004-05 experiment shows that the details of benefits flown to farmers comes to Rs.3820/- [6]. This is due to reduced inputs (both fertilizer usage and pesticide sprays) and increased yield. During 2005-06 and 2006-07 experiments also, the impact studies have shown the farmers have benefited in a similar manner.

The turnaround time for advice delivery is 24-36 hours.

3.6 Advantages

The *eSagu*TM system provides a quality personalized agro-advice to the farmers. It is a query-less system and provides agro-advice even without the farmer asking a question by following a proactive approach and averts problematic situations. Through *eSagu*TM, accountable advice can be provided with two-way communication. The advice is comprehensive, complete and regular in terms of diagnosis, analysis, advice delivery, follow-up and feedback. The *eSagu*TM system enables farmers (marginal and poor) to cultivate with the knowledge on par with that of an agricultural expert. The *eSagu*TM is a scalable system. It is a cost-effective system and can be made self-sustainable. The system provides strong database to support decision making and documents success stories and new problems. It aids in successful implementation of crop insurance scheme by making farm as a unit of insurance. It also enables quick deployment of services during the times of crisis. The *eSagu*TM system capacitates rural livelihoods and generates rural employment. The system can be used to validate agriculture technology. It significantly reduces the lag period between research efforts and field application. Finally, *eSagu*TM improves the

capacity and knowledge of the farmer in the era of globalization to compete in the international market. It also provides the expert advice that is crucial to the farmer to harvest different kinds of crops based on the demand in the world market with quality and assurance.

4.0 Improving performance of banking system with eSagu™

The eSagu™ system is a comprehensive system that can act as a fulcrum for the rural economy. It can also support several other services like agri-inputs, farm credit, crop insurance, commodity futures and produce marketing besides customized agro-advisory. eSagu™ could go hand in hand with rural banking system by virtue of its strong technological support driven by information and communication technologies (ICTs). The financial institutions will definitely benefit by leveraging eSagu™. Some of the critical benefits are as follows.

4.1 Makes farming a deterministic activity by providing the best technological support to each farm.

Due to various factors the farming process has become a speculative activity. Due to lack of knowledge regarding scientific agricultural practices, the farmers are making several mistakes and are not getting the potential yield; sometimes crops are failing without recovery. With help of eSagu™ system, it is possible to make farming process a deterministic activity as each individual farmer irrespective of his literacy level and extent of land holding can cultivate crops like an agricultural expert since his crop is under the direct supervision of an expert team of agricultural scientists. The expert team prepares location and crop specific crop plan well before the starting of the season with help of a technical advisory committee. Soon after registration, this plan will be given to the farmer after making necessary modifications best suited to his farm based on the resources available with him. This kind of planning is very useful especially in organic cultivation where the farmer has to be pro-active rather than reactive. Fresh agricultural advisory will be flowing to the farmer on weekly basis based on the current crop status and feed back from him starting from pre-sowing time to post-harvest period with the help of a coordinator. Hence farming will be more organized and systematic by this system which will enable the farmers to repay their loans promptly.

4.2 Capacitation of rural livelihoods and employment generation.

Agriculture is not only a science but also an art which should be both innovative and creative. Unfortunately, the educated youth in the villages are migrating to urban areas desperately searching for jobs. As a result, majority of the uneducated and undereducated are taking up cultivation as a source of livelihood. Even though these farmers are rich in their traditional knowledge acquired from their predecessors, they are often struggling and frequently driven into crises when ever there is a paradigm shift in the crops and cropping patterns. The potential of the educated rural youth can be effectively tapped by actively engaging them in farm activities to help the farmers while helping themselves. Each computer center in a revenue village can generate employment for about a dozen educated and qualified youth. Also, women self help groups (SHGs) can be motivated to take up auxiliary sources of self employment like vermi-composting, mushroom cultivation, sericulture and apiculture under scientific guidance and regular monitoring by experts.

4.2 Marketing of the financial products.

Lack of awareness about different financial products available with the rural banks is one of the major hurdles in capturing the rural credit market. The eSagu™ coordinators may be given the necessary training about various financial products. Since the coordinators are from the same village, they can penetrate more effectively than anybody else by virtue of their access to the rural masses in general and farming community in particular. In addition, village computer center may act as help desk for interested customers where posters can be displayed about these financial products. More importantly, advertisements may be printed on the back side of the agro-advisory slip about the financial products.

4.4 Identification of borrowers and preliminary appraisal.

The major challenge of financial inclusion of rural poor lies in identifying the borrowers since people who stayed away from the mainstream banking are usually with little or no productive assets. For instance, majority of land holdings are cultivated by either tenants or agricultural labourers. The land owners are using their land documents to avail loan from the rural banks and utilizing it for purposes other than agriculture such as family health, children's education, marriages etc. The tenants and the labourers have to depend obviously on the local money lenders for capital investment on agriculture. The land owners will be changing their tenants most often and hence it is difficult for the bank to know whether a particular person is cultivating some land during that season or not. Under such circumstances, eSagu™ local center in the village can play a crucial role in identifying the borrowers based on the farm registration i.e. farmers will register into eSagu™ for agro-advisory at the beginning each cropping season by paying the registration fee. In eSagu™, we can use the Global Position System (GPS) coordinates instead of survey numbers so as to avoid the duplication of loan on same piece of land by different tenants.

4.5 Post-sanction monitoring.

It is very important to see that the loan sanctioned is utilized for productive purpose; else it may turn into a non performing asset. Post-sanction monitoring is the biggest asset of eSagu™ by virtue of its documentation of crop developments at regular intervals. The history of developments in each individual farm will be documented along with visuals of the crop, incidence of pests and diseases, irrigation and fertilizer management, compliance of agro-advisory by the farmers, weather data etc. The banker can access this database online, see the individual fields as a sequence of developments right from sowing to till that date. In this way the bank will be better informed about proper utilization of the loan from time to time. This will save lot of over heads to the bank besides knowing the probability of prompt repayment.

4.6 Follow-up for loan recovery.

Farmers usually repay the loan after the harvest of their produce. It is important to visit the farmer while he is harvesting his crop or while he is selling the produce after storing it for some time. But how to know, when the farmer is actually going harvest or sell the produce? Again eSagu™ is the best source. The banker can log on to eSagu™ to see the details of the crop, variety, date of sowing/transplanting, duration, probable date of harvesting etc. One can easily assess the yield potential by looking at the visuals. In addition, coordinator being the resident of the same village will know about farmer's plans to sell the produce. Most importantly, the banker will know whether there is good crop to harvest or not. If there is bad crop or no crop, there may be of little use in pressing the farmer for loan repayment. In such case, the crop insurance must come into the rescue of the farmers as the crop insurance is mandatory for all the loanee farmers under formal banking system. However there are problems in the effective implementation of crop insurance. The eSagu™ system can solve the insurer's problem also as described under next heading.

4.7 Aids in successful implementation of crop insurance scheme [11].

Crop insurance has been an experiment in India even 20 years after its inception in 1984 as Comprehensive Crop Insurance Scheme (CCIS). The current National Agricultural Insurance Scheme (NAIS) is not an exception as it was evidenced by setting up of a panel at national level to study crop insurance short comings in December, 2004. The financial experience of the government with the crop insurance scheme has been disastrous as NAIS was operated on the basis of area approach and its group character had encouraged those wanting to take undue advantage of the scheme. It would appear that in many cases where the actual loss was serious, little or no compensation was paid. There are also cases where there was little loss but the compensation was based on block experience. NAIS was aimed at adopting a new technique of Small Area Crop Estimation Approach (SACEA) taking Gram Panchayat as unit of insurance. But, it failed to implement the same successfully. Adverse selection and moral hazard are the other constraints in successful implementation of crop insurance. In case of adverse selection, only those having the risk will take out crop insurance where the insured are more intelligent and aware of the risks than the insurer. Moral hazard is a case where the insured may change his behaviour because of being insured and take certain actions to collect the indemnity. All the above problems can be effectively addressed by this system as described below-

- (a) The unit of insurance can be brought down to micro level far below the Gram Panchayat i.e. if a farmer cultivates 4 or 5 different crops in different pieces of land, each piece of land can be treated as an independent unit.
- (b) The history of each independent unit of land along with farmer, crop, soil and weather details will be available on-line and the insurer can access this data base at any time during that cropping season.
- (c) Moral hazard can be minimized since the operations performed in each farm can be tracked from time to time in accordance with the agro-advisory delivered by the expert team of scientists.
- (d) Adverse selection can also be countered effectively as the expert team evaluates and cautions the farmer about the crops that can be cultivable in that soil under prevailing weather conditions. Otherwise, the insured has to pay high premium to cover the high risk.
- (e) Finally, this system helps both the insured and the insurer in settling the claims of indemnity as the damage due to natural calamities like hail storms, inundation due to floods, notified pests and diseases etc. is usually supported by visuals along the relevant weather data.

5.0 Conclusions

The rural financial services are suffering from the problems of loan recovery and financial inclusion. In this connection, the eSagu™ system which is an IT-based personalized agro-advisory system can be used to improve the performance of financial services especially regarding loan recovery and financial inclusion. The eSagu™ system has been field-tested and being operated for 7000 farms on 16 major crops in Andhra Pradesh since 2004. It was proved that the agricultural expert advices delivered by eSagu™ system are benefiting the farmers significantly by reducing inputs (fertilizers and pesticides) and increasing yield. In this paper we have explained how rural financial institutions can exploit eSagu™ to improve the efficiency of rural finance in terms of loan recovery and financial inclusion. The performance of loan recovery can be improved as eSagu™ improves the probability of crop success by making agriculture a deterministic activity and enabling the farmer to get the maximum gain from the given piece of land. The eSagu™ system also maintains a weekly record of each farm. This information helps in finding the credit requirement, timely credit lending, post-sanction follow-up and recovery. It also improves the performance of financial inclusion, as the farm records information enables to extend the benefit of financial services by identifying poor and marginal farmers by estimating the credit requirement and potential productivity.

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