# Smart Card based e-Public Distribution System

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**Abstract:** The Government of India in an effort to ensure fair supply of food items under PDS to the targeted underprivileged sections as per the eligibility fixed by the Government of India. In spite of the best efforts by Government officials at various levels, there are a few bottle-necks and inconveniences to the targeted citizens in availing the services provided. All these happen because every job in the ration shop involves manual work. Because of intervention of manual work there are lots of illegal activity occurs. As solution to this problem the proposed system proposes a transparent and highly scalable Ration Distribution (Food Distribution) system with biometric authentication. The conventional paper based ration card is replaced by smart card. The system is placed at each ration shop which is connected to the server through web. Every time before ration collection each user has to login into the system. The user need not to pay the cash money as the appropriate balance is deducted from users bank account, so there is no direct involvement of ration shop owner in transaction. The transaction details are send to users mobile. The government can have overall control and monitoring at each ration shop through web. In addition user as well as ration distributor will get SMS based alert about arrival of commodities. As a result, this new e-PDS system can reduce possible human errors and provide accurate information of public distribution system at any point.

**Index Terms:** Fair Price Shop, Public Distribution System, Unique Identity.

## I. INTRODUCTION

India's Public Distribution System (PDS) with a network of 4.78 Lakh Fair Price Shops (FPS) is perhaps the largest retail system of its type in the world. One of the main problems with this system is the inefficiency in the targeting of beneficiaries and the resulting leakage of subsidies. The TPDS system today supports over 40 crore Indians below the poverty line with monthly supply of subsidized food grains. The system also provides gainful employment for 4.78 Lakh. Fair Price Shops Owners, their employees and hired labour who work at the FCI and state warehousing godowns. One of the main problems with this system is the inefficiency in the targeting of beneficiaries and the resulting leakage of subsidies. The Planning Commission had the following to say on the PDS system in its 2005 report. many systemic challenges that plague the PDS system today "For every Rs 4 spent on the PDS, only Rs 1 reaches the poor" ."57% of the PDS food grain does not reach the intended people ".many systemic challenges that plague the PDS system today are PDS Leakages, Scale and Quality of Issue, System Transparency and Accountability, Grievance Redressed Mechanisms. Keeping in mind the above mentioned factors, it is thus crucial to strengthen the PDS to ensure Adequate supplies, reasonable subsidies and efficient delivery of subsidized food to the deserving people.

In an effort to make the public distribution system (PDS) more efficient, various state government in India has decided to introduce smart cards for the consumers. In the initial phase of the project, system would be installed Special training in operating this system is being given to ration dealers in the state. The computers would keep updated consumer information provide online information of all stocks available in a particular PDS outlet.

In the initial phase of project each user has to register for ration card online from respective ration shop through web and l the form will be scrutinized by s given by smart card. A smart card has a computer chip and enables its holder to purchase goods or avail of services, or perform other operations using data stored on the chip. As Government provides the food, oil and fuel to economically challenged people at subsidized rates which are distributed to the public through ration shops. They also fix an upper limit on the consumption per head. Depending on the number of dependents in a family the system will calculate the upper limit of the rationing and will maintain this record for future references. It can also maintain a log as to which family has been consuming how much.

Once user select the quantity, his account balance is checked and if it is sufficient user will get the items and account will be automatically updated. The proposed system will also be maintaining an account of the material which is coming in the ration shop and will automatically be maintaining the current status so that the owner cannot claim that the goods are over. In all this mechanism will be a boon for the economically challenged people who depend on these shops.

A. Rationing System in Maharashtra
The ration card is issued one per family by the state government. It has three categories extreme poverty level (Antyodaya), below poverty line (BPL) and above poverty line (APL). These poverty lines are defined by the Planning Commission of India every few years based on data collection and analysis from various sources. The table1 shows the different ration cards and scheme provided by Maharashtra government.

The affluent families do not purchase food grains under PDS and therefore with a view to curb diversion of food grains and provides more food grains to the needy families, the State Govt. introduced Tricolor ration card scheme w. e. f. 1st May, 1999. Accordingly, as per following criteria's 3 different colored ration cards are issued in the State. The types of ration card and their eligibility criteria are given below.

• Yellow Ration Cards

The Yellow ration card under Targeted Public Distribution System includes 2 categories.

1. Below Poverty Line(BPL)
The criteria for BPL under Yellow ration card are:

a. Families having annual income up to Rs. 15,000/- having been included in IRDP List of 1997-98.
b. None of the members in the family should be a doctor or a lawyer or an architect or a chartered accountant.
c. None of the members in the family should be a professional tax payer, a sales tax payer or an income tax payer or eligible to pay such tax.
d. The family should not posses residential telephone.
e. The family should not posses four wheeler vehicle.
f. None of the family members should hold total two hectare rain fed or one hectare semi-irrigated or 1/2 hectare irrigated (double in drought prone talukas)

2. Antyodya Anna Yojna
In the state Antyodaya Anna Yojana has been started w.e.f. 1st May 2001. Under this scheme 35 Kgs food grains is distributed to the AAY cardholders. Under this scheme the families are selected from following BPL categories.

a. Land less agriculture laborers, marginal farmers, rural artisans/ craftsmen such as potters, tanners, weavers, blacksmiths, carpenters, slum dwellers and persons earning their livelihood on daily basis in the informal sector like porters, coolies, rickshaw pullers, hand cart pullers, fruit and flower sellers, snake charmers, rag pickers, cobblers, destitute and other similar cat categories in both rural and urban areas.
b. Households headed by Widows or Terminally ill persons or disabled persons or persons aged 60 years or more with no assured means of subsistence or social support.
c. Single widows or terminally ill persons or disabled persons or persons aged 60 years or more with no assured means of subsistence or societal support. Primitive Tribal Households ( Madia, Kolam, katkari).
d. Household headed by leprosy patients or recovered leprosy patients are eligible to get benefits under this scheme.
e. While distributing AAY ration cards to eligible families, priority given to HIV/AIDS affected persons.

• Saffron Ration Cards
The criteria for Saffron ration card are as follows:

a. Families having total annual income of more than Rs. 15,000 and less than 1 lakh.

b. None of the members in the family should have four wheeler mechanical vehicle (excluding taxi- driver).
c. The family in all should not posses four hectare or more irrigated land.

• White Ration Cards
The criteria for Saffron ration card are as follows:

The families having annual income of Rs. 1 Lakh or above, any member of the family possessing a four wheeler or the family aggregately holding more than 4 hectare irrigated land are issued white ration

TABLE 1 Ration card types and respective schemes

| No | Card Type | Category | Food Grains | Price in Rs/Kg | Monthly quantity distributed/family |
|----|-----------|----------|-------------|----------------|--------------------------------------|
| 1 | Yellow | AAY | Wheat | 2 | 35kg |
| | | | Rice | 3 | |
| | | BPL | Wheat | 5 | 35kg |
| | | | Rice | 6 | |
| 2 | Saffron | APL | Wheat | 7.20 | 15kg |
| | | | Rice | 9.60 | |

## II. LITRATURE REVIEW

In this section, we briefly discuss the existing works about Public Distribution System[1] In this automated system conventional ration card is replaced by smartcard in which all the details about users are provided including their AADHAR (social security) number which is used for user authentication. This proposed to use smart card instead of manual ration card with UID for unique authentication.

K. Balakarthik [4] presents an efficient method for the user to buy the products in the ration shop by just flashing the card at the RFID reader at the ration store and the user can check their purchase details in a dedicated website. The paper proposes web site functionality by accepting requests from the user's browser and responds by sending back HTML documents (Web pages) and files.Database creation and GUI design and provides the details of centralized management and updating of database through web.

Rahul J. Jadhav, Dr.Pralhad K. Mudalkar [7], The structure of e-PDS system, software requirements and implementation is mentioned in the paper and it proposed to create different database tables as well as GUI including different login pages.It also defines role of administrator as well as ration distributor.

S.Valarmathy, R.Ramani [9] proposed to use RFID and GSM technology based Ration cards by showing the RFID tag into the RFID reader. Then the controller checks the user codes and details of amounts in the card. After verification, these systems show the amount details. The user need to entered the required materials by using the keyboard, after receiving the materials controller send the information to government office and user through GSM

technology. In this system microcontroller is used for executing the process.

Dhanojmohan, Rathikarani, Gopukumar [5],"Automation in ration shop using PLC'', proposed methodology for ration shop automation using embedded PLC. Further the updation to the government database about the stock available and the user details were carried out. A.N. Madur, Sham Nayse [3] "Automation in Rationing System using Arm 7", this system is based on radio frequency identification of user. First user is authenticated, then system shows the balance of person. User have to enter the amount of Kg he want to withdraw. System checks his account. If the user will have sufficient balance to withdraw the current amount, system will open the valve. Through valve grain will come and it will get weighted by weight sensor. Once the count reached the entered amount controller automatically shut down the valve and updates the account of the user. The updated account information is send to the user's mobile using GSM module.

### III. METHEDOLOGY

#### A. System Architecture

The proposed system consists of two units .Server and Client unit. The server will completely control the activities like customer identification, alerting the customers as well as shop owner at the arrival of grains and updating the database. The Admin have overall access to Server unit by logging into the system. Admin can perform various task which are under his control. The second unit is client unit which is placed at the ration shop. FPS user will interact to the system by this unit and also the user registration process is done by FPS owner at client unit which is connected to server through web. The overall architecture of the system is illustrated in Figure 1, where the main components are shown.
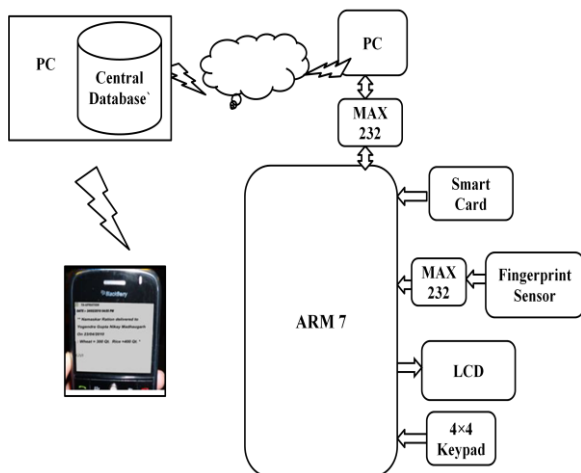


Fig.1 Block diagram of proposed system

All customers have to register for the ration card. The registration is done at main control station. For registration all customers have to provide their personnel details about their family. After this head of family is provided with smart card which is used to buy their monthly ration.

When the ration is dispatched to a ration shop a message is sent to the shop. The message contains the quantity of grains allotted for this month as well as message is send to all customers related to the particular ration shop to alert the customers that their monthly ration has been arrived. At ration shop we are using smart card and Fingerprint authentication for identification. After reading smart card the LCD will display message "Enter UID no". The user will enter UID no through keypad then controller will send this data to server, server will check that ration card is valid or not. If it is valid then it asks for user authentication using fingerprint. Again the fingerprint is verified with database at server side if valid member then, the name and amount of ration allotted is displayed on the LCD. Using keypad customer has to enter the product's corresponding serial number they want to buy along with quantity. After getting the input from the keypad controller will send this data to server, the server will check for account balance and if it is sufficient user can get the commodity otherwise insufficient balance is displayed on LCD. The transaction details are sending to the customers mobile.

#### B. Data Flow Diagram
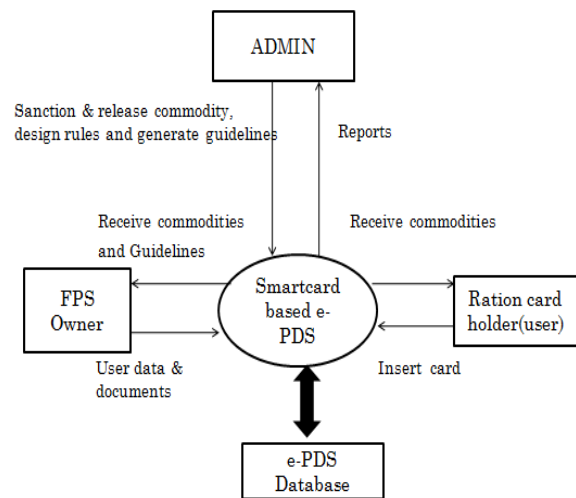The DFD for proposed system is shown in Fig.2



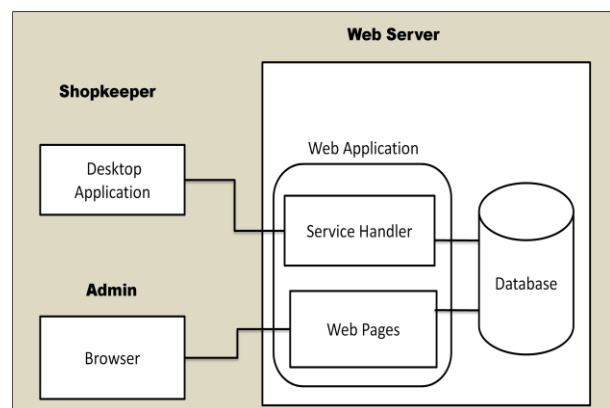Fig.2 DFD of proposed system

#### C. Software Architecture



Fig.3 Software Architecture

The software which acts as an interface between the hardware and the cloud is a windows application. It is a Graphical User Interface which will be accessed by the ration shop owner and government authority. The software architecture is shown in Fig.3

The software is designed in a way that nothing is stored in the local computer and all the details are either retrieved from the cloud or updated in the cloud. This ensures the at most security of the data and tackles any sort of malpractices. The software automates various functions of PDS System like:

1) Replacement of Paper based Ration Cards with Smart Card based Ration Cards authenticated by finger print based biometrics.
2) Fair price shop Operations (Inventory management system)
3) Registration of a new Ration Card
4) Registration of a new ration shop
5) Cancellation/modification of Ration Cards and ration shops
6) Cancellation/addition of member(s) in ration cards and the corresponding database.
7) Identification of Inactive Cards (Bogus Cards)
8) Shop wise allocation and per card allocations
9) Cancellation/modification of Ration Cards.
10) Change in member data for each ration card.
11) Change in the number of Ration Cards per FPS/KO
12) Complaint Monitoring System
13) e-mail and SMS alert
14) Card transfer from one FPS to another
15) Feedback mechanism.

### D. Database

A database is defined as an organized collection of data and tailored to our system, our database is employed to mainly store the user's personal and ration information including tables namely Admin, State, Taluka, City, Shop, Ration Card, Person, Item, Allocations, Purchase Secondarily the database is also used to store data gathered from the online web-interface, such as updated personal information, password, email and mobile numbers by the users. In offering more features to the users, our online system can manipulate the user information by querying the database for complex data retrieval. This includes automated operation, such as summarizing an individual's monthly purchase details.

### E. Graphical User Interface (GUI)

The GUI component of the system is purposely developed for friendly interaction with the users. All types of users, namely the customers, employees and the system administrators are given unique access to their individual member area, where the customers can access their personal information, purchase details and availability of food grains, while the employees can access their shop details and the administrator can access all the details and he can activate or deactivate the user accounts. The developed GUI is in the form of dynamic web pages, which are database driven. This signifies that the information displayed on the web pages are constructed based on the data extracted from the database.

The GUI of the suggested system is designed to be easy-to use and simple. The e-PDS home page is composed of six types of different login pages these are as follows.

1) Admin Login:
2) State level Login
3) District Level Login
4) Taluka Level Login
5) FPS Login
6) Guest Login

**1) Admin Home Page:**
Administrator of the system is involved in following activities:
- Add/Edit/Delete New ration card type.
- Add/Edit/Delete New ration shop owner type.
- Add/Edit/Delete New State.
- Add/Edit/Delete New unit of measurement.
- Add/Edit/Delete New item
- Ration Card type wise allocation of essential commodities.
- Items distribution to the State.
- View feedback
- Send SMS and E-mail.

**2) State User Home Page**
State level user of the system is involved in following activities:
- Add/Edit/Delete New District.
- Add/Edit/Delete New Taluka.
- Add/Edit/Delete New City.
- Add/Edit/Delete New FPS.
- Add/Edit/Delete New ration card.
- Ration Card wise member information.
- Items distribution to the district office.
- Create new district user.
- View feedback
- Send SMS and E-mail.

**3) District User Home Page**
District level user of the system is involved in following activities:
- Add/Edit/Delete New Taluka.
- Add/Edit/Delete New City.
- Add/Edit/Delete New FPS.
- Add/Edit/Delete New ration card.
- Ration Card wise member information.
- Items distribution to the Taluka office.
- Create new Taluka user.
- View feedback
- Send SMS and E-mail.

**4) Taluka User Home Page**
Taluka level user of the system is involved in following activities:
- Add/Edit/Delete New City.
- Add/Edit/Delete New FPS.

- Add/Edit/Delete New ration card.
- Ration Card wise member information.
- Items distribution to the Fair Price Shop.
- Create new FPS user.
- View feedback
- Send SMS and E-mail.
- View Stock.

**5) Fair Price Shop User Home Page**

Fair price shop user of the system is involved in following activities:

- Distribution of items to the Ration card holders.
- View feedback
- Send SMS and E-mail.
- View Stock.

## IV. CONCLUSION

Using this proposed system we can avoid the corruption in rationing system to a large extent by providing transparency at each level. As there is no manual data stored in books or register, all the data is stored in database hence it is easy for higher authority to cross check the data at any point. So implementing this will be really helpful to targeted people.

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## BIOGRAPHIES

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