An Innovative Fruit and Vegetable Market Information System in Sri Lanka: The Govi Gnana (Farmer Knowledge) Service[1]

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Abstract

The vast majority of Sri Lanka's poor live in rural areas and depend on agriculture for their livelihood. This paper takes the view that the asymmetry of information between farmers and buyers where farmers are unaware of what, when and how much to produce is a primary reason for this situation. The paper presents a possible information and communication technology (ICT) solution to the problem in the form of a widely available, accurate, timely and credible information service and discusses early findings from a pilot implementation of the service. The findings indicate that the newly available market information is already helping farmers improve their bargaining power at the spot market, reducing cheating by middlemen and also helping locate forward sales contract possibilities, albeit slowly. Going forward, the paper proposes a comprehensive ICT-enabled agriculture marketing service spread across the island connecting all of the island's major markets and exporters with farm organizations as a sustainable solution to the agricultural poverty problem on the one hand and regular good quality supply of produce to the market on the other.

1. Introduction

The majority of Sri Lanka's poor live in rural areas and depend on agriculture for their livelihood. The reverberating point is that they are poor; unable to participate in society in the manner worthy of their contributions and unable to benefit from development. It is not because these rural farmers are lazy. In fact, they sweat and toil through the day, and keep up through the night to protect their crop. They pawn their valuables to get their fertilizer and pesticides and pray that droughts and floods will spare their fields. Finally they ride on flat bed trucks of collectors, not in the front seat, but sleeping on top of their produce sacks in a valiant attempt to get a decent price for their produce.

What has gone wrong? There are many factors that contribute to the dismal situation that has evolved, but a key failure has been in produce marketing. Fifty years of state intervention in this area did not bear fruit. The state institutions intended to coordinate demand and supply of agricultural produce between farmers and state outlets did play somewhat of an allocation role during the closed economy. However, with the policy shift to an open economy where state agencies were forced to compete with private enterprise, these institutions failed after incurring heavy losses. Today, more than 25 years after the adoption of free market policies that were inter alia expected to eliminate poverty, farmers continue to be poor. They do not receive a fair price for their produce and are being forced out of business.

A key assumption in economics is that basic information about the state of the market is available to market participants. While this may hold true in certain markets, it is definitely not the case at agriculture markets in Sri Lanka or for that matter in many developing countries. There is a tremendous asymmetry in information among the players, and those with timely and accurate information end up as winners. Now, there is emerging global evidence that if farmers are given basic access to agricultural prices at nearby markets, their incomes could significantly improve. A recent University of California study in rural China as reported in *TheFeature* found that farmers with access to market prices via mobile telephones were able to increase their incomes by 60 percent. There are several other current pilot projects like Kenya Agricultural Commodities Exchange (KACE) and Huaral Valley Network in Peru that are attempting to use mobile Internet to make a difference in the lives of rural farmers. However, the evidence is not all positive. A study by *Panos Institute* found that attempts in Uganda to deliver price information to farmers had failed with much of the information bypassing farmers with many of them too poor to access the Internet. The situation was exacerbated by a lack of coherence in the way information was presented.

Given this background the current paper builds a case for and reviews the implementation of a unique project in Sri Lanka using a public-private platform for collection and dissemination of agriculture prices and forward market information using a multi-pronged ICT solution. The final objective is to improve the living standards of local farmers by linking the farmers with the global agriculture value chain.

2. The Govi Gnana (Farmer Information) Service

2.1 The Farmer Problem

A farmer expects a return on his investment like any other entrepreneur in order to cover his expenses and earn a reasonable profit. Sometimes he gets this return, but other times he is not so "lucky". Unlike most entrepreneurs, farmers do not have good knowledge of their market demand; for the most part, they are shooting in the dark. The general case is that most farmers grow whatever crop they are used to, and take the crop along, or send it through a collector for sale at a wholesale market. Given the returns from the crop are not certain and the farmer has no collateral, banks are reluctant to lend him the necessary funds. Thus, the farmer for the most part depends on the collector or the commission trader at the wholesale market to carry him over. Only when the produce arrives at the market (many hours away) does the farmer find out what the supply-demand situation is at the market and thus the going price for his produce. If the demand is high, he gets a high price and if the demand is low, he gets a low price. Theoretically, it could be argued that over time these price fluctuations would not matter as the farmer would receive the mean price in the long run. But, in reality, that is not the case. If the price that the farmer receives is inadequate to pay off his loans, he falls in to greater debt at usurious rates. He is then unable to afford the right quantities of fertilizer and pesticide in the next season which results in lower yields and poor quality produce, leading to lower income. After a while, the farmer is caught in a vicious circle, and unless he gets "lucky" several times with good prices, he fails. The reason why farmer suicides in Sri Lanka are many is precisely this unfortunate predicament that the farmers face.

2.2 Reasons

The reasons for the problem defined earlier are many-fold. While supply side issues like costs of seed, fertilizer and pesticides cannot be downplayed, discussions with farmers suggest that if the farmer is working towards some certainty on the demand side, for instance a contract to supply a given amount at a given price, then the supply side issues can be managed. But the reality is that most farmers are unaware of what is required, how much is required and when it is required. The crux of the problem is in the asymmetry of information. The buyer is able to determine in advance what is required, but individual farmers are not aware of this. The ultimate result is mismatch of demand and supply leading to volatile price movements, and farmers ending up with prices that may not even cover his expenses.

2.3 A Possible Solution

If, lack of information to the farmer is the underlying cause of the farmer problem, then the solution has to be one that provides accurate and timely information to the farmer. The Govi Gnana Service (GGS), to mean farmer knowledge service in the local languages is therefore a mechanism that provides such information, not only *to* the farmer, but also *from* the farmer. If successful, GGS will be able to create thus far illusive stability in farmer income by bringing in a calculated certainty in to the now unpredictable and volatile produce prices that they receive. It will help farmers to plant crops according to forward contracts and raise crop loans using the guaranteed future revenue as collateral.

An ICT myth that needs to be debunked is that using the Internet will obviate middlemen between small farmers and the marketplace. Agricultural produce is not downloadable music and the need for middlemen such as collectors and traders as agents who add value in aggregating, transporting and selling farmer produce must be accepted. Our objective is to make the farmer better off. But it will also make the collector and trader better off. Trade theory has proven time and again that a trade takes place if, and only if, both parties gain.

2.4 GGS Starting Point

Starting as a simple price capture and dissemination system GGS will later link all stakeholders in the agriculture value chain. In the very first stage, GGS enables farmers to make the right decisions on where to sell what they already have in hand and at what price. In the next phase it will make widely available, information on possible forward contracts and help farmers to enter in to these contracts with traders to sell produce that is yet to be harvested. This process will also link up banks with farmers and traders through these forward contracts and help them obtain collateral for crop loans based on this collateral. Further it will also provide access to a number of non price-related, but essential farmer extension services. With more and more farmers and traders participating, GGS will ultimately grow in to a virtual and decentralized agriculture produce exchange located in agricultural areas. It is envisaged that every farming village and collection point, every trader and every wholesale buyer in Sri Lanka would be connected to this exchange.

3. GGS Pilot

Government of Sri Lanka (GoSL) launched an ambitious project named *e*Sri Lanka, designed "to take the dividends of ICT to every village, every citizen and every business and change the way Government works".[3] In order to test critical hypotheses in realising this vision, the Government called for and competitively selected a few pilot projects from the 150 proposals received. GGS was one such selected proposal.[4]

Given six months duration and a tight budget, the first phase of the GGS pilot was implemented at the Dambulla Dedicated Economic Centres (DDEC). The pilot objectives to achieve proof-of-concept were identified as follows:

1. To create efficiencies in the spot markets at DDEC by capturing and disseminating live prices across the markets for farmers and traders to negotiate the best price based on accurate information for produce already brought to the market.

2. To help farmers obtain the best possible price by disseminating real-time prices to locations outside the market so that they could decide whether they should bring in the already harvested produce to the DDEC, or sell locally.

3. To create a simple platform for forward sales contracts (FSC) centred at DDEC by creating an e-bulletin board for farmers and traders to jointly determine what to produce and when and what price to sell, or at the very least, to determine when exactly to harvest what has already been planted (which may vary by 1-2 days).

While the above objectives are directly related to the main information problem that needs to be solved, in terms of knowledge of demand and supply, and therefore price in both spot and forward markets, the remaining objectives are related to agricultural credit and extension services.

4. To enable easier access to short-term crop loans from participating banks by linking them to the FSC platform. This is done by allowing banks direct access to farmers' new collateral (their individual FSC).

5. To improve agriculture extension services by linking up with various agriculture related portals and emerging initiatives of the Department of Agriculture.

3.1 The Pilot in Practice

Having explained the problem and the possible solution at a theoretical level, we shall now move on to consider how GGS actually works in reality. Consider Dambulla; situated almost at the very centre of Sri Lanka, DDEZ was established in 1999 and today is the island's largest wholesale market for vegetables and fruits with reported sales of over USD 300,000 a day. Farmers and collectors from all districts bring produce to this market and the same is then despatched to every nook and cranny of the country; as many as a thousand trucks pass through the market on a busy night. It is a hive of activity. Trading starts in the evening and goes on past midnight. Even the resident banks are open till the wee hours in the morning to settle accounts. Everything looks good. But, in reality, all that glitters is not gold. As explained earlier, farmers do not always get a good price and traders do not necessarily get the best quality or the right produce.

The market has 143 trade stalls spread across the 12 acre market manned by commission traders who act as brokers in the transaction between the farmer and buyer. While prices for, say, a particular quality beans maybe LKR 20 a kilo in stall 3, the same could very well be LKR 23 a kilo in stall 123. This is because there is no system for market participants to know the "current" price. There is no central price dissemination mechanism in the market. It lacks transparency. Unlike at the tea auction in Colombo, the best and the biggest in the world where all buyers have the ability to bid on every lot of tea sold guaranteeing the best possible price for the tea seller, hardly any bidding occurs for the farmer's produce. He sells the produce to whomever who may request for his produce at a "reasonable" price, without knowing if that is the best price he can get for the produce.

According to a survey carried out at DDEC just prior to the launch of GGS, it was found that before coming to the market, most farmers depended upon word-of-mouth from other farmers and expect to receive similar prices when in the market.[5] Additionally, the survey also showed that when they are actually in the market, farmers primarily depend on individual commission traders for price information. Thus it is quite clear that it is the information fed by the trader what the farmer receives and uses to base his selling price decision. Another interesting finding was that only about half the farmers bargain for a higher price while the rest do not. It was found that a considerable number among them do not bargain because they are unaware of what the best price is.

3.2 Efficiency at DDEC Spot Market

The first objective of GGS was therefore to create efficiency in the spot market through a certain level of transparency in the market by capturing and disseminating real price data. In order to achieve this, prices of produce bought and sold had to be captured directly at source and disseminated.[6] In the first instance, five large traders were networked and software designed to capture all their transactions directly at source. This immediately dealt with the credibility of the data problem. But with a lot more trade stalls not covered, the problem of breadth had to be solved. In order to address this issue, independent data collectors were recruited to roam the market with wireless hand-held devises to randomly capture price data from across the market. An unintended result was the creation of the largest outdoor Wi-Fi zone in Sri Lanka.

As prices are captured; both directly at source and indirectly via hand held computers, they are dispatched to a central server. Thereafter the data is instantly analysed and pushed out to a number of display screens located at strategic points around the market. At the start of the pilot, these displays were 17-inch computer screens, some hung on walls and others in display kiosks. But, soon it was evident that these screens were too small to attract the attention of the farmers - a group of people who are not only not used to the "computer culture" to recognize these display units, but also averse to technology. Later these screens were replaced by large 8 by 6 foot projector screens hung at 20 feet. The change in reaction was one that ICT for development professionals long to see. From just a couple of farmers

hanging around the small screens, dozens at a time started to congregate by the large display boards. (Figure 1)

Figure 1: Farmers congregating at a display board at DDEC

The highest traded price, the lowest traded price and the last traded "current" price of every type of produce bought and sold are continuously displayed on these screens along with the time they were recorded and the trade stall at which it was recorded. In effect this is an alternative to a more sophisticated auction, something that is not possible at the market within the current infrastructure constraints. Be that as it may, the real-time dissemination of price information is slowly, but surely, leading to the price for produce across the market being negotiated on accurate information. Farmers are instantly able to bargain for the best price at the market. Traders also directly benefit. They could now show the farmer that he is in fact receiving the best possible price in the market at that particular time. In addition, if a farmer is interested in displaying his offer price, he could simply input the same at a participating trader and it would immediately be displayed across the market. This indicates the seller expectation and leads other farmers to form individual expectations based on the quality of their produce.

The price displays were designed to be user-friendly with pictures and numbers as shown in Figure 2, instead of words and numbers keeping in mind the unsophisticated clientele. While literacy is not a problem in Sri Lanka (over 90 percent) this would be of immense help in countries where literacy is low.

Figure 2: Picture based local language price details on display screen at DDEC.

The GGS price dissemination with large screens has not been in place for long enough to undertake a comprehensive study; the main reason being, farmers who visit the market only once in two weeks or so, need to get used to the new information first before they begin using the same regularly. Notwithstanding the above, there is quite an amount of anecdotal evidence coming in to validate the expected outcome from certain types of farmers; mainly the younger and more forward looking farmers. This evidence suggests that the first objective of the pilot to create efficiencies in the spot market for produce already harvested and brought to market is beginning to be met, albeit gradually.[7]

A noteworthy point is that convincing the traders of the need for transparency at the market was perhaps the hardest task of all in implementing GGS. To them, lack of independent price information to the farmer was not an issue; in fact, to most it was to their advantage. The team had to convince these traders over a year prior to implementing the pilot by explaining to them the benefits accruing to them in terms of improved business. These were explained as creating trust among farmers; enabling greater interaction with farmers and buyers who do not physically visit the market; ability to reduce pilfering by trade stall manager by keeping a record of transactions; having a dynamic accounting system that saves time at the end of the trading night and keeping a track of accounts of all trading partners etc. But, a key reason why the Trade Association finally agreed to the pilot perhaps was the belief that technology would somehow improve the efficiency of the market and give them an advantage over similar markets being established across the country. The traders were also strongly influenced by an internal champion who was able to see beyond the threat to the opportunities from GGS.[8]

3.3 Disseminating Prices

The second objective was to disseminate the live prices outside the market so that farmers and collectors could decide whether to bring the produce to DDEC if already harvested, or, if not harvested, whether to wait an extra day or two with the hope of prices moving up if the going prices were too low. Another reason for this dissemination was to

provide the opportunity for farmers to independently verify if the collectors who sell their produce at the market on their behalf were painting an accurate picture of the market prices.

Once the prices are captured dissemination is relatively easy. The price information that is contained in the display boards are made available on the Internet as is. Any farmer or trader anywhere could log on to www.ggs.lk and follow the dynamics of the market, real time. However, given the fact that Internet penetration in rural Sri Lanka is extremely low, the expectation of farmers actually logging on to the website is also very low. It may be the case that rural telecentres may carry this information or even be broadcast over community radio etc. but it will take some time for the Internet media to reach the masses. Taking this fact in to consideration a fully automated voice and fax solution in Sinhala and Tamil was developed to disseminate the prices. The vast majority of farmers who do not have access to a computer, but have access to a telephone, can call a special 3-digit access code and by simply entering a code for his produce obtain real-time prices from DDEC.[9] If he needs additional details or prices of a number of types of produce, he could simply get an automated fax message. For just the telephone charge for the duration of less than a couple of minutes, he could end up earning hundreds, if not thousands of rupees more.[10]

Analysis of traffic data of the website and voice solution seem to point towards regular queries indicating early evidence of the second objective being met. But, more research needs to be undertaken to really understand to what extent those who the information is supposed to benefit are using this information.

3.4 Creating a FSC Platform and Better Access to Crop Finance

Most recently, a pilot information platform for forward sales contracts (FSC) was added to GGS. This is a major breakthrough in using ICT for agriculture marketing and has the potential to become a significant instrument to overcome the problems faced by farmers and traders.

In 1999 the Central Bank of Sri Lanka (CBSL) introduced FSCs as an alternative to government intervention to stabilize prices. It is an agreement by which a farmer agrees to sell, (and a trader agrees to buy) a given quantity of agricultural produce of a specified quality, on a given future date, at a predetermined price. Besides the farmer and the trader, the FSC has to be authorized by a participating bank to be effective.[11] It also gives the bank the opportunity to participate in the financing of either or both the farmer and the trader. Now over four years since its inception, farmers, traders and banks are gradually realizing the benefits of FSC as signing an FSC itself helps the market price for that commodity at harvest to stabilize around the signed price. The CBSL has done an excellent job in promoting the concept and getting the buy-in of numerous farmers and traders. At a practical level, those who have entered into FSC are benefiting immensely. However less than 8 percent of the total paddy crop of 2004 and even less of other crops were under FSC. The lack of an appropriate platform to make the farmer aware who is willing to enter in to an FSC or make the trader aware which farmer, or collector for the most part, has what to sell when is a key

reason behind the slow growth of the FSC programme.[12] The current phase of the GGS pilot, as the first step, has created a simple bulletin board where farmers and traders can post their supply and demand requirement through the traders at DDEC. This facility has not been publicized yet, but would soon be taken to farmer organizations to demonstrate to them how by using the service, which is also linked to participating banks, they can obtain a FSC for the intended produce but also a bank facility freeing them from usurious money lenders.

3.5 Improving Extension Services

Once GGS has a certain minimum reach, it is possible to provide agriculture extension services via the system. As a start the team is in discussion with the Department of Agriculture to disseminate to the farmers innovative multimedia presentations on agricultural technology that are being developed in CD ROM format.

4. GGS way Forward

The foregoing discussion laid out the logic and early learning of the GGS agriculture marketing solution spread across the island based on an ICT network. It is fairly clear that basic access to accurate and timely prices has begun to empower farmers in terms of obtaining a fair price for their produce at DDEC and also provide them with an opportunity to decide where to sell the harvested produce prior to taking the same to the far away market without knowledge of current prices. The phone solution has seen unexpectedly positive results with evidence even from absolutely remote villages accessing the information through facilities sponsored by a number of NGOs. The forward sales contract platform would also soon emerge giving farmers a much broader set of possibilities in deciding what, when and how much to produce. However, GGS is still in pilot phase and has to be scaled up. The following is the expected way forward:

1. At least half of all DDEZ trader stalls (72 stalls) would be networked. This would increase the credibility of the service and also provide the opportunity for greater participation of traders; and through them, more farmers.

2. The price dissemination mechanisms shall be enhanced. This would include radio broadcasting, a television ticker and text message services. It is hope that the reach would increase with the increase of number of channels of dissemination.

3. GGS would to be connected with the emerging telecentre project of *e*Sri Lanka; the "Vishva Gnana Kendra (VGK: meaning global knowledge centre) project". In fact, GGS has just been linked up by VSAT to the rollout of these hundreds of VGK being set up across the island. It is envisaged that GGS would become the core content in the farming communities in which VGKs are being established. It is also envisaged that VGK operators would create "small business windows" to farm

organizations in these areas to help them interact with GGS for mutual benefit, not only for price and FSC information but possibly also for web-cam enabled extension services etc.

4. Other selected agriculture wholesale markets besides DDEC will be connected to GGS and spot price information among these markets shared real time. This would lead to a certain convergence of prices. The immediate plan is to link up all dedicated economic zones across the country.

5. All large supermarkets, wholesale buyers and export companies will be linked to GGS. It is expected that GGS would be the platform for building new partnerships between these large global players and farm associations or collectives (with a minimum size).

For GGS to be a success it must be able to sustain itself. Initial research confirm that a number of revenue streams are possible; for instance a fee from the traders for being connected to GGS in recognition of the individual benefits accrued to them by being able to conduct business with a greater number of farmers, an access fee from VGK and other institutional users in recognition of the benefits accrued to them by reselling or using the information for their decision making and advertising fees from businesses associated with agriculture who wish to purchase space in the live price feeds and the automated voice solution. The objective is to keep the cost to farmers at an absolute minimum to farmers until they are able to sustain a charge.

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[2] Diluk Aluvihare currently at City University of New York, Sriganesh Lokanathan currently at Massachusetts Institute of Technology, Faiq Faiz and Suren Kohombanage of Interblocks Limited, W M Karunaratne of the Central Bank of Sri Lanka, along with Shalitha Warnasuriya, Mangala Wijeratne and P Jinadasa of the DDEC contributed immensely towards the extensive research that resulted in the Govi Gnana Service. S K G S Samantha Kumara continues to play a crucial role in the implementation success.

[3] See www.icta.lk for details.

[4] GGS was proposed by a Consortium of local firms led by e-development labs responsible for the concept, design and development of GGS. The other members of the Consortium were Interblocks Limited, responsible

for the software solution and PricewaterhouseCoopers Lanka for pilot project management (They dropped out during the early stages of implementation). Atlantis One Technologies provided the automated voice solution.

[5] A 300-sample survey was conducted at the DDEZ in early 2004.

[6] There have been many attempts before GGS to capture and disseminate price data from the DDEC. In fact the Agrarian Research and Training Institute still continue this on a daily basis, by asking traders for prices they transacted produce the previous day. But there are two major problems with this method: one is accuracy and the other is timing. There is no incentive for the trader to tell the investigator the truth and by the time the data is processed and published a few days later, the information is only of academic interest.

[7] An evaluation is currently being undertaken.

[8] Mr P Jinadasa, the owner of Dilrukshi Traders is a commerce graduate from the University of Colombo and one of the most successful traders at the market. If not for his belief of the concept and the need to use ICT to make the business of being a commission trader market attractive to his next generation, GGS may not have seen the light of day.

[9] As at end 2004 Sri Lanka had an estimated 300,000 Internet users (including shared use) while there were 3,203,000 phone connections. Sri Lanka's population is 19,400,000.

[10] 066 228 3180 is the hunting number for GGS. In addition, Dialog Telekom assigned 221 as the access code to GGS. GGS is currently discussing with Dialog Telekom (Sri Lanka's largest telecom company with over 2 million mobile phone subscribers; www.dialog.lk) to obtain the services at low cost to the farmers.

[11] Two Government banks, a number of private commercial banks and almost all the regional development banks participate in the FSC scheme.

[12] Another reason is that the financial risk element is embedded in the FSC, which needs to be treated separately.

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