# 4 Literature Review: Learnings from Best Practices: Overview of Related Case Studies

A survey of the Literature reveals that while a large segment of literature is available for food security and for e-governance but not much is available on the application of e-governance in improving food security. However some case studies of computerization of PDS attempted by some States in India are available. In this chapter four case studies have been under taken to study the successful application of e-governance in improving food security and thus reducing pilferage and leakage of foodgrains. These case studies , are in the rural heartland of India , are as below :

1. Computerisation of Paddy Procurement and Public Distribution System in Chattisgarh
2. Implementation of Sugarcane information System in Uttar Pradesh
3. E-governance strategies in procurement and distribution of food grains successfully adopted by ITC, a private company, leading to improved yields and better food management practices thus enhancing food security
4. Barcoded Ration Card & Biometric Food Coupon System for Effective and Efficient Service Delivery in Gujarat

In this context, the key question revolves around *mechanisms* of improvement: *how*, if at all, can PDS reform be enabled, and can this possibly remain successful in the long term. Attempt is made to study the above four cases in order to learn the best practises and draw examples for the computerisation of the food procurement and distribution channels.

## 4.1 Computerisation of PDS in Chattisgarh

This case study discusses the use of ICT to control diversion and leakage in the delivery mechanism and its successful application in computerisation of food grain supply chain. In 2007-08, Government of Chhattisgarh computerised whole food grain supply chain from procurement of paddy at 1532 purchase centres to transportation of PDS commodities to 10416 FPS for further distribution 3.7 million ration card holders, covering 6 different organizations. As an outcome of the project, 0.78 Million farmers

have received computer generated cheques without any delay. Citizen participation has been increased in monitoring PDS (Dhand, Srivastav, Somasekhar and Jaiawal).

In Chhattisgarh, the main agricultural produce is paddy. 2.966 million Families live on farming out of which 1.522 million families are small farmers (having less than 2 hectares of land). Government of Chhattisgarh procures paddy in Chhattisgarh on behalf of Government of India. This scheme benefits about 1 million farmer families by procuring about 3 million metric tonnes of paddy in the Kharif Marketing Season (KMS) of a year, spending about 24000 Million Indian Rupees. (600 Million US Dollars). The procurement takes place through about 1333 Primary Agricultural Societies in the whole state covering geographical area of 135000 Sq. KM. The paddy procured is converted into rice by millers after entering into an agreement, Rice is then handed over to Chhattisgarh State Civil Supplies Corporation to use it in another important scheme for providing food security to the poor i.e. Targeted Public Distribution System.

### 4.1.1 Targeted Public Distribution System (TPDS)

TPDS is a Government of India's scheme to provide food security in the country as detailed in Chapter 2. Under this scheme every Below Poverty Line (BPL) family gets 35 KG rice per month at a subsidized rate of Rs 6.25 per KG.According to this criterion there are about 2.4 Million BPL families in Chhattisgarh. Government of Chhattisgarh further augmented this scheme to give 35 KG rice at Rs 3 to about 3.7 million families. Thus GOI and Government of Chhattisgarh spends about 2500 million Indian Rupees every year as a subsidy to operate this scheme for the benefit of 3.7 Million BPL families.

### 4.1.2 Leakage and Diversion

PDS is widely criticized for diversion and leakages in the delivery. PDS is ranked third in corruption among the 5 basic services (Schooling, Water Supply, PDS, Electricity and Hospitals) according the India Corruption study 2005 done by centre for media studies. [2] It is estimated that 25% diversion takes place before the ration reaches to the beneficiaries [3]. The main objective of total food grain supply chain computerization in Chhattisgarh is to check this diversion. The diversion takes place in three main areas.• Diversion in the procurement itself.

• Diversion in the movement of commodities between CGSCSC warehouses.

• Diversion while transporting to FPS from CGSCSC warehouses.

• Diversion at the FPS level.

The following sections discuss the strategy for use of ICT to check this diversion and its implementation focusing on two important schemes of Government of India - paddy procurement at Minimum Support Price (MSP) and Public Distribution System (PDS) - cover the whole food grain supply chain. The two schemes are described here.

### 4.1.3 Procurement of paddy at Minimum Support Price (MSP)

70% of population of India lives on agriculture. Majority of the farmers are medium and low income group and require selling their produce immediately after production because of mainly two reasons. These farmers do not have adequate storage facilities to store the produce and these farmers require money at the earliest as they have to repay the loans taken for purchasing seeds, fertilizers etc. Based on this weakness, market forces often try to exploit these farmers. At the time of arrival of agricultural produce, market does not come forward to purchase the same and thus rates of the produce come down due to surplus commodity. Farmers are forced to sell their produce at lower rates. As soon as the produce is transferred to the hands of middle-men from farmers, scarcity is created by storing the produce for later use and thus rates rise high. To check this type of practice and ensure farmers get proper price to their produce Government of India operates a scheme to purchase farmer's produce in the season at MSP.

In Chhattisgarh (one of the sates in India), main agricultural produce is paddy. 2.966 million Families live on farming in Chhattisgarh out of which 1.522 million families are small farmers (having less than 2 hectares of land). Government of Chhattisgarh procures paddy in Chhattisgarh on behalf of Government of India. This scheme benefits about 1 million farmer families by procuring about 3 million metric tones of paddy in the Kharif Marketing Season (KMS) of a year, spending about 24000 Million Indian Rupees. (600 Million US Dollars). The procurement takes place through about 1333 Primary Agricultural Societies in the whole state covering geographical area of 135000 Sq. KM. The paddy procured is converted into rice by millers after entering into an agreement, Rice is then handed over to Chhattisgarh State Civil Supplies

Corporation to use it in another important scheme for providing food security to the poor i.e. Targeted Public Distribution System.

The case study is complete process computerization of food grain supply chain in Chhattisgarh from paddy procurement from farmers, its storage, milling and distribution of rice and other commodities to 3.7 million ration card holders through 10,416 Fair Price Shops (FPS). As a part of this project, 1532 Paddy procurement centres, 50 storage centres, all district offices concerned, 99 Civil Supplies Corporation distribution centres and 35 FCI rice receiving centres have been computerized covering six different organizations involved in food grain management viz. Department of food, Marketing Federation(MARKFED), CG State Civil Supplies Corporation (CGSCSC), Food Corporation of India (FCI), Central Cooperative Bank and Primary Agricultural Cooperative Societies (PACS). Purchase and issue at paddy procurement centres including generation of cheques has been computerized. Miller's registration, Agreement with millers and generation of Delivery Orders etc. are computerized. 3.7 million.

### 4.1.4 Paddy Procurement and Milling

Paddy is procured from about one million farmers of Chhattisgarh at MSP at 1532 procurement centres spread throughout the state.

- Since 2007-08, paddy procurement at these centres is done through computers. Paddy Procurement Centres are mainly located at village panchayat level and connectivity is not available at most of these centres. Hence a form based stand alone module has been developed for online purchase of paddy and issue of paddy to millers, storage centres and FCI
- Cheques for payment to farmers and delivery memos for movement of paddy to different places are printed on computer at real time. Special importance has been given to on-the-spot generation of cheques on computers as it reduces the delay in payment to about one million farmers.
- 1532 data entry operators, who are local to the society, were recruited and trained on the operation of PACS Module.
- An interesting innovation of data transmission through motorcycle riders has ensured near real time data transmission from purchase centres to the central server and vice

versa. 250 Motorcycle riders have been hired to carry data everyday from procurement centre computers to block headquarters, where they upload the data on the central server through the internet. Similarly any new version of software and delivery order details are downloaded from the server at the block level by these motorcycle riders, and carried to the procurement centres.

- V-SAT based NICNET connectivity is available in Chhattisgarh at block headquarters in the offices of Janpad Panchayats..
- All operations carried out by the district level offices such as collector office, DMO of MARKFED and DM of CGSCSC as well as head quarters are computerized through web based applications.
- 2 computers each were installed with a form based module at all the 50 storage centres of MARKFED, to receive and issue paddy. 70 Custom Milled Rice (CMR) receiving centres of CGSCSC (subset of 99 distribution centres) and
- 35 CMR receiving centres of FCI are using a web module to generate sample slip, analysis report and acknowledgement report.

### 4.1.5 Unified Ration Card Database and issue of PDS commodities to FPS

- Unified Ration Card database has been prepared. The ration cards are printed using the database.
- Only those ration cards having a unique number and a barcode printed through that database, are valid
- . Since the entire ration cards database has been computerized shop-wise allocations have now been automated. Per card allocations are fed into the computer at the State level. Shop-wise allocations are calculated by the software.
- All Fair Price Shops are required to give declaration of their stocks and sales in the previous month before issue of PDS commodities. These figures are entered in the web application at CGSCSC warehouses.
- Based on allocation, stock and sales figures of FPS, the actual amount of PDS commodities to be issued to the FPS is calculated by the software, and a delivery order is issued on the web application. After the issue of the delivery order a truck challan is issued indicating the truck number,driver's name, quantity dispatched etc.

The truck challan is also generated using the web application. Thus information regarding allocations, stocks, issue and sales for each FPS is now available on the central server.

- At least 10% of this data is physically verified by the staff of the food department every month, and action is taken against any FPS giving false declarations

### 4.1.6 Web-site for Citizen Participation

Citizen awareness and participation in the public delivery system is a major check against diversion and leakage. Hence a citizen interface website has been created. One can lodge complaints, give suggestions. This web-site also provides a method of citizen participation to check diversion of trucks carrying PDS commodities to FPS from warehouse. Citizens can register their mobile numbers on this web-site by selecting one or more FPS of their interest, for participation in the monitoring of PDS. Whenever PDS commodities are dispatched to the FPS from the warehouse an SMS is automatically sent to the registered mobile numbers. This message has the truck number, the quantities of PDS commodities being sent by that truck, and the date and time of dispatch (Figure 1). Thus any one can know exact date and time of truck dispatch with quantities of commodities. Citizens participating in monitoring of PDS can then check whether that truck arrived at the FPS carried full quantities dispatched. They can even get PDS commodities unloaded and stored in the FPS in their presence. If commodities do not arrive at the FPS in full quantity within reasonable time, citizens can register their complaint at the website or through call centre. This message has the truck number, the quantity of PDS commodity being sent by the truck, and the date and time of dispatch. A sample SMS is shown in Figure 1 below.

Shop 4420031 00/Baktara Truck CG04/1439, Rice 87.91 Qtl, Wheat 1.25 Qtl, Sugar 0.0 Qtl, Salt 1.0 Qtl Date 27 Sep 08 11:00.

**Figure 1: Sample of SMS (Kattamuri, 2015)**

This has improved transparency and citizen participation.

### 4.1.7 Truck photograph to server with latitude and longitude of truck position

An application in J2ME has been developed and loaded in a GPS enabled mobile phone with camera to be used at warehouse. When a truck with rice and other

commodities reaches the warehouse for delivery, the truck is photographed using the application and sent to the server. The truck and receiver's photograph along with latitude and longitude reaches the server. Server side program compares the latitude and longitude of truck with latitude and longitude of the warehouse to ensure that the truck is in the warehouse premises by the said date and time. This innovation is helping to check claims made by receiving centres without actually receiving the truck dispatched to a certain extent.

### 4.1.8 Call centre and Complaint Monitoring System

A call centre with a toll free number 1-800-233-3663 is operational. The complaints received by call centre are immediately entered in the system and the complaint number is given to the complainer for further use. All the registered complaints either through call centre or through internet are seen in the inbox of officer concerned login. The officer is supposed to enter the details of enquiry report and action taken on complaints found correct. The status of the complaint is informed to the complainer on demand. Complaint redressal is monitored at directorate and secretariat level for speedy disposal of complaints.

### 4.1.9 Outcomes / Benefits resulting from the Project

Time gap in giving cheques as payment for the paddy procured from farmers is reduced to one day from 3 to 6 days delay in earlier years. During Kharif season 2007-08, cheques are generated through computers on cheque roles and the generation of cheques was instant. 0.78 Million farmers were benefited during the season by receiving computer generated cheques.

- Centralized miller data base and uniform procedures: Computerised millers registration was introduced in this season to check execution of agreement with fake millers. Giving permission for milling, execution of agreement and generation delivery orders are done through web based application. In the manual methods it was very difficult to ensure that uniform procedures are followed in all the districts. Computerization resulted in ensuring uniform procedures throughout the state. Web application led to micromanagement of inventory, resulting in quicker milling, less damage to rice and paddy, and substantial savings.

- Automatic Calculation of monthly allotments eliminated irregularities and mal-practices in granting allotments to FPS. Now it is calculated automatically based on the number of cards in the shop.
- Computerised receipt and issue of PDS commodities at distribution centres resulted in effective monitoring of lifting and increased transparency.
- The SMS alert system, citizen interface web site is encouraging citizen participation in monitoring of PDS.
- Complaint monitoring system increased the speed of action on different complaints due to close monitoring. Call centre operating to accept complaints on department of food has many success stories in controlling diversion.
- Data available on web in the public domain for creating transparency.
- Ration Card database available online: About 3.7 Million ration cards have been prepared through computers in 2007-08. The data is available in a database which is a base for the computerization of PDS. The data is made accessible to public on web. Public can access the following:
    - Village-wise, ward-wise or FPS-wise details individual ration card holders along with his name, father's name and type of ration card.
    - Village-wise, ward-wise number of beneficiaries.
    - Fair price shop details
    - 10416 FPS details are available online
    - FPS wise allotment details
    - Allotment of commodities for PDS schemes are automatically calculated by the system.
    - Allotmentfor other welfare schemes like Mid Day Meal, ICDS. Hostels etc. are entered by District Food Controllers ever month.
    - FPS wise number of cards and allotment of different commodities for the selected month are available online for public view.
- Lifting details are available online: The quantity of commodities reached FPS from Distribution Centres is known as lifting. Delays in lifting are one of the big challenges that department faces. For day to day monitoring of lifting by different districts and distribution centers, lifting details are made available online.

- Sales details of individual FPS: FPS owners are supposed to submit an affidavit ever month with the details of the sales actually made against the allotment for that month. The sales quantities are used to calculate entitlement of quantities that actually be issued to the shop, keeping into account the previous month's balance quantities available in the shop.
- Details of 'RICE FESIVAL (chawal parv): RICE FESTIVAL is an innovative step taken by the department to check diversion. It is nothing but distribution of PDS commodities to the beneficiaries in the presence of public and nominated government officials on pre-specified day in a month. The details of the ration card holders benefited in the rice festival are available on web.
- Details of paddy procurement: Chhattisgarh procures more than 3 Lakh Metric Tons of Paddy on Minimum Support Price (MSP) every year from more than 7 Lakh farmers over a period of 3 months. Paddy procurement is done in 1532 procurement centers in remote areas of the State. The process of paddy procurement involves purchase of paddy, payment to farmers, storage of paddy and its conversion to rice by milling. All these operations are computerized in 2007-08. The following details are available online for increasing transparency.
  - Details 7.8 lakh farmers that sold paddy to different societies.
  - Procurement of paddy by different societies and its transport to FCI, Miller or Storage centre.
  - Details of stock at storage centres.
  - Payment details to farmers.
  - Mandi Purchase Details.
  - The details of Rice procurement-CMR and levy rice received by CGSCSC centres
  - Act and control orders of the department
  - Details of registered mills, permission granted for milling and agreement executed.
  - Complaint lodging and its status.
  - SMS alerts whenever trucks are dispatched to FPS to registered users.

### 4.1.10 Challenges faced in execution of the project

**Lack of connectivity at paddy procurement centres**: Paddy procurement is done in 1532 procurement centres at remote places of the state. Connectivity is not available at these places and daily procurement details are required to be available at the State level. An interesting innovation of data transmission through motorcycle riders has ensured near real time data transmission from purchase centres to the central server and vice versa. V-Sat based NICNET connectivity is available in Chhattisgarh at block headquarters in the offices of Janpad Panchayats. 250 Motorcycle riders have been hired to carry data everyday from procurement centre computers to block headquarters, where they upload the data on the central server through the internet. Similarly any new version of software or other information is downloaded from the server at the block level by these motorcycle riders, and carried to the procurement centres.

**Unreliable Power Supply at procurement centres**: Anticipating bad power supply at procurement centres, generater sets were made available at each centre. Proper earthing and UPS are provided for computers for voltage stabilization.

**Massive data entry of beneficiary details in Ration card database:** About 3.7 Million ration card holder's details are entered in the database for creating computerized ration cards. Since the data was enormous the only option was a decentralized data entry. A windows based form was developed for data entry. In the field Microsoft Access was used for data entry and transporting data to the State Headquarters for convenience. The windows data entry software had elaborate validation checks to minimize mistakes in data entry. In addition to that, a checking software was developed to check the data for mistakes when it was received at the State Headquarters. Once checked the data was imported into Microsoft SQL Server 2005 which was used to generate and print ration cards.

**Font compatibility for Hindi data:** The common problem in storing Hindi data is its compatibility as different people tend to store the data in different fonts which are mutually incompatible. From the very beginning, it was decided to use Unicode only for storing data in all modules. Thus compatibility is achieved.

**Other Challenges**

- Lack of trained manpower

- More than 2500 man days of training and workshops were conducted to meet the challenge.
- Coordination between different departments
- Six different organizations are using different modules of the system which are inter-dependent.
- Coordination between these organizations is a major challenge. Secretary, Department of food took personal interest and coordinated with almost daily meetings and monitoring.

### 4.1.11 Strategy Adopted by the State Government for successful implementation

- Mill registration made compulsory.
- Computerized procurement at PACS made compulsory. Special approval from Managing Director is required for manual procurement at PACS which will be given only for 3 days at a time.
- Computer Generated Delivery Orders and Delivery Memos etc. are made legal.
- Government Order was issued to cancel all manually created ration cards and to give legality only to the computer generated ration cards.
- FPSs were earlier in private hands which resulted in high diversion. FPS were first de-privatized and given to Panchayats, Cooperative Societies, and SHGs etc. Even this reform is not directly related with technology, it proved to be a very good step towards checking of diversion.
- Submission of a declaration with the sales details of the month has been made compulsory under EC act. Based on the declaration, stocks available at FPS are calculated. The quantity of stocks available is subtracted from the allotment and balance is only allowed to be issued. This checks piling up of excess stocks at FPS.
- Allotments were previously given by Food Controller under the supervision of the District Collector. By an officer order the granting of allotment has been automated. The system has been accepted with some initial resistance.
- Computer Generated Delivery Orders and Truck Challans are made legal. Special approval from the Managing Director is required to issue manual delivery orders or truck challans.

- Whole food grain supply chain from paddy procurement from farmers to rice distribution to FPS is computerized without leaving any gaps. Data is captured as and when they are generated.
- National Informatics Centre, a Government of India enterprise is selected as ICT partner for design, development and implementation support. NIC is providing ICT support to the project as internal part of the department rather than external agency. This strategy helped improve sustainability of the system.
- Connectivity has been given highest priority. VSAT network has been established with 200 VSATs connecting all paddy storage centres and CGSCSC distribution centres. Broadband connection and other connectivity has been obtained wherever available as a redundancy.
- Number of workshops has been conducted from the project initiation stage as a matter of strategy to involve the field officers in the development and make them owners of the system.
- Full Dress Rehearsal To create the confidence and test the system in the real environment, 'full dress rehearsal' of the system was conducted from 27th October 2007 to 29th October 2007 where all operations-procurement of paddy, movement of paddy, mill registration, grant of permission, issuance of DO and receipt of CMR-took place with dummy data.

### 4.1.12 Learnings from the study

Use of technology in delivery mechanism can definitely reduce corruption when used in a strategic way. The technology itself cannot check corruption. The technology should be used to create transparency combined with a convenient system for a citizen to lodge complaints with confidence that the complaint will be attended to. Manual methods should be replaced by computerizing processes. Data should be captured as and when they are generated instead of developing MIS applications for entry of data after manual processes are followed. Commitment of higher authorities, Capacity building in the operating personnel and connectivity are the 3 essential things for success and sustainability of any e-governance project enhanced role of gram panchayats in monitoring FPS has led to increased accountability .

## 4.2 Sugarcane Information System

Sugarcane information system, a solution deployed by the state cane commissioner to weed out ill-practices in sugar procurement process, is reaping a rich harvest.This is an e-governance project serving 3 million sugarcane growers selling sugarcane worth $3.0 billion to 125 sugar mills operating in Uttar Pradesh. Each of the 150 million transactions of the growers with Sugar Mills is captured in real time ,uploaded on the website, sent as an SMS and is available on IVRS. The system has increased the income of the farmer by US$169 million and that of the Sugar Mills by US $140 million The Sugarcane Information System (SIS) is the largest rural information technology platform in the country providing a comprehensive solution to all the needs of sugarcane farmers. The SIS is the result of a remarkable collaboration between the government, 125 Sugar Mills and 3million farmers. Recently the Government of India has awarded the Gold Medal for the National Award for e-Governance to this initiative.

### 4.2.1 Background of the SIS

India is the second largest producer of sugar in the world and 50% of national production of Sugar Cane is from Uttar Pradesh. Sugarcane cultivation is the means of livelihood of almost 3 million farmers of the State. The sugarcane produced worth Rs 150 billion (US$ 3.billion -1US$=50INR) is procured by 125 sugar mills operating in the State.

The cultivation of Sugarcane is entirely different from that of wheat or rice because it is a perishable crop which cannot be stored beyond two days after the harvest . Furthermore, the sugar mills are the only purchasers and the procurement is staggered in 12 to 100 instalments over a period of 6 months while payments are made through banks after 14 days supply of sugarcane. Thus there are a large number of physical transactions /interactions between the farmers and sugar mills for the two must maintain regular communication with each other round the year.

### 4.2.2 Farmer –Sugar Mill Interaction

These interactions total upto 150 million for the 3.million sugarcane growers. Each interaction is equally important as it has a direct bearing on the income of the farmers as well as the sugar mills. There was no system that could communicate the outcome of an

interaction/transaction to the farmers or sugar mill management. As a result farmers and sugar mills were facing problems which are as under:

**A)** Problems faced by the farmers

a) *Lack of transparency in the farmer sugar mill interactions:* The parameters pertaining to farmers area under sugarcane, number of supply tickets, weight of sugarcane supplied, payments made etc. Is not available to them. Absence of data sharing/transparency leads to resentment, corruption and presence of middle men.

b) *Wasteful expenditure on travel*: For each information or clarification, the farmer had to travel 25 to 50 km to the sugar mill at least 12 times a year. Each visit cost around Rs. 200 per trip and would consume the entire day.

c) *Lower incomes due to smaller supply to sugar mills*: the farmer gets Rs. 30 per quintal more for sugarcane supplied to a sugar mill as compared to the manufacturers of jaggery. The lack of transparency in supply tickets forced the farmers towards the jiggery units.

d) *Lower incomes because of smaller area under sugarcane*: The cultivation of sugarcane gives an additional income of Rs. 6000 per hectare to the farmer viz-a-viz alternative crops like wheat and rice. Increased area under sugarcane will result in an increase in the income of the farmers.

e) *Reduced weight due to staleness in sugarcane*: After harvest sugarcane starts losing both its sugar content and its weight in the absence of reliable instantaneous communication with sugar mills about supply ticket the farmers harvest their crops 72 to 48 hours before supply. Each delay of 24 hours in supply time will lead to a 4% reduction in weight of sugarcane and financial loss to farmer.

**B)** Problems faced by sugar mills

a) *Loss of Income due to arrival of stale sugarcane:* The fresh sugarcane has a high sugar content which quickly reduces with time. Each reduction of 24 hours in harvest to crush time would increase sugar recovery by .2% leading to an additional income for sugar mills

b) *Lower utilisation of installed capacity:* The 125 sugar mills have installed capacity to crush sugarcane for 180 days in a year whereas availability is sufficient for only 120

days. Due to the farmers diversion towards jiggery producers the sugar mills and farmers

c) *Unnecessary data entry:* The manual weight slip given out at 7000 purchase centre where is then entered into computers. This is an avoidable cost.

### 4.2.3 Implementation of Sugar Cane Information System

The Cane Commissioner launched the Sugarcane Information System (SIS), in May 2010 to bring complete transparency to the interaction/transactions between the farmers, growers' cooperatives and sugar mills. Each of the 125 sugar mills are the independent delivery centres and they have borne the cost of SIS.

The SIS consists of three sub systems i.e website, SMS & Query SMS and IVRS systems operating simultaneously and Hand Held Computers (HHC) for accessing data from remote purchase centres.

1. *Websites:* The website is the most comprehensive method of communication and this data is also the platform for SMS, IVRS and HHC systems. All the 125 sugar mills have websites with identical features and each of the 3.0 million sugarcane growers have personalised password protected web pages containing latest upto the minute information regarding their transactions.
2. *SMS system:* All the 3 million sugarcane farmers have been contacted individually and their mobile number was collected. The SIS sends around 150 million SMS to all the farmers as well as the desired information on the Transactions
3. *IVRS:* The IVRS system is most suitable for low literacy level farmers since it reads out the instructions as well as the desired information on transactions
4. *Hand Held Computers (HHC):* This is a rugged and a cost effective device equipped with a printer and GPRS capability. With the use of HHC the purchase centers of sugar mills have been connected with main computer system of sugar mill via GPRS connections and the sugarcane farmers get printed weight slips and SMS.

The impact of SIS so far is summarized below in table 1:

**Table 1 Impact of SIS for one year (Rizvi, 2012)**

| S. No. | Item | Description |
|---|---|---|
| 1 | Stakeholders | 3.0 million farmers, 125 sugar mills and 168 growers' cooperatives |
| 2 | Websites | 125 websites – one for each sugar mill |
| 3 | Webpages | 25 million webpages with password for each of 3 million farmers |
| 4 | Short Messaging Service (SMS) and Query SMS | 150 million SMSes sent after each interaction free of cost by the sugar mills |
| 5 | Interactive Voice Response System (IVRS) | 15 million hits on toll free lines at each of 125 sugar mills |
| 6 | Increase in income of farmers (annually) | Rs. 8,456 million (169 million US$) |
| 7 | Increase in income of sugar mills (annually) | Rs. 7,000 million (140 million US$) |
| 8 | Cost | Free to all 3.0 million farmers, Cost borne by sugar mills |

The innovations that evolved during implementation of SIS are:

a) *The simultaneous use of 3 mediums* – viz websites, SMS and Query SMS system and IVRS – is a novel and unique approach. Before SIS, all e-Governance initiatives relied on a single medium and was unable to cover all beneficiaries. The simultaneous operation of 3 mediums provides access to all beneficiaries taking into account the varying IT literacy levels of the individual users.

b) *Use of farmers mobiles* : Each of the 3 million farmers get a free update about their interactions/transactions through SMS.

c) *No cost to government or farmers* : The cost of implementation is borne by the sugar mills and the gains far outweigh the costs.

### 4.2.4 Success Achieved by SIS

The SIS has been operational since August 2010. An independent assessment of the results was carried out by Management Development Institute (MDI) Gurgaon. At the National Awards for e-governance, the project was awarded a Gold Medal. The project has also been studied by Indian Institute of Management Lucknow and Indian Institute of Technology Delhi.

All the stake holders, i.e. the sugarcane farmers, the sugar mills and the Government, have reaped financial, educational and social benefits.

The key benefits to the farmers include elimination of middlemen, transparency in the system, increased supply of their produce to the mills, saving of unnecessary travel, increase in farming area under sugarcane and increased weight of the supply of sugarcane. The financial impact of SIS on the farmers is shown in Table 2.

**Table 2 Financial Benefits to Farmers due to SIS (Rizvi, 2012)**

| S. No. | Item | Before SIS | After SIS | Increase in Income in millions of Rupees and millions of US $ |
|---|---|---|---|---|
| 1 | Number of trips to sugar mills/society offices per year | 20 | 4 | Rs. 5220.00 ($104.40) |
| 2 | Time interval between harvest and supply to purchase centres higher weight of supply (hours) | 48 | 24 | Rs. 1546.20 ($30.90) |
| 3 | Higher production supplied to sugar mill vis-a-vis jaggery meets (million hectares) | 56.76 | 64.43 | Rs. 459.80 ($9.20) |
| 4 | Increase in area under sugarcane (million hectares) | 1.79 | 2.25 | Rs. 348.00 ($7.00) |
| 5 | Increase in productivity (tonnes/hectare) | 56.34 | 57.00 | Rs. 891.40 ($17.80) |
| | | | Total: | **Rs. 8465.40 million ($ 169.3 million)** |

SIS also benefits the sugar mills because of supply of fresh sugarcane, enhanced supply of sugarcane and data entry reduction. A summary of impact of SIS on the sugar mills is shown in Table 3.

**Table 3 Financial Benefits to Sugar Mills due to SIS (Rizvi, 2012)**

| S. No. | Item | Before SIS | After SIS | Increase in Income in millions of Rupees and millions of US $ |
|---|---|---|---|---|
| 1 | Time interval between harvest and supply to purchase centres (higher sugar recovery in hours) | 48 | 36 | Rs. 966.00 ($19.30) |
| 2 | Time interval between arrival of sugarcane at purchase centre and supply to the factory (higher sugar recovery in hours) | 18 | 14 | Rs. 579.40 ($11.60) |
| 3 | Cost of data entry of grower wise sugarcane purchase details (no. of entries) | 41.8 million | Zero | Rs. 208.80 ($4.20) |
| 4 | Increase in sugarcane supply to all the sugar mills (million tonnes) | 56.76 | 64.43 | Rs. 5253.00 ($105.10) |
| | | | Total: | **Rs. 7007.20 million ($ 140.10 million)** |

The software package for implementing SIS for a single sugar mill cost Rs. 1.0 million ($ 0.02 million). The package included development of website, software of SMS system, IVRS and HHC. Thus the total cost of implementing SIS was Rs. 125 million ($2.50 million). Compared to this the increase in income of the sugar mills was

Rs. 7,000 million ($140 million). The additional financial benefits accrued by the sugar mills were 56 times the cost of implementation of SIS.

### 4.2.5 Citizen centricity and relevance

The SIS is the result of a unique collaboration between the various stakeholders viz the government i.e. officials of the Cane department, 125 private sugar mills and 168 sugarcane growers cooperative societies. All the 30 lakh farmers are provided with real time information of their interactions related to the area under sugarcane cultivation, supply tickets, weight of sugarcane supplied, payment made ect. Now farmers no longer need to run from pillar to post for getting information. SIS empowered the underprivileged farmers with timely and appropriate information which ultimately rid them of middlemen. Use of Hindi as medium of SMS and IVRS for communication has helped SIS to reach every person irrespective of levels of literacy.

### 4.2.6 Cost to user

SIS is the outcome of an unique collaboration where the project was conceptualised by the government while private enterprise was responsible for its implementation and the farmers benefitted from it. SIS is not funded by the government but by the sugar mill owners but is free for the farmers.

### 4.2.7 Long Term Significance

a. *Low literacy rate no barrier to e-governance*

The successful implementation of SIS in a state with low literacy rate is a remarkable achievement that highlights the fact that an innovative IT solution can penetrate barriers of low literacy and deliver results to the last person. The simultaneous operation of 3 mediums provides access to all beneficiaries taking into account the varying IT literacy levels of the individual users.

b. *Sustainability*

The cost of SIS is borne by the Sugar mills without any budgetary support from the government. The Sugarcane farmers, the growers cooperatives and the sugar mills are receiving considerable financial benefits from SIS while the Government plays the role of a Facilitator.

c. *Penetration of IT in rural areas*

The availability of information through SIS has led to increased use of computers in rural areas. The confidence gained by the farmers on IT tools ect is revolutionary and is an invaluable asset.

d. *Reduction in layers of middlemen and government*

The implementation of SIS has brought complete transparency in all transactions. This has led to elimination of middlemen and has also cut down on the Role of middle level government officials thereby simplifying the system and reducing corruption.

e. *Replicability*

The lessons learned can be replicated in the following areas.

The SIS can be used by all organisations and by Government departments that interact with a large number of people spread over a wide geographical area. The areas where SIS can have a relevance are as follows:

1. Social Welfare Department – inform beneficiaries about release of scholarship and social security pension
2. Primary Education Department- verify attendance of teachers
3. Land records- inform the owners about any change in ownership
4. Rural Development- inform citizens about release of funds for local village body

### 4.2.8 Transferable Lessons Learnt

i. *Use of Technology appropriate to literacy level*

The SIS uses three parallel systems that cater to the varying IT literacy levels of the users,

ii. *Sustainability*

The SIS addresses the financial, social, regulatory and environmental sustainability of the project. All stakeholders benefit substantially from the initiative and this factor ensures its sustainability.

iii. *Decentralised implementation*

Each of the 125 sugar mills were made an independent delivery centre. The sugar mills and sugarcane growers were within close vicinity of each other and thus implementation was easy.

iv. *Decentralised Monitoring*

The 168 cooperative growers societies were given the task of monitoring the implementation. The service provider and the end users were in constant touch leading to a flawless and smooth execution.

v. *Agreed Goals- stakeholder consultation*

The system was designed after incorporating the suggestions of both the farmers as well as the sugar mills. The agreed goals facilitated the implementation in a smooth manner.

vi. *Training*

The sugar mills IT persons were trained to understand the design standards. The time spent on training led to a perfect communication of the cane commissioner's team with the IT personnel of the sugar mills. This ensured that penetration of SIS was quick and upto the design standards. Similarly the farmers were trained on the use of SIS by 168 grower's societies.

### 4.2.9 Recognition and Awards

SIS has won numerous national and international awards. It won the Gold medal of prestigious International Commonwealth CAPAM Innovation Award for 2012. The Government of India has awarded the SIS with the Prime Ministers award for excellence in Public Administration, The Government of India has also conferred the National Award for e-Governance in gold Category. The Indian Institute of Management, Lucknow (IIM Lucknow) and Indian Institute of Technology, Delhi (IIT Delhi) have also studied the impact of SIS. A Microsoft sponsored study has also been conducted on the successful implementation of the project.

## 4.3 ITC's e-Choupal as a tool of Rural Transformations

This brainchild of S Sivakumarand was initiated in June 2000 in Madhya Pradesh for Soya Procurement. Because of the Green Revolution, India's agricultural productivity has improved to the point that it is both self-sufficient and a net exporter of a variety of food grains. Yet most Indian farmers have remained quite poor. The causes include remnants of scarcity-era regulation and an agricultural system based on small, inefficient

landholdings. The agricultural system has traditionally been unfair to primary producers. Soybeans, for example, are an important oilseed crop that has been exempted from India's Small Scale Industries Act to allow for processing in large, modern facilities. Yet 90% of the soybean crop is sold by farmers with small holdings to traders, who act as purchasing agents for buyers at a local, government-mandated marketplace, called a *mandi*. Farmers have only an approximate idea of price trends and have to accept the price offered them at auctions on the day that they bring their grain to the *mandi*. As a result, traders are well positioned to exploit both farmers and buyers through practices that sustain system-wide inefficiencies.

ITC is one of India's leading private companies, with annual revenues of US$2 billion. Its International Business Division was created in 1990 as an agricultural trading company; it now generates US$150 million in revenues annually. The company has initiated an e-Choupal effort that places computers with Internet access in rural farming villages; the e-Choupals serve as both a social gathering place for exchange of information (*choupal* means gathering place in Hindi) and an e-commerce hub. In mid-2003, e-Choupal services reached more than 1 million farmers in nearly 11,000 villages, and the system is expanding rapidly. What began as an effort to re-engineer the procurement process for soy, tobacco, wheat, shrimp, and other cropping systems in rural India has also created a highly profitable distribution and product design channel for the company, an e-commerce platform that is also a low-cost fulfillment system focused on the needs of the farmers. The e-Choupal system has also catalyzed rural transformation that is helping to alleviate rural isolation, create more transparency for farmers, and improve their productivity and incomes. This case analyzes the e-Choupal initiative for soy; efforts in other cropping systems (coffee, wheat, and shrimp aquaculture), while different in detail, reflect the same general approach. The e-Choupal system has also catalyzed rural transformation that is helping to alleviate rural isolation, create more transparency for farmers, and improve their productivity and incomes. This case analyzes the e-Choupal initiative for soy; efforts in other cropping systems (coffee, wheat, and shrimp aquaculture), while different in detail, reflect the same general approach.

### 4.3.1 The Business Model

A pure trading model does not require much capital investment. The e-Choupal model, in contrast, has required that ITC make significant investments to create and maintain its own IT network in rural India and to identify and train a local farmer to manage each e-Choupal. The computer, typically housed in the farmer's house, is linked to the Internet via phone lines or, increasingly, by a VSAT connection, and serves an average of 600 farmers in 10 surrounding villages within about a five kilometer radius. Each e-Choupal costs between US$3,000 and US$6,000 to set up and about US$100 per year to maintain. Using the system costs farmers nothing, but the host farmer, called a *sanchalak*, incurs some operating costs and is obligated by a public oath to serve the entire community; the *sanchalak* benefits from increased prestige and a commission paid him for all e-Choupal transactions. The farmers can use the computer to access daily closing prices on local *mandis*, as well as to track global price trends or find information about new farming techniques—either directly or, because many farmers are illiterate, via the *sanchalak*.

They also use the e-Choupal to order seed, fertilizer, and other products such as consumer goods from ITC or its partners, at prices lower than those available from village traders; the *sanchalak* typically aggregates the village demand for these products and transmits the order to an ITC representative. At harvest time, ITC offers to buy the crop directly from any farmer at the previous day's closing price; the farmer then transports his crop to an ITC processing center, where the crop is weighed electronically and assessed for quality. The farmer is then paid for the crop and a transport fee. "Bonus points," which are exchangeable for products that ITC sells, are given for crops with quality above the norm. In this way, the e-Choupal system bypasses the government-mandated trading *mandis*.

### 4.3.2 The e-Choupal system

The re-engineered e–choupal supply chain looks very different from the existing system and has the following stages:

1. Hub Logistics
2. Weighing& Payment
3. Inspection and Grading

4. Pricing
5. Inbound
6. .Logistics

#### 4.3.2.1 Pricing

The previous day's *mandi* closing price is used to determine the benchmark Fair Average Quality (FAQ) price at the e-Choupal. The benchmark price is static for a given day. This information and the previousday *mandi* prices are communicated to the *sanchalak* through the e-Choupal portal. The commission agents at the *mandi* are responsible for entering daily *mandi* prices into the e-Choupal. If and when the Internet connection fails, the *sanchalak* calls an ITC field presentative.

#### 4.3.2.2 Inspection and Grading

To initiate a sale, the farmer brings a sample of his produce to the e-Choupal. The *sanchalak* inspects the produce and based on his assessment of the quality makes appropriate deductions (if any) to the benchmark price and gives the farmer a conditional quote. The *sanchalak* performs the quality tests in the farmer's presence and must justify any deductions to the farmer. The benchmark price represents the upper limit on the price a *sanchalak* can quote. These simple checks and balances ensure transparency in a process where quality testing and pricing happen at multiple levels. If the farmer chooses to sell his soy to ITC, the *sanchalak* gives him a note capturing his name, his village, particulars about the quality tests (foreign matter and moisture content), approximate quantity and conditional price.

#### 4.3.2.3 Weighing and Payment

The farmer takes the note from the *sanchalak* and proceeds with his crop to the nearest ITC procurement hub, ITC's point for collection of produce and distribution of inputs sold into rural areas. Some procurement hubs are simply ITC's factories that also act as collection points. Others are purely warehousing operations. ITC's goal is to have a processing center within a 30 - 40 kilometer radius of each farmer. There are currently 16 hubs, but there will eventually be 35 in the state of Madhya Pradesh. A chemist visually inspects the soybean and verifies the assessment of the *sanchalak*. It is important to note that this is the only test assessment before the sale. Laboratory testing of the sample for oil content is performed after the sale and does not alter the price. The reason for this is

that farmers, having historically been exploited, are not immediately willing to trust a laboratory test. Therefore pricing is based solely upon tests that can by understood by the farmer. The farmer accepts foreign matter deductions for the presence of stones or hay, based upon the visual comparison of his produce with his neighbors. He will accept moisture content deductions based upon the comparative softness of his produce when he bites it.

ITC is working to change farmer attitudes towards laboratory testing. It is developing an appreciation of better quality by using the subsequent lab tests to reward farmers with bonus points if their quality is good.

#### 4.3.2.4 An IT-Driven Solution

From the conception of the model, an IT-based solution was recognized as fundamental to optimizing effectiveness, scalability, and cost. Information Technology is 20% of all the effort of ITC's e-Choupal business model, but is considered the most crucial 20%. The two goals envisioned for IT are:

- Delivery of real-time information independent of the transaction. In the *mandi* system, delivery, pricing, and sales happen simultaneously, thus binding the farmer to an agent. e-Choupal was seen as a medium of delivering critical market information independent of the *mandi*, thus allowing the farmer an empowered choice of where and when to sell his crop.
- Facilitate collaboration between the many parties required to fulfill the spectrum of farmer needs. As a communication mechanism, this goal is related to the commitment to address the whole system, not just a part of the system.

It should be noted that ITC did not hesitate to install expensive IT infrastructure in places where most people would be wary of visiting overnight. It is a manifestation of the integrity of rural value systems that not a single case of theft, misappropriation, or misuse has been reported among the almost 2,000 e-Choupals.

#### 4.3.2.5 Modularity of Investments, in Size and Scope

ITC managed its investments modularly along the scope and scale axes in what it terms "rollout-fixit-scale up" and "pilot-critical mass-saturation." This incremental control of investment levels along with the clarity of revenue streams and the social import were critical in getting board approval for the initiative.

#### 4.3.2.6 Risk Assessment and Mitigation

ITC identified the following risks as it designed the business model:

- Radical shifts in computing access will break community-based business models.
- The *sanchalaks* are ITC's partners in the community, and as their power and numbers increase, there is a threat of unionization and rent extraction.
- The scope of the operation: the diversity of activities required of every operative and the speed of expansion create real threats to efficient management.

#### 4.3.2.7 Managing Bureaucracy

When the e-Choupals were conceived, they faced a fundamental regulatory obstacle. The Agricultural Produce Marketing Act, under whose aegis *mandis* were established, prohibits procurements outside the *mandi*. ITC convinced the government that e-Choupals would operate according to the spirit of the Act and thus e-Choupal procurement was in line with its goals. Since ITC would not be using the *mandi* infrastructure for its procurement, and would have to incur its own costs with the e-Choupal infrastructure, the government offered to waive the *mandi* tax on the produce procured through the e- Choupal. However, ITC recognized that the tax was a major source of revenue for the government and local *mandis* and, as ITC's competition was also subject to the tax, the tax itself was not making ITC uncompetitive. ITC therefore chose to continue paying the tax rather than risking the relationships with the government and the mandis.

### 4.3.3 Benefits to the Farmer

Farmers benefit from

- more accurate weighing, faster processing time, and prompt payment, and from access to a wide range of information, including accurate market price knowledge, and market trends, which help them decide when, where, and at what price to sell.
- Farmers selling directly to ITC through an e-Choupal typically receive a higher price for their crops than they would receive through the *mandi* system, on average about 2.5% higher (about US$6 per ton).

- The farmers no longer bear the cost of transporting their crops to the *mandi* and are instead reimbursed for transport to the procurement hub.
- The transaction at the ITC hub is also much faster than at the *mandi*, usually taking no more than two or three hours.
- The total benefit to farmers includes lower prices for inputs and other goods, higher yields, and a sense of empowerment.
- The e-Choupal system has had a measurable impact on what farmers chose to do: in areas covered by e-Choupals, the percentage of farmers planting soy has increased dramatically, from 50 to 90% in some regions, while the volume of soy marketed through *mandis* has dropped as much as half.

### 4.3.4 Benefits to ITC

- Net procurement costs that are about 2.5% lower (it saves the commission fee and part of the transport costs it would otherwise pay to traders who serve as its buying agents at the *mandi*).
- It has more direct control over the quality of what it buys.
- The system also provides direct access to the farmer.to information about conditions on the ground, improving planning and building relationships that increase its security of supply.
- The company reports that it recovers its equipment costs from an e-Choupal in the first year of operation and that the venture as a whole is profitable.
- Moreover, farmers are beginning to suggest—and in some cases, demand—that ITC supply new products or services or expand into additional crops, such as onions and potatoes. Thus farmers are becoming a source of product innovation for ITC network as a distribution channel for its products (and those of its partners) and a source of innovation for new products. For example, farmers can buy seeds, fertilizer, and some consumer goods at the ITC processing center, when they bring in their grain. Sanchalaks often aggregate village demand for some products and place a single order, lowering ITC's logistic costs.
- The system is also a channel for soil testing services and for educational efforts to help farmers improve crop quality.

ITC is also exploring partnering with banks to offer farmers access to credit, insurance, and other services that are not currently offered.

### 4.3.5 Development Benefit

The e-Choupal system gives farmers more control over their choices, a higher profit margin on their crops, and access to information that improves their productivity. By providing a more transparent process and empowering local people as key nodes in the system, ITC increases trust and fairness. The increased efficiencies and potential for improving crop quality contribute to making Indian agriculture more competitive. Despite difficulties from undependable phone and electric power infrastructure that sometimes limit hours of use, the system also links farmers and their families to the world. Some *sanchalaks* track futures prices on the Chicago Board of Trade as well as local *mandi* prices, and village children have used the computers for schoolwork, games, and to obtain and print out their academic test results. The result is a significant step toward rural development.

## 4.4 Bar Coded Ration Cards and Biometric Food Coupons in Gujarat

The Government of Gujarat identified that the primary goal was to ensure that the end beneficiary reap the maximum benefit out of the transformation process. While technology can always be used to automate the administration of TPDS, it was essential to make the end beneficiary feel empowered. Keeping this goal in mind, it was possible to come up with a robust distribution mechanism. The key challenges were identified, the first one being the need for elimination/reduction of bogus ration cards which would automatically ensure that ration is distributed only to the target population and not to mischief makers. So, beneficiary identification was the first step in the TPDS transformation process. Further, the next challenge was to devise a full proof architecture which would involve all key stakeholders and make them accountable to the citizens by strengthening the vigilance mechanism. Last but in no way the least, a sustainable solution with a strong leadership was required to ensure that the initiative is not lost into the rigmaroles of the government machinery.

While there were problems with the PDS mechanism all over the country, the following statistics shed light on the key issues in Gujarat:

1. Approximately 45 % of intended beneficiaries were subject to exclusion errors and close to 10 % of beneficiaries were included erroneously.
2. Gujarat was categorized as moderate (10% - 25%) as far as leakage at FPS level was concerned.
3. As far as leakage due to ghost card was concerned, Gujarat was categorized into the High Leakage category (25 % - 50 %).
4. For a survey done in 2003-04, out of a total off take of 320.24 kg/BPL family/annum only 169 kg actually reached the target population while the rest was lost.
5. In the year 2009, approximately 62.5 million beneficiaries were identified through ration card records whereas the overall population was estimated to be 60.5 million which was a big concern.

To briefly lay down the problems with the existing TPDS mechanism, the following pain points were identified:

1. Due to the large number of transactions, monthly reconciliation for MIS reporting and further allotment of quota for upcoming months was very difficult.
2. With manual records, it was difficult to monitor and ensure FPS operations were fair and that grains were not diverted to black market.
3. Citizens were tied to specific FPS making them dependent on these dealers.
4. In the absence of a strong grievance redressal mechanism, citizens could not voice their opinion.
5. Presence of large number of bogus cards meant that ration was regularly being diverted to undeserving candidates.
6. Benefit to citizens was reduced drastically because of too many middlemen feeding into the system.
7. Some Fair Price shops were not viable enough to sustain operations while providing superior quality.

**Stakeholders:** Stakeholder Identification and ranking of the same in order of importance as far as the end goal is concerned is key to implementation of any project. It

helps in identifying the degree of change of roles and responsibilities for each stakeholder and planning out an effective roadmap. The key stakeholders of PDS delivery were:

1. Ration card holder/End Beneficiary
2. e-Gram (CSC)
3. Fair Price Shops
4. Gujarat State Civil Supplies Corporation
5. State/District/Taluka Supply Administration

The end **Beneficiaries** were a) below poverty level ration card holders, b) above poverty level ration card holders and c)Antyodaya Anna Yojana beneficiaries.

At the state level action was taken to address the problems. In the year 2010, the then Civil Supplies Secretary came across the concerning statistics that highlighted the number of registered PDS beneficiaries to be in excess of the total population of the state and this basically triggered the entire re-engineering process. The department figured that the first step to address the identified issues was to reduce bogus ration cards created by false means. The solution comprised of a complete resurvey to recollect beneficiary data along with issuance of bar coded ration cards and centralized management of FPS data in order to track miscreants and improve accountability. Hence, the department developed and implementation strategy which started with creation of new application forms for a fresh survey of beneficiaries. This new application form was designed to capture details of beneficiaries along with other details such as EPIC number, driving license number, BPL number etc. for verification of authenticity by matching these details against already existing databases. This activity itself led to a reduction of 12.8% of ration cards.

The following reforms envisaged as a part of this initiative were directly linked to the TPDS shortcomings identified above.

1. By devising a mechanism where only the end beneficiary can authorize transactions, diversions and leakages can be reduced drastically. This would empower the beneficiaries to safeguard their own rights.
2. Accountability was improved by decentralizing decision making but centralizing TPDS administration.

3. Focus was on the improvement in quality of governance and that of the solution rather than on the technology which would only play a role of facilitator.

To bring about a greater level of surety in beneficiary identification, biometrics of at least one member of the family was also captured leading to a further reduction of around 11% of ration cards. Prior to issuance of bar coded ration cards, photo and biometric details of atleast one adult member of the family was captured at FPS and Village Panchayat level.

The **Leadership and Management** issues were addressed by vesting the ownership of the project would lie with the department itself from development to implementation. A continuous survey to identify true beneficiaries would be done by asking citizens to fill up the newly designed application forms.

Once the most basic task of identifying true beneficiaries was completed, a high level strategy was devised keeping in mind the design, technology and leadership style of the initiative.

### 4.4.1 Modalities of the new Solution

#### 4.4.1.1 Design

1. Authentication of transactions through biometrics of card holders, supply staff, FPS dealers etc.
2. Demand aggregation by considering card holders and FPS dealers as building blocks
3. Freedom of choice of FPS dealer and choice between food coupons and cash coupons

#### 4.4.1.2 Technology

1. Software modules required for computerization were provided by NIC,
2. The architecture envisaged was centralized while the mode of operations were decentralized 4. Project costs were reduced by using ICT infrastructure set up under National eGovernance Plan (NeGP).
3. A biometric based bar coded system was used as shown in Figure 2 below.

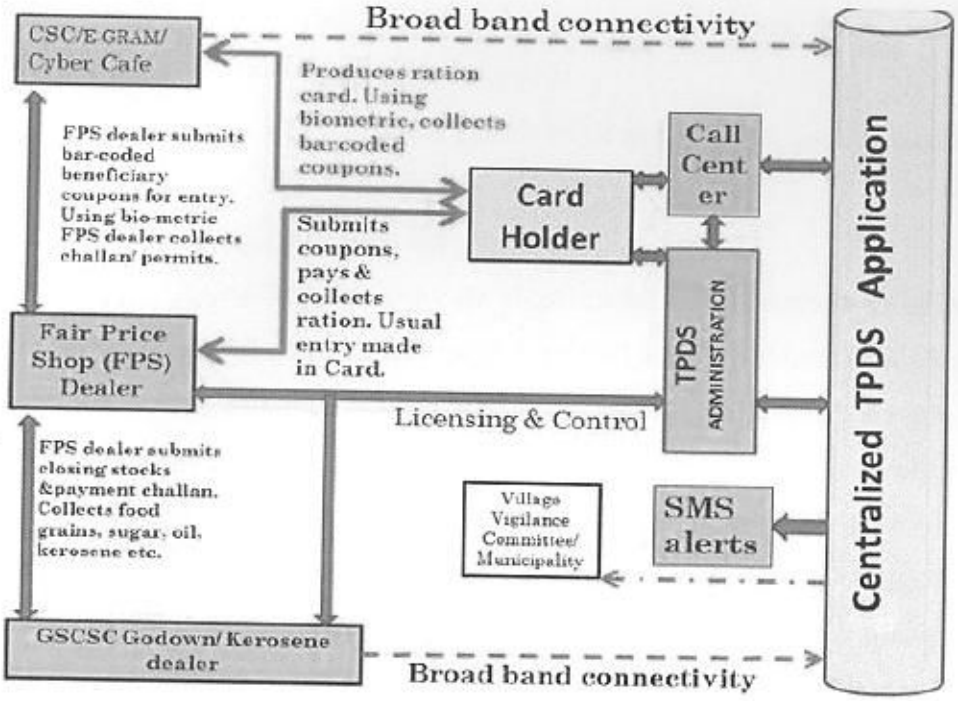


**Figure 2 Biometric based barcoded cupon system (Pwh Coopers, 2014)**

### 4.4.2 Benefits

In the re-engineered process, the following is required to be done by the citizens availing the benefits:

1. e-Gram centers were set up which would provide bar coded coupons for availing PDS facility.
2. Before approaching an FPS, citizens were required to visit the e-Gram facility withtheir bar coded ration cards.
3. The bar coded coupons were made available to citizens after online verification of biometric details of any of the family members. Each coupon sheet contains the name of the card holder, number of family members, FPS dealer's name, quantity price etc.
4. Once the coupon sheet is collected, the citizen must visit the FPS shop allocated to him.
5. FPS dealer makes entry of the sale in the bar coded ration card at the time of sale.
6. At the end of each month, the FPS dealer visits the e-Gram facility and submits the coupons deposited at his shops in order to register the quantity of sale made by him in

a central database. This quantity registered would form the basis of the permit provided to him in the subsequent month.

In order to emphasize on the citizen centricity of the solution, certain additional services are also provided.

#### 4.4.2.1 PDS Transparency Portal

A PDS portal was set up by the department for dissemination of information to the masses. The portal contains information related to card holders, FPS wise list of card holders, details of food grain permits issued to FPS dealers. The portal went on to provide a list of more than 16,000 FPS dealers and information of approximately 6000 superior kerosene providers along with their address and phone numbers for each of the talukas in all districts. It also provides a gas agency wise list of more than 70 lakh LPG connection holders. The portal allows citizens to verify details of their ration cards as well as their monthly entitlements. In fact it is even possible to verify the quota allotted to FPS dealers each month. Needless to say, this introduces transparency and makes most of the information easily accessible to citizens.

#### 4.4.2.2 SMS Alerts

Beneficiaries have the option of registering their mobiles with PDS to get SMS updates related to commodity lifting in particular FPS areas.

#### 4.4.2.3 Call Center

The absence of an easily accessible grievance redressal mechanism had been identified as one of the key pain points in existing PDS. Setting up call centers gives citizens an easy and cost effective way of registering their complaints without having to stand in queues or travel to local offices.

### 4.4.3 Innovativeness of the Project

The innovativeness of the project lies in the fact that the citizen was always kept at the center of all solutions envisaged. It has been often observed that the end goal becomes hazy as and when the complexities of implementation are faced. In this case however, despite the rigorous Process Re-engineering, the project was implemented successfully. This reform initiative establishes that citizen-centric public service delivery can be assured in a hassle-free and cost effective manner, if the technology along with business process re-engineering (BPR) is used in an innovative manner. Design of the

reform processes is such that the official discretion of the District/Taluka Supply Administration has been minimized while optimizing the accountability, transparency and rule based administration. Project roll out has been quite smooth while costs have been kept at the minimum by leveraging available e-Governance infrastructure, to the extent possible. The very design of the Project is based on centralized architecture and therefore, it has been easy to replicate the project across FPS areas in the State.

### 4.4.4 Technology Platform

The Civil Supplies department decided to work with the biometric based bar coded system. All solutions were developed by National Informatics Center. A centralized architecture was developed so that all PDS information could be stored and updated centrally. By leveraging the IT infrastructure made available to the state under National e-Governance Plan, the cost of the project could also be reduced.

### 4.4.5 Issues with existing technology

A major issue was ascertaining card holder's identity by matching Electoral Roll Data (EPIC) and capturing of bio-metric data. Capturing finger print of the right person was also difficult. There was the problem of unavailability of e-Gram center in vicinity. In addition to this, in case of a connectivity failure, citizens had to wait till connectivity was restored in order to avail coupons.

#### 4.4.5.1 Measures to enhance accountability

The transparency level has increased in the overall Governance of the Public Distribution System after the introduction of the Barcoded Ration Card & Biometric Food Coupon Systems. The System is designed in such a way that at each level the roles and responsibilities are fixed and they have to enter the data into the system for subsequent month's processing.

Barcoded ration cards are linked with biometric authentication of the beneficiaries and they have to pass through the process of authorization as well as fingerprint authentication to avail the food coupons. FPS owner needs to validate the collected food coupons to get the subsequent month's food grains as it is linked with the opening stock minus food coupons validated thus resulting in the closing stock.

At each level the accountability has been fixed owing to transparent processes with the help of PDS computerization. Currently, no hand held devices have been made available to FPS dealers; the same has been envisaged for the future and will enable the FPS dealers to capture transactions at the point of distribution.

#### 4.4.5.2 Measures to ensure possibility of replication

Replication across other fair price shops in the state was not an issue due to the centralized architecture of the re-engineered system. In fact, the new process was extremely citizen friendly and also translated into substantial savings for the government and thus was a strong incentive for replicating the solution all over the state post pilot implementation. Moreover, it provided employment opportunity through e-Gram services where citizens can collect coupons. The e-Gram services were made viable as citizens had to pay a small fee to collect coupons. This payment was refunded to the citizens in the form of deduction from the highest cost coupon.

#### 4.4.5.3 Restrictions, if any, in replication and or scalability

While the initial implementation was done in a few pilot villages, replicating the same process over the entire state would bring in complexities while capturing biometric of entire population and distributing bar coded ration cards all over the state. Also, the implementation model was based on the presence of e-Gram services in a well distributed manner. Unavailability of these services would lead to problems in availing coupons without which citizens cannot approach an FPS.

### 4.4.6 Risk Analysis

Some of the risk factors identified were as follows:

1. Requirement of a good strong network of e-Gram services in all areas to cater to citizens without which the entire model would fail.
2. Connectivity of these e-Gram services was essential to ensure uninterrupted service delivery.
3. With a centralized data base to keep track of all PDS activities, any failure at center would cause a state wide collapse.
4. Viability of e-Gram services was essential as they were operated by private vendors who would perish without profits.

5. Stakeholder participation was important to ensure that the roles and responsibilities post re-engineering of processes were complied.
6. Change in leadership sometimes led to projects losing sight.

### 4.4.7 Capacity Building

Capacity building forms an integral part of most e-Governance projects because they employ ICT to facilitate transformation. The re-engineered process is often supported by latest technologies. Without a continuous training and capacity building exercise, the true value addition of the project may not be realized. The State unit of NIC has been involved in the development of software component of TPDS Solution. Software related training has been provided by NIC District Team to various stakeholders involved in the system.

### 4.4.8 Impact on Stakeholders and Beneficiaries

Any comprehensive software solution would require investments into data processing, storage and networking resources. The solution catering to various layers of TPDS administration including the State, District, Block, FPS, card holders and other associated organizations would generate vast amount of data. Instead of evolving a green field software solution in terms of hardware/networking resources across the State/District/Block/FPS level, existing computational and connectivity set up under the National e-Governance Plan (NEGP) was utilized, wherein GoI had already assisted states in setting up of State Wide Area Network (SWAN), State Data Centers (SDC) and several thousand Common Service Centers (CSCs) at the village level. Furthermore, with reduction in the number of fake card holders by about 11%, there have been savings in the quantum essential commodities supplied to the 225 FPS dealers.

As per available data, post digitization of ration cards, beneficiaries are now assured of *right* quantity of food grains at the *right* time. Positive feedbacks have been received from card holders in the pilot FPS areas. The process has led to improved analysis of FPS functioning on monthly basis by means of MIS reporting for each application/process. Concept of pilot FPS in each taluka has been helpful in training the block level supply staff and FPS dealers in implementing this project.

Not only the organization but the citizens find an added value. The services are made available closer to the home of the beneficiaries and to the extent possible through e-Gram at village panchayat. Online forms and facility to take print out of the same from e-Gram have been made available. The village level entrepreneur who runs the e-Gram and authorized cyber café owners have been benefited by earning handsome amount by issuing bio-metric food coupons to the authenticated Barcoded Ration Cardholders. PDS web portal having basic features as under is accessible to all the citizens. It provides a list of FPS dealers and SKO Retailers/ hawkers with address, phone nos. etc. for all Taluka in each of the 26 districts of the State. It also provides FPS-wise list of more than 1.10 Crore ration card holders along with cardholders' name, card category, LPG/PNG/Kerosene status. A district-wise list of SKO Agents and LPG Distributors who lift the SKO and LPG refills from Oil Marketing Companies every month i.e. available on the website. It also lists gas agency-wise list of more than 70 Lakh LPG/PNG gas connection holders in the State. Each card holder can verify his/her ration card details as well as monthly entitlement of essential commodities on this portal. Anyone can verify the authorized quantum of essential commodities to each FPS dealer/ SKO Retailer/ Hawker each month. Citizens can also submit grievance/complaint online. The beneficiaries can register his/her mobile at PDS portal to get PDS commodity lifting related SMS alert linked with FPS Area. They also get SMS alerts regarding the food grain lifted by the FPS owner. They can register their complaint / grievance on the PDS portal as well as on the dedicated Toll-free number. Their grievances are redressed within a stipulated time frame as per the laws of State government.

The other stakeholders have also benefitted from the exercise. Robust conceptualization from various team members has led to the successful design/implementation of reform components. Digitization of the form data has helped in laying a solid foundation in the introduction of transparency, accountability and the ease of PDS administration. Actual transactions in food coupons issued monthly have been drastically reduced due to digitization of ration cards and authorization at various levels. Actual e-permits issued have also been declined due to biometric authorization of FPS owner at collector office and also at Government go-downs.

Thus it can be seen from the above case studies that the implementation of e-Governance solutions has benefitted the farmer, led to increase in production, effective tracking and weighment of the produce and reduction in pilferages at the distribution end of the value chain. These case studies reflect the successful implementation of e-governance solutions in reducing pilferage, increasing citizen participation and improving the overall food security environment in rural India.