Technical And Financial Feasibility Of Information Technology Enabled Public Distribution System

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ABSTRACT

This paper tries to address an issue of massive inefficiencies and leakages in one of the largest public distribution systems in the world. Diversion of public distribution system commodities is beyond imagination, and that leads to huge losses to the government and more importantly, the targeted beneficiaries of the public distribution system remain deprived of benefits. This study concludes that it is feasible - both on the technology and the financial front - to establish an effective public distribution system that helps plugging leakages and diversion of commodities and making sure that benefits reach the targeted population and that too, in a country with poor infrastructure, so much so that almost one-sixth of the villages in the country do not even have electricity. In addition, this study highlights how information technology can be leveraged to provide its benefits to the population at the bottom of the pyramid.

Keywords : Public Distribution System, Leakage, Commodities, Corruption, Infrastructure, Information Technology, Food Grains,Smart Cards
JEL Classification: H24, H40, H21, I38

INTRODUCTION

India has the largest public distribution system in the world when it comes to distribution of subsidized commodity necessary for daily living to the economically underprivileged and population that is living below the poverty line. Providing benefits of such a system to the real needy ones on such a large scale calls for an effective and efficient management in terms of procurement, storage and distribution of such commodities in a seamless manner. Unfortunately, that is not happening. We, time and again, see several issues related to inefficiency in procurement, storage and distribution of commodities under the public distribution system. Unscrupulous diversion of commodities meant for the poor is rampant in our country. Procurement is impaired due to petty reasons such as unavailability of gunny bags. Talking about storage - on the one hand, huge quantity of food grains are left in the open at the mercy of nature and gets spoiled, and on the other hand, people are dying in the country due to starvation. There are reports mentioning that almost one-third of the public distribution system commodities are diverted and these never reach the targeted population.

The motivation behind this study is to see if it is possible to have an information technology enabled public distribution system that addresses the issues of diversion and ensures that the benefits of such a system reaches the targeted population.

OBJECTIVE OF THE STUDY

The objective of the study is to design and evaluate the structure of effective and efficient information technology enabled public distribution system in India.

LITERATURE REVIEW

Major problems identified from various studies are leakage, mixing and less weight. Apart from that, the problem of bogus ration cards has also become quite prominent. Diversion of the goods from PDS is rampant. One such study by Tata Economic Consultancy Services attempted to find out how much of PDS supplies are being diverted from the system (fcamin.nic.in/dfpd). The study reported that there was a diversion of 36% of wheat supplies, 31% of rice and

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23% of sugar. Statistically, at 90% confidence level, the actual diversion of wheat would fall in the range of 32-40%, rice in the range of 27-35% and sugar in the range of 20-26%. The Table 1 shows the extent of diversion in various

Table 1 : State & National Level Diversion Of Food Grains

Name of State / UT	Estimated Diversion (%)		
	Wheat	Rice	Sugar
NORTHERN REGION			
1. Delhi	53	53	25
2. Haryana	53	44	28
3. Himachal Pradesh	47	18	8
4. Jammu & Kashmir	28	29	28
5. Punjab	69	40	6
6. Uttar Pradesh	46	49	36
WESTERN REGION			
1. Goa	23	28	6
2. Gujarat	23	21	18
3. Maharashtra	26	30	22
4. Madhya Pradesh	20	24	32
5. Rajasthan	31	36	17
SOUTHERN REGION			
1. Andhra Pradesh	15	19	16
2. Karnataka	30	18	19
3. Kerala	28	23	25
4. Tamil Nadu	24	33	28
EASTERN REGION			
1. Bihar	44	64	47
2. Orissa	39	54	54
3. Sikkim	52	21	41
4. West Bengal	40	34	24
NORTH EASTERN REGION			
1. Arunachal Pradesh	47	56	23
2. Assam	61	64	52
3. Manipur	48	19	37
4. Meghalaya	62	54	39
5. Mizoram	63	54	41
6. Nagaland	100	46	24
7. Tripura	27	33	13
UNION TERRITORIES			
1. Chandigarh	24	12	35
2. Dadra & Nagar Haveli	18	7	26
3. Daman & Diu	40	38	13
4. Puducherry	40	20	39
National Level	**36**	**31**	**23**

Source: http://planningcommission.nic.in/plans/mta/mta-9702/mta-ch8.pdf, pp. 239

States and Union Territories. Mr. Shanta Kumar, the then minister of civil supplies and public distribution, told the Lok Sabha that 36% of wheat and 31% of rice is diverted to the black market (Times of India, Lucknow, December 22, 2000). The Table 1 shows that the diversion is more in Northern, Eastern and North Eastern regions; it is comparatively less in Southern and Western regions. A high 64% diversion of rice was estimated in Bihar and Assam. In the case of wheat, the diversion was an estimated 100% in Nagaland and 69% in Punjab (Table 1).

It is significant to note that the diversion is estimated less in the case of sugar as compared to rice and wheat. The PDS is better organized in towns where sugar is consumed, while its infrastructure is weak in rural areas, especially in poorer Northern, Eastern and North Eastern States. Most of the states suffer from the problems of lack of infrastructure and shortage of funds with government agencies, except for a few in the West and the South. The central government should ensure adequate infrastructural capacities in districts and at block levels to plug leakage of scarce resources, which reportedly helps only contractors, and corrupt government staff and keeps the poor and the needy away. One study claimed that each fair price dealer has to "maintain", on an average, nine government functionaries. It is significant that the allocation to poorer states like UP, Bihar and Assam got more than doubled after the switchover to TPDS, but the off take by the States was poor and by actual BPL beneficiaries, even poorer. The scheme has not made any impact on nutrition levels in those States.

A detailed study on TPDS was published in a paper *'Food Security and the Public Distribution System In Rural Uttar Pradesh'* (Shrivastava, 2001). The study was carried out among 2250 households across 120 villages in 25 districts in four economic regions. It showed that savings through TPDS in UP accounted for only 1.3 percent and 1.1 percent of the cereal budget of households in two lowest units. The scheme hardly helped the poor. This, it was stated, is because the UP government does not lift its quota due to bad administrative arrangements and a substantial portion of whatever is lifted is often sold in the black market. Pricing provides a hefty incentive for an estimated 41 percent leakage. Imperfect targeting has led to exclusion of eligible households. The basis for selecting beneficiaries lacks transparency, and it is too complicated for local officials to administer. There is a lack of political commitment to the TPDS, it was stated, as well as administrative cynicism, while the PDS shopkeeper does not have an adequate incentive. Multiplicity of agencies, poor co-ordination and low administrative accountability have combined to cripple the delivery machinery. Greater local supervision and a clear enunciation of entitlements could help reduce the extent of leakage.

The Tata Report also examined the effectiveness of laws like Essential Commodities Act, 1995 and Prevention of Black-Marketing and Maintenance of Essential Commodities Act, 1980 in checking diversion. The report found no correlation between the frequency of use of Enforcement Acts and the extent of diversion in particular states. In the Northern Region, Uttar Pradesh has more diversion of rice and sugar (as compared to Punjab), despite a higher number of raids and convictions. Similarly, in the West, Gujarat did not appear to be much better managed (than Madhya Pradesh and Rajasthan), despite reporting the highest number of detentions in the country under these Acts.

METHODOLOGY

To minimize problems of diversion at all levels in a Public Distribution System, a preliminary model of the Information Technology Enabled System is proposed, keeping all infrastructural requirements and constraints into consideration. This model is developed keeping in mind the n-logue's business model for IT connectivity in rural India. The n-logue's model (n-logue.com) has been successfully implemented in Tamil Nadu (SARI Project) and in Dhar District of Madhya Pradesh (in association with Gyandoot).

This proposed plan was then discussed in detail with 25 experts in the area of Information Technology and Public Distribution System during experts' opinion survey, which was conducted by way of personal discussions on issues of technological feasibility, financial viability and on some other operational issues. The relevant data on functioning of the public distribution system in Gujarat was collected by meeting officials of Gujarat State Civil Supply Corporation. A model of information technology enabled public distribution system was proposed, and its technical feasibility was checked using experts' opinion method, and financial feasibility was checked using cost-benefit analysis of the system. The feasibility study was carried out during the year 2006 and 2007 for design and implementation of an information technology enabled public distribution system.

DELIVERY SYSTEM IN GUJARAT

❖ Each month, FCI allocates quota to every state in various categories like APL, BPL, Antyodaya Ann Yojana (AAY) separately. The Civil Supply Corporation decides whether to take full allocated quota or not. In the state of Gujarat, the APL family generally gets only kerosene and not the food grains or sugar. So, Gujarat State Civil Supply Corporation (GSCSC) lifts 100% of BPL allocation and for the APL quota, the decision is taken from the past off take record. That record was very poor (less than 1%).

❖ GSCSC then releases the quota to each district on the demand made by the District Supply Officer (DSO). Before release of the quota, GSCSC also compares the past demand data. If any abnormality is found, then the DSO has to justify the change in demand.

❖ In Gujarat, there are 42 godowns owned by FCI and other 192 godowns are owned by GSCSC. Each godown has a minimum storage capacity of 500 tones. Once the demand of DSO is approved, the GSCSC releases the stock and informs the designated transporter to take the goods to the nearest godown in that district / taluka. The transporter generally uses a truck with a capacity of 5000 to 10000 kg. Putting up a cap on permissible transit loss by transporter minimizes the transit loss. For the transporter, permissible transit loss is 30 kg if the goods of 10000 kg are transported for a distance of more than 32 km. If the loss is more than the maximum permissible transit loss, then they will be charged an amount 1.5 times the APL issue price. This is most of the times higher than the prevailing market price. So, it restricts the diversion of goods meant to be distributed under PDS to the open market.

❖ GSCSC repacks the grains procured from FCI in standard packaging of 50 and 100 kg before sending the same to the godowns. This facilitates verification and inspection at the time of unloading at godowns from trucks as well as during inspection at godowns.

❖ In states like Gujarat, the management of transfer from FCI to the state and from the state level to the DSO level (Godown officer at Taluka level) is relatively efficient, and so, the diversion of goods is almost negligible. Even the transit losses and losses in Godowns (storage losses) are also very small. In fact, the whole inventory and store management is computerized. Updated data of stock is transferred from each godown every week to GSCSC state level office, and it is entered into the computers and is then analyzed for further decision making.

❖ The FPS owner gets a license from the Taluka Mamlatdar. The authority of licensing is at the Taluka level. After getting the license and depositing the money into the designated bank's NOA (Non-Operating Account), he goes to the godowns with his own transport facility to lift the quota.

❖ From this point onwards, the problem of leakage starts as there is no check of GSCSC after the FPS owner takes the grains out of the godowns.

❖ Many of them may come with single common vehicle, saying that they are on the same route.

❖ Even though there are vigilance committees at all the levels starting from the village level, including members from all interest groups, the committee itself becomes the biggest source of corruption and tie-ups are found between the vigilance committee members and FPS dealers. In border districts like Panchmahal, the whole quota lifted by FPS owners may be diverted to another state.

❖ Even though the FPS license is issued considering certain criteria, ultimately, there may be only one dominant person controlling all the FPS in the given area.

So, we can say that the key point from where serious diversion of the food grains starts is when the FPS dealer lifts his quota from the godowns.

DISCUSSION ON PROPOSED INFORMATION TECHNOLOGY ENABLED PUBLIC DISTRIBUTION SYSTEM : A CASE STUDY OF GUJARAT STATE

The following model is being proposed after these discussions. The cost of the system is calculated only for the state of Gujarat, which can be scaled up at the national level. The proposal of the new IT enabled system of PDS has been divided into four parts:

1) Operational procedure for the **proposed system**.

2) Superiority of the proposed system over the current system.

3) Checking current IT infrastructure availability and outlining the **requirement of infrastructure** for the proposed system, and looking at various alternatives to meet the shortfall.

4) Cost benefit analysis of the proposed system and finding out the payback period.

❖ **OPERATIONAL PROCEDURE FOR THE PROPOSED SYSTEM :** The broad functionalities of the proposed system are as under :

(a) The system has a back - end server at the District supply officer level, Taluka development officer level, or in any central location so decided, and this is connected to various ration shops in that town through leased lines or with dial up modems.

(b) In the ration shop, a dedicated terminal with embedded software application and smart card reader (point of sales device) is provided. The terminal can operate the main application only and cannot carry out any other function. This application remains fully under the control of the central authority of that city and the data will be replicated at the back - end system.

(c) Smart Cards are issued by a nominated issuing office. Such offices must have the basic complement of hardware - i.e. web camera or electronic thumb pad to be interfaced with the system so that the photographing system for bio-metrics or the thumb impression is stored in the card.

The details of the steps involved in this entire procedure are enumerated in the following paragraphs :

❖ **Digital Database Of The Population :** In the first phase, it is proposed that the digitalized database of the entire population be prepared along with the biometric image of fingerprints using smart card technology. Left thumb impression should be taken looking at its superiority as compared to other alternatives. This is proposed keeping in mind the requirements of a secure identification system to eliminate the loopholes of the current ration-card system. The problem of collecting and including thumb impressions is a mammoth task. To avoid this in the first phase, thumb impressions of only BPL and AAY ration cardholders can be collected. This is more practical because APL ration cardholders in Gujarat only get kerosene under PDS, and the share of APL cardholders (with non-LPG status) in total off take for wheat and rice is less than 10% (Monthly Food Grain Bulletin, Ministry of Food and Distribution, 2004).

❖ **Creating Biometric Image And Data Matching :** To collect the biometric images along with the proposed family entitlement card, thumb impression must be stored in the digital database using smart card technology. A three-month campaign similar to a *"voter's ID card exercise"* can be launched and coordinated at the taluka level. To inform people, fair price shop network, notice at the Gram Panchayat office, and TV and Radio advertisements can be used. In case all members of a family do not turn up to give their fingerprints, only those members who have registered their biometric image in the database can go and buy ration for the family from the shop. In Gujarat, there are around 34 lakh BPL cards, 66 lakh APL cards, and around 11 lakh AAY cardholders. In an ID system that combines smart card and biometric technologies to verify the identity of individuals, a 'live' biometric image (e.g. scan of a fingerprint or hand geometry) is captured when an individual is enrolled in the ID system. Smart cards provide secure, convenient and cost-effective ID technology that stores an enrolled biometric template and compares it to the 'live' biometric template. Unique family identification numbers along with their category (APL/BPL) and their monthly commodity entitlements are stored in the database. The ration card then is replaced by the entitlement card based on debit card technology (Smart Card Initiative, GOI, 2001).

❖ **The Smart Card :** The fields of data stored in the proposed entitlement card are as under :

(a) Unique Identification Number of The Family : This appears on the card . This number should have codes for the state, district, village and family.

(b) Name, Age, Income and Relationship of All Family Members : Name of the head of the family also appears on the card.

(c) Residential Address of The Family : This also appears on the card.

(d) Caste Category and Income Category of The Family: Income category has to appear on the card.

(e) Details of the family's entitlement of ration and other benefits : This information too appears on the card.

(f) Fair Price Shop (FPS) number and name of the shop owner : This information too appears on the card.

This information is to be stored at the Taluka Development officer level and District Supply officer level. And from there, it is uploaded and updated to the higher level. This is possible by using 64 kpbs connectivity available at TDO level under Gujarat State Wide Area Network (GSWAN - www.gswan.gov.in). To get the ration, households must approach the fair price shop with their smart cards instead of ration cards, with the quantity of their monthly entitlements stored in it. The FPS owner then debits the quantity from the original entitlement with the help of the point of sales device (smart card reader). The same will be displayed on the LCD display, and after confirming that the amount being purchased is being displayed on the LCD, the customer makes the payment. This is to ensure that the shopkeeper does not debit an amount more than the purchased amount. And if the details in the card and the database match, then the receipt is generated. In this way, the shopkeeper does not debit more quantity than actually purchased, and only the entitled customer receives the ration. The fair price shop owner then has to upload these receipts to the Taluka Level office on a weekly/daily basis and from there, the updated data of the stock available with the FPS dealer is disseminated to the district and state level, godowns, and also to the gram panchayat level. For the purpose of transparency, the updated information of the stock available to the customers at the FPS of respective villages is displayed in each village at the Panchayat office through a kiosk. Whenever the FPS dealers lift the quantity from the godowns, the information is shared with the taluka level office and the Gram Panchayat, where the stock is then updated accordingly. Entitlements of each cardholder are reset on a monthly basis. And every month, the off take quantity is then compared with the lifted quantity by the fair price shop owner to know if there is any leakage.

❖ **How A Person Can Lodge A Complaint :** The kiosk or community information centre has an electronic machine for sending the complaints. In this machine, after inserting the card, different coloured buttons should be pushed to send a complaint regarding quality of grains, FPS dealer or any other frauds.

❖ **Updating The Database :** The need for record updation from time to time will arise due to the following reasons :

(a) Migration to other taluka, district, state or nation.

(b) Division of family.

(c) Transfer of family member/s.

(d) Death or

(e) Birth of new family member/s.

For updating data for *migration in Gujarat*, data stored in the card as well as in the system is digitally corrected. Here, as the entire system is interlinked, the name is cancelled from the current FPS location and is added in the new FPS location.

❖ **Example:** Suppose family Y is moving from village A in Bhavnagar district to village B in Ahmedabad district. The family can use the same card, and the central database is to be updated by eliminating the data from the Bhavnagar database and transferring it to the Ahmedabad database. The designated FPS in village B will be required to add the family to its database, and it will be deleted from the database of FPS in the village A.

For updating data for *migration outside Gujarat but in India*, data stored in the card as well as in the system needs to be digitally corrected. Here, the entire system in India should be interlinked. Until the time this is achieved, the head of the family should be deemed responsible for reporting the true status of the family.

For updating data for *migration outside India*, data stored in the card as well as in the system needs to be digitally corrected using connectivity with the visa consulate or by getting regular updates from the foreign location.

❖ **Example :** Suppose family X is moving out permanently from India as mentioned above. Their entitlements are cancelled and are informed to the concerned FPS dealer. If only part of the family or a single member is moving out of India, the family entitlements are reduced proportionately and are conveyed to the FPS dealer to make the necessary changes in his database.

In case of *division of family*, no new cards are issued for the divided nuclear families without cancellation of the names from the previous card's data and digital database of the previous family.

❖ **Example:** Suppose a family with eight members is divided into two families of four members each, and they continue to live in the same village. The database is updated by creating a separate record for each family. There may not be any change in total entitlements because there is no change in the total number of members. If they continue to live in the same area, there will not be any change in total entitlements in designated FPS. However, the entitlements of the united family will now be reduced by the entitlements of the four-member family moving out of it, and the new separated family will be issued a new card with separate entitlements for them. No member-data addition is required because the data of each member has already been stored when they were part of the united family. The FPS database is also updated in a similar manner. If the divided family moves to any other district/Taluka, the data is updated in a similar way as it is done for the migration within the state.

Addition or deletion of name because of *birth and death* can be done through updation from registrations of death and birth in the municipal or such offices. Even information network involving crematorium, cemetery and hospitals can also be established to update the unregistered death or birth.

This kind of effort has already started in few states in India itself. For example, the Multi-purpose Household Survey (MPHS) is a project implemented by the government of Andhra Pradesh. This ambitious project, which proposes to cover 1,125 mandals (a mandal is the smallest administrative block above a village) across 23 districts of the state, intends to create a total of 76.5 million records. That is approximately the size of the total population of Andhra Pradesh. Each record gives a graphic detail of the personal, social and economic details of every citizen. The Andhra Pradesh government is looking at this project as an excellent launching pad for effective e-governance. The database has already been put to use at the mandal's level for instant issue of caste certificates, birth certificates and nativity or domicile certificates. The time taken to issue these certificates has come down drastically from 15 days to 15 minutes.

❖ **SUPERIORITY OF THE PROPOSED SYSTEM OVER THE CURRENT SYSTEM :** A secure identification system is mandatory for solving the fundamental problem of verifying whether individuals are who they claim to be. If we can have information technology enabled system for public distribution of goods, then we can minimize the problems of leakage, frauds and abuses. With the help of technology, we can have a flawless and transparent system. To achieve this target, the most suitable system is found to be a replacement of ration cards by smart cards containing ration card information and biometric image of the holders. It is also proposed that in this information technology enabled PDS, all FPSs, taluka development offices, district supply offices and godowns of FCI etc. - all components of the PDS remain connected through leased lines or dial-up modems or via GSWAN. This will aid in instant transformation of data and will lead to automatic updation of all records as well as aid in maintaining consistency in records.

❖ **WHY SMART CARD ? :** One major issue while choosing the type of entitlement document is forgery or illegal duplication/production and usage of the ration cards by unauthorized persons. This issue is gaining greater significance with the passage of time due to difficulty of physical verification of the citizen, or manipulation by the fair price shop dealer. Any security lapse on the citizen interface will have a very large impact on the cost of PDS and on the people living below the poverty line. Other issues related to the choice of ration card document are document life expectancy, cost of issuance, and ease of use by the citizen and availability of technology.

The issue of cost also needs to be seen in the context of total cost of scheme implementation, and life cycle cost, rather than just the cost of issuing a card, or the cost of the card itself. Since the actual issue of cards can at best be completed only once in a reasonable time frame, it must be ensured that the technology allows for the minimum cost over the life cycle of the card, and cost of transactions. Compared to conventional devices such as the booklet form of ration cards and magnetic-stripe cards, smart cards offer enhanced security, convenience and economic benefits. In addition, smart card-based systems are highly configurable to suit individual needs. Also, smart cards incorporate encryption and authentication technologies that can implement requirements of issuer and user for the highest degree of security. Using encryption, contents and data can be securely transferred via wired and wireless networks. Coupled with biometric authentication methods, which rely on personal physical attributes, smart cards are used in distributing government welfare payments in order to reduce frauds and abuse. Smart cards reduce transaction costs by eliminating paper and paper handling costs in government benefit programs.

❖ **Elimination of The Problem of Bogus Cards :** In the current system, it has been found that there are ration cards issued even in bogus names when no such person exists. The reason is that the current system is more subjective in terms of the authority that is lying with the *people* to issue cards. Even if we use a digitally interconnected database, i.e. RDBMS, if bogus data is entered, then it cannot be verified until the identity proofs are checked. To avoid this loophole, digital database with biometric image is the best possible solution. Even if any bogus data is entered, it has to be supplemented with the biometric image, which is unique for everybody. So, the card cannot be duplicated or created.

❖ **Example 1:** Suppose a person X is already registered with the PDS as a part of the family Y. Now, when he moves from town A to town B, he can manipulate the system and get another ration card in town B by greasing the palms of the issuing authority. Then the person X will be getting double entitlements from PDS, one as a part of family Y in town A, and the other in town B. This loophole can be eliminated by using interconnected database of the whole state. This means that now, if he goes to town B and tries to get the system manipulated, the system will not allow duplication of data and so, no card can be issued.

❖ **Example 2 :** There is another possibility that the person X, in consultation with the issuing authority, may generate bogus data of person Z and get the card issued for him as Mr. Z. But with the interconnected digital database, this becomes virtually impossible because bogus data can be generated, but the bogus fingerprint cannot be generated. Thus, the same person cannot have entitlements at two different places in any case.

❖ **REQUIRED IT INFRASTRUCTURE IN GUJARAT :** There are two alternative systems, which can be used. One as suggested by the researchers is to minimize the outlay and can be implemented without any sophisticated technology, the current basic telephone network is sufficient to implement this system. The other is the n-logue business model, which in ₹ 40,000 provides the entire system.

❖ **System One**

Requirements:

a) Point of sales device (Smart Card Reader).

b) Land line Telephone.

c) Power and telephone back up for 5 hours each.

d) LCD or any other digital display device.

e) Personal computer with low-grade Pentium processor with in built modem and necessary software including local language software installed (*Optional*, required only for CIC Community Information Centre).

f) A kiosk for the Gram Panchayat office to display information of stock available for the customers at the FPSs.

g) A device for making complaints at the Gram Panchayat office (Source: Expert's Opinion Survey) .

❖ **System Two :** Looking at the non-viability of the fair price shops, there is a need for public private partnership. According to the model of n-logue, the above stated system with some additional technology can also provide many more services. And thus, it can be made profitable and interest generating for the FPS dealer also. This enhanced system of n-logue will also provide the services of internet connectivity, telephone, computer etc. N-logue was launched to fulfil the need for Internet and voice services in every underserved small town and village in India. With its headquarters in Chennai, it has already successfully enabled internet access in a number of rural areas (the Appendix-1 carries the details on the n-logue system.).

❖ **THE COST BENEFIT ANALYSIS**

1) To connect state, District and Taluka level offices of Civil Supply department and its Godowns, the estimated expenditure is ₹ **3.5 crores**, including the cost of computers, printers, scanners, software, infrastructure etc. This estimation is done on the basis of projected cost of similar connectivity project derived by Government of Tamil Nadu. Gujarat Government has already given cost estimation assignment for this connectivity to Tata Telecom (Source: Expert's opinion Survey).

2) For *System One,* the fair price shop owner is required to have the point of sales device, LCD display and telephone which costs around ₹ 22,000 per Fair Price Shop (FPS). There are around 14000 fair price shops in Gujarat , so the one time cost will be ₹ **26.4 crores.**

3) The cost of smart cards per family with above mentioned specifications would be ₹ 60. Total number of cards required to be issued in Gujarat is around 1.11 crores. This makes it 34 lakh cards for BPL families, 11 lakhs for AAY category, and the remaining for the APL families. So, the total cost of smart cards will be around ₹ **67 crores** and initially, if the Government decides to go for only BPL and AAY category cards, then it will be around ₹ **27 crores.**

4) The overall fixed cost to the government, if it bares all the cost of such a system, will be around ₹ **98 crores** for the state of Gujarat including cost of issuing smart cards to all the households. And if the government decides to go for only BPL cards initially, then the same will be about ₹ **58 crores**.

5) The running cost involves cost of telephone and electricity as well as maintenance of hardware. Some additional costs are to be incurred on training of FPS owners to operate the new system. The running cost will be of maintenance of hardware for which a state level contract can be given to some private agency. The other operating cost to the FPS dealer of telephone and electricity will be around ₹ 2500/annum/dealer, which will be incurred by the dealers.

6)In case the current fair price shops can be converted into IT booths by using n-logue model as per *System Two*, the cost per booth will be around ₹ 40,000 including computer, internet, telephone, power and telephone backup, local language software etc. The n-logue's model has been successfully implemented in Tamil Nadu (SARI Project) and in Dhar District of Madhya Pradesh (in association with *Gyandoot).* The Government of Gujarat can also tie up with n-logue or any other such company for implementation of this model. If this is done, the FPS dealers can simultaneously provide various services to the people at nominal prices, where they can also earn some margin. So the problem of non-viability of FPS because of low offtake can be avoided, plus the people in villages can also have access to the internet and gain a lot of information on agriculture and other useful areas.

This system will have an additional cost of ₹18000/FPS, so the total cost will increase by approximately ₹ **25 crores as compared to model 1.**

BENEFITS OF THE NEW SYSTEM

The new IT enabled system is expected to save administrative cost of salaries of vigilance committees, inspection expenses, etc. The major advantage of this system is that it can plug loopholes causing leakage of the goods from targeted public distribution system. Looking at the results of various research works, it can be seen that the level of leakage in the state of Gujarat was around 25%. Looking at the figures of offtake of wheat for the year 2003-2004, the total distribution of wheat under TPDS was 436110 tonnes. Out of which, only 31162 tonnes were distributed to the APL households, the remaining quantity of around 405000 tonnes was distributed to the BPL and AAY households. Minimum Support Price for wheat for the year 2003-2004 was ₹ 6.2/kg and the other procurement incidentals were in the range of around ₹ 1.55/kg. So, the effective cost of procurement to the Central Government was about ₹ 6.75/kg. The current issue price of wheat in the state of Gujarat for the BPL cardholders is ₹ 2 and the total subsidy (Central Government and State Government) is ₹ 5.75/kg. So, the total subsidy of wheat for BPL+AAY cardholders is around ₹ **232.88 crores**. At the normal leakage rate of 25%, the total amount of leakage on account of subsidy is ₹ **58.22 crores**. As per the new system, leakage is reduced to a great extent, but due to some of the practical problems, it is safe to assume that the leakage cannot be fully eliminated, but it can be reduced from 25% to 5% - which implies that the total saving will be of ₹ **46.5 crores/year.**

Looking at the figures of offtake of rice for the year 2003-2004, it can be found that the total distribution of wheat under TPDS was 134379 tonnes. Out of which, only 10291 tonnes were distributed to the APL households, and the remaining quantity of around 125000 tonnes was distributed to the BPL and AAY households (Food Grain Bulletin, 2004). MSP for the rice (common) for the year 2003-2004 was ₹ 5.5/kg and the other procurement incidentals were in the range of around ₹ 0.55/kg. So, the effective cost of procurement to the Central Government was about ₹ 6/kg. The current issue price of rice in the state of Gujarat for the BPL cardholders is ₹ 3, which means the total subsidy (Central Government and State Government) is ₹ 3/kg. So, the total subsidy of rice for BPL+AAY cardholders is around ₹ **40.3 crores**. At the current leakage rate of 25% , the total amount of leakage on account of subsidy will be ₹ **10 crores**. As mentioned earlier, with the new system, leakage will be only 5% , and the total savings from the leakage of rice will be

₹ 8 crores /year. The total savings from reduction in leakages will be around **₹ 54.5 crores/year.** If we take these savings as the monetary benefit of the new system, and comparing it with the cost of the system, the payback period will be **1.8 years for model**, and **2.1 years for System 2**, if all the category card holders are included in this system.

LIMITATIONS & CHALLENGES

1)Technology changes very fast. The cost of upgrading such a large scale system to make it compatible with other advanced systems has not been considered.

2) Looking at the past experiences, systems like n-logue work well under the limited coverage area, but when it is implemented on a larger scale, such systems fail.

3) Maintenance of such a large system on a continuous basis will be quite complicated, and if it breaks down even for a while, the old vulnerable system will come back into existence and parallel running of the two systems will lead to chaos.

4) Any system for its successful implementation relies on the people who are actually the stakeholders in the system. So, until and unless people become aware and are educated, true advantage of any sophisticated high tech system will remain on paper only and will not be passed on to the people.

Apart from these limitations & challenges, it can be safely concluded that the new proposed system is not only superior, but is also cost effective and that's why it is recommended to be implemented first on a pilot basis with a group of villages, and then can be implemented throughout the state and may be, across the country.

CONCLUSION

There is a definite case for implementing an information technology enabled public distribution system in a phased and customized manner in as many states as possible, and such a system is not only going to be cost effective, but also has a great potential to avoid any leakage and divergence of commodities from the Public Distribution System. Technical as well as financial feasibility is certainly there, but the real challenge is in effective implementation at such a large scale across the country. Having said that, the good news is that mobile density is at record high in the country and Unique Identification Number project is already underway, hence, it can be believed that nationwide implementation of information technology enabled leakage and diversion proof public distribution system is not a farfetched dream.

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APPENDIX-1

INTRODUCTION

N-Logue was launched to fulfil the need for Internet and voice services in every underserved small town and village in India. With headquarters in Chennai, it has already successfully enabled internet access in a number of rural areas.

CONNECTIVITY

CorDECT, an advanced Wireless Access system, is the heart of N-logue's connectivity. Here are the main features of CorDECT :

❖ 35 / 70 kbps Internet access.
❖ 10 Km of line-of-sight connectivity extended to 25 Km using repeaters.

MAINTENANCE

corVIEW OMC Console is the support system for maintenance. Here are the main features :

1) It includes hardware and software configuration, subscriber administration, accounting, fault notification and traffic.

2) The functions range from a bird's eye-view of the operational status of a network of corDECT systems to probing the internals of an individual wall set.

OTHER SERVICES (BENEFITS)

Local service providers in Access Centres. Each access centre includes:

❖ A leased Internet connection to the nearest Internet gateway.
❖ A 60 feet tower with multiple CBSs to transmit the corDECT signal.
❖ A DIU and RAS for routing Internet and voice data.
❖ Radius, NAT and DNS servers.
❖ Software to bill customers on a monthly basis and track the payments.
❖ Local Service Providers only need an operating knowledge of the technology, enough to maintain a satisfactory quality of service - can be any entrepreneur, need not be a Telecom expert.

VILLAGE KIOSKS

❖ Wall Set that receives the wireless corDECT signal.
❖ Branded PC with 15 inch color monitor.
❖ Computer peripherals including speaker, microphone, CD-ROM, digital camera, inkjet printer and sound card.
❖ UPS with battery providing 4 hours of back-up power for PC.

An application suite consisting of word-processing, browsing and email software all in local languages as well as in English, 6-months of unlimited Internet access, a marketing kit, and introductory training provided by n-Logue Telephony equipment including STD-ISD meter for additional ₹ 5000.