CITIZEN CARD

PRE-FEASIBILITY STUDY
FINAL REPORT

GUJARAT INFORMATICS LIMITED

TATA

TATA CONSULTANCY SERVICES

Gujarat Informatics Limited

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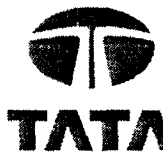
Pre-feasibility Study – Final Report



TATA CONSULTANCY SERVICES
A Division of Tata Sons Limited
801 Sakar II Ellis Bridge Ahmedabad 380 006

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1 Introduction

1.1 Background

Gujarat Informatics Ltd. (GIL) was established as the nodal agency for IT development in the state in February 1999, by the Government of Gujarat. The company was started with a clear objective to promote IT and accelerate the process of E- Governance in the state. Along with the announcement of the IT policy, the Government has enabled GIL to effectively implement IT projects in the state.

GIL entrusted Tata Consultancy Services with the pre-feasibility analysis for taking up the Citizen Card project. The Scope and Terms of Reference for the assignment is given herewith.

1.2 Scope and Terms of Reference

The Scope and Terms of Reference for this assignment are as follows.

- The consultants would explore why a citizen card is required. The potential benefits of this concept to the government as well as the citizens would be studied to objectively bring out the need of the citizen card.
- The consultants would, based on the above, propose the functionality of the citizen card
- To assess the readiness of the proposed functions, the consultants would study computerization in government departments. This would help in identifying and prioritizing the functionality of the citizen card. This would also include the linkage with documents such as - Election Card, Ration Card, Birth Registrations, etc
- To bring out the feasibility of alignment of citizen card with the National Identity Card program. The recommendations on the functional and technological aspects would also take this into consideration for optimizing the investments for the citizen card as well as the national Identity Card.
- Prevalent and upcoming technologies of similar systems would be studied to select a system, which is best suited. Detailed discussions with vendors of card based systems would be undertaken to get a clear picture of their costs and features.
- Based on the above studies, the consultants would recommend the functional and technical features of the citizen card. An overall system would be visualized encompassing the practical aspects.
- The consultant would address issues related to the card, which would include legislative issues such as making the card mandatory, cards for migratory individuals, etc.
- The technological framework based on the functional requirements and issues listed above would be formulated. This would include the hardware and network requirements. The framework would also take into account the software features as well as security aspects. In addition the overall application architecture would be recommended, which would cover aspects such as data storage, data distribution, etc.

- The phases of implementation would be detailed and would cover the time frame, and geographical, population and functional coverage. The consultants would also address key implementation issues such as the implementation structure, implementation agency, initial collection of data etc.
- The project cost would be estimated based on technological architecture, functional requirements and other implementation issues. These would encompass the fixed costs as well as the recurring costs. Phase wise distribution of costs would be given.
- The benefits from the project would be detailed. In addition other sources of revenue generation and sustainability models for the project would be outlined.
- The consultants would recommend a framework for a pilot study of the citizen card. This would encompass the functionality to be covered, the technological framework and project plan. The consultants would also recommend the target population and possible locations. In addition prerequisites for the success of pilot project would be recommended, such as training, promotion, etc.

This final report represents the culmination of research, both secondary and primary and builds on the broad approach that has been delineated in the Inception Report and the presentations made to GIL.

1.3 Structure of the Report

This proposal contains ten sections including this section.

- Section 2 sets out the Objective of the Citizen Card, State's Concerns, Citizen's Concerns and Need of the Citizen Card.
- Section 3 talks about various Case Studies of Citizen Card.
- Section 4 provides details about Status of Departments, Existing System, Prioritization of Functions and Proposed Functionality.
- Section 5 explains Proposed System including Citizen Card, Overview of the System, Citizen and beneficiary Information Systems and System Architecture.
- Section 6 describes about Program Implementation encompassing Implementation Methodology, Implementation Plan and Implementation Issues.
- Section 7 indicates Project Cost and Funding
- Section 8 deals with Benefits to the Citizen, Benefits to the Government and Project Viability Analysis
- Section 9 explains Objective of Citizen Card Pilot, Location for the Pilot, Pilot Cost, Pilot Implementation Agency, Implementation Methodology and Implementation issues.
- Section 10 highlights the Methodology of Success Measurement of Pilot

2 Concept

2.1 Citizen Card – Enabling E-governance

The advent of Internet has changed the way many businesses view service delivery. This is also true for tech-savvy Governments. The word 'e' has caught on in a big way with Governments worldwide. The big draw of bringing together Government and technology is the potential value that it offers to both citizens as well as Government. It is truly a win-win scenario.

Citizen card is a concept that is slowly but surely making its presence felt. With India offering unique challenges to the planners and implementers of any new idea, the fact remains that the success of any strategy depends on how well it can be customized to the needs of the local realities.

Real value of citizen card initiative derives less from simply providing public services by swiping the card rather than from the ability to force an agency to rethink, re-organize and streamline their delivery before doing so, much as the process re-engineering wave that benefited most businesses in the '80s. The benefits can derive from two major areas, one being productivity improvement and the other being cost reduction.

The key thrust of the solution is to achieve visible results in a short period for high-priority Government-Citizen interface areas.

2.2 Objectives of Citizen Card

The strategic objective of Citizen Card is to support and simplify delivery of services for all parties: government, citizens and businesses. The use of Information and Communication Technologies can connect all the three parties and support their processes and activities. In e-governance, electronic means are used to support and stimulate good governance. Therefore the objectives of use of citizen card help in fulfilling objectives of good governance. Good governance can be seen as an exercise of economic, political and administrative authority to better manage the affairs of a country at all levels- national and local. The other objectives of the Citizen Card implementation are as follows:

1. To establish identity of a citizen and to provide proof of personal details
2. To integrated and improved "intake" of citizens for various benefit schemes / programmes of the departments
3. Measure and report the effectiveness of the various benefit schemes.
4. Verification of the genuineness of claims and detection of any double claims is also another objective which citizen card solution would like to achieve.
5. Usage as multipurpose single card for citizens

2.3 The State's Point of View

The citizen card concept would have to take into view the political willingness for the project as well for the proposed functionality. Legislative issues, that could facilitate the citizen card's proposed functionality would also be an important aspect to be addressed. In addition issues related to the acceptability of the card outside the state, Migrants from other state, etc would have to be looked into.

The feasibility of alignment of citizen card with the National Identity Card program would have to be brought out. The assignment would also have to consider optimization of existing investments for the National Identity Card as well as the state government's initiatives.

2.4 The Citizen's Concerns

There are several issues that would be of concern to the citizen. These would have to be addressed before moving ahead with the project

- *The card could be made compulsory or optional.* Making the card optional would require that the card offer significant benefit to the citizen to generate interest and momentum driving towards successful implementation of the card.

- *When - at what age?* The age of issue of the card would have to be defined so as to provide the card to those who could derive benefit from it.

- *Why should I pay?* The pricing of the card would have to be related to its cost, benefits to the user as well as their willingness to pay.

- *What benefits do I get?* The perceived benefits to the citizens would be a driving factor for the citizen card project.

- *What if I lose the card?* The appropriate system for replacement of the card would have to be kept in mind – especially from the viewpoint of costs, security, etc

- *Loss of privacy:* The card could mean a potential threat to citizen's privacy as they could be tracked.

- *Potential for harassment:* The card could be a potential tool for harassment and discrimination. The card design would have to take into consideration this issue to ensure its success.

- *Use by Illiterates:* The card would have to be designed to facilitate ease of use by all sections of the society, including the illiterates

- *How many cards do I keep?* The citizen already has several cards and documents (Ration Card, Driving License, Voter ID card). Does he need an additional card?

This report dwells on these issues and has addressed them in the subsequent sections. But the key to all these issues lies in the approach taken for promoting the citizen card as a multipurpose card and the way it is implemented.

2.5 The Need for a Citizen Card

The fundamental question for the government in the context of citizen card is - Why do we need the citizen card? The need for a citizen card, though not obvious, arises from several factors. Some of these factors that necessitate the citizen card are listed below:

- *Better service delivery*

  Better service delivery to citizen could be facilitated through a common citizen database. This database could be used for more efficient citizen services. This would also simplify procedures for both the government as well as the citizens.

- *Optimize subsidies and public support systems*

  One of the most difficult issues that the government will have to address is that of subsidies reaching the target section of society. This is an extremely difficult task and often the subsidies are misused at the cost of the target population. The citizen card could bring into play, a mechanism for efficient and effective public support system.

- *Maximize tax collection and plug leakage*

  The citizen card could ensure that the tax collection is maximized with minimum leakage. This could be made possible by making it mandatory to list the citizen card number in all transactions. This would ensure that all transactions are tracked and tax leakage is plugged.

- *Reliable and standardized method of identity*

  At present, there is no reliable and standardized method of identifying an individual. The identity of an individual is presently being proved with multiple 'Identity' requirements.

- *Increase individual - government transactional efficiency*

  The electronic delivery of services would enhance individual - government transactional efficiency by reducing manual entry of information and reducing paperwork.

- *Support e-governance initiatives*

  The citizen card could go a long way in supporting e-governance initiatives of the state. Since computerization would be mandatory to utilize most of the benefits of the citizen card, e-governance could be an important outcome of the citizen card implementation.

- *Existence of multiple cards and documents*

  The citizen has several existing cards – driving license, ration card, voter identity card etc. – these could be replaced by a single card.

- *Statistical Information*

  There exists little infrastructure with government to obtain recent and relevant statistics on social and economic parameters as well as the performance of various welfare measures taken by government. The citizen card system could be a beginning in this area by becoming a citizen's information repository.

3 Citizen Card Case Studies

The consultants undertook a desk study and analysis of systems similar to the citizen card. Among around 25 cases, the consultants selected a set of seven cases that were relevant, differing in their application and provided valuable learning that could be applied to this project. The cases that were studied were analyzed from different viewpoints which include the purpose, system, implementation methodology, use by various agencies, changes required, etc. The subsequent sections describes the case studies in greater details and concludes with the learning that must be kept in mind for implementing the citizen card project in Gujarat.

3.1 Nishan – National Identity System Home Affairs Network

3.1.1 Background

The Ministry of Home Affairs, Government of India entrusted Tata Consultancy Services with the preparation of a detailed feasibility report for implementing a National Identity Cards System in India.

The Union Home Secretary of India, triggered an acronym for this national assignment, which the consultants believe is invaluable to its successful implementation, probably even more so than all the research and analysis that was done for this assignment.

$N_{ational}$ $I_{dentity}$ S_{ystem} H_{ome} A_{ffairs} N_{etwork}

3.1.2 The Nishan Architecture

- The Nishan system will be a co-located system.
- There will be no data validation at any of the distribution, access or backbone nodes. All the verification of data will be done at the central site.
- Link back-ups will be required to maximize system uptime.
- Data backup at the central location will be carried out at regular intervals to facilitate disaster recovery.

3.1.3 Nishan Application Architecture

Nishan's multi-tier application architecture includes three tiers and these are as follows:

- *Client Tier:* Client application for Nishan is the data capture application including user authentication and data uploading components. All the processing of the client applications will be done at the application server end.
- *Mid Tier:* Nishan applications that belong to mid-tier are data verification, card production and dispatch application in addition biometrics and applications that will interface with external components like income tax, electoral databases, etc.
- *Data Source Tier:* Nishan database containing biometrics, digital photos, scanned documents, and applicants' demographic information will belong to this tier of the

application architecture. To avoid technical and administrative complexity and reduce cost, a single RDBMS platform is recommended.

3.1.4 Network Architecture

The network architecture for Nishan is summarized in the table below:

	Number of nodes	Bandwidth requirement
Collection unit layer	15,000 x 4	
Distribution layer nodes	462	8Mbps - 30Mbps
Access layer nodes	43	30Mbps - 60Mbps
Backbone layer nodes	5	100Mbps – 170Mbps.

In addition to the above central location, servers will comprise of Nishan databases replicated from backbone nodes, applications for processing the data, external databases for verification, card production system and backup of captured data.

3.1.5 The Card - NISHAN

While globally paper cards are the norm, there is a significant move towards plastic card form of identity. The consultants have analyzed a cross-section of firms representing ID card manufacturing, personalization and equipment production and recommend the following option:

Vendor:: DataCard, USA

- Expected life of 10 years, very highly secured with holographic topcoat, laser engraving, variable micro-text, and color photo
- Front Color Photo @300 dpi
- Front Laser Engraving for personal Name, DOB, Sex, verification type and reference, signature, Personal ID No, booth reference, validity with alphanumeric details in English and local language. It will also put the ID No. in micro-text for additional security.

The recommended codification for Nishan is:

□□□□□□	□□	□□□□□
(6 digit postal code)	(2 digit partition code)	(5 digits random code)

Once the cards are produced and the Master Database is updated, the cards will be dispatched from the card production center through Indian postal system. The document would be securely delivered to the enrolment center, which will inform applicants to collect their cards against a biometric signoff.

3.1.6 Citizen Database for the ID Card

Looking into the enormous task of building up a reliable database, the consultants recommended a privately managed data capture operation. This could exploit the abundance of cheaply available human resources and maintain the infrastructure at a minimal expense.

This data capture option is based on private initiative, with the data being owned and

secured by the government. For sensitive areas, the government machinery could plan, initiate and carry out the data capture through online or paper based forms. For a majority of the Indian population, the market model with online workstations could be deployed.

A decentralized approach is not recommended as the project might get embroiled in a state's administrative structure, which is not desirable. A multi-lingual ID card is not recommended as most of the Nishan card data is numerical, image and encoded fingerprints. The textual data, a person's name and gender, is obviously recallable and could be printed in English. The recommended data type to be captured for Nishan is:

Data capture scope	personal details, present address, biometrics and details of the immediate family – implying a repeat data capture for family members who are 16 years and above and only recording the name and age of the children below 16 years
Personal details	name, date of birth, gender, parent or guardian's name, place of birth.
Biometrics	fingerprints, hand geometry and a digital photograph

It was recommended that Nishan data capture process prioritize accuracy over that of speed.

3.1.7 Verification Process

The verification process for Nishan is follows:

- *Verification Step One:* The verification process commences with an individual presenting proof of identity at a collection center, such as Electoral roll number, Passport number, Income Tax PAN. The verifier at the collection center will sight the original or attested copy of the document[s] and record the reference number[s] along with the personal data. The verifier will also scan the documents.
- *Verification Step Two:* After an individual's data is received at the central location, the biometric template will be selectively matched to crosscheck duplicate entries. This to assure that a set of biometrics is not being utilized to create duplicate entries.
- *Verification Step Three:* After the biometric verification, an applicant's data record will be cross-matched with either one [or more] of the references that have been submitted at the time of data collection. A perfect cross-reference will signal that the individual's identity card may be processed, printed and dispatched.
- *Verification Step Four:* In the case of an unsuccessful cross-reference, image files of the verification proof will be retrieved to establish whether there was a data-entry error or the data needs to be re-verified at the field level.
- *Verification Step Five:* In the case of an unsuccessful resolution in the preceding step four, a field level verification and/or investigation will be carried out by the local police, which will ascertain the reason for a no-match and feedback their findings to Nishan through a collection center.

It is recommended that during the enrolment process, data is also captured for persons with no ID proof. That will be an essential starting point to create an identity reference for those people outside the socio-economic stream.

3.1.8 Project Implementation Schedule

Nishan is conceived as a dynamically updateable identity card system or network. The initial enrolment should not be compressed within three years or less, as even three years is an unprecedented and very aggressive schedule. While a two-year implementation is unrealistic, stretching the schedule beyond five or six years will be counterproductive. A pilot implementation phase followed by a five-phase approach has been proposed.

Table 3-1 Nishan project implementation schedule

Process	Milestones	Minimum process time [box = 3 mths]	Comment
RFI	High level decision to go ahead	1 year | 2 years | 3 years	Very ambitious
	Enact legislation		RFI not necessary
	Advertise RFI		RFP longer w/o RFI
	RFI submission		Cumbersome negotiations
	Evaluate RFI and shortlist		Consortium wants minimum payback
RFP	Prepare RFP		Govt. wants maximum coverage
	Advertise RFP		
	RFP submission		
Bidding evaluation	Evaluate RFP		
	Select consortium		

The pilot phase of Nishan is estimated in terms of population numbers around 20 to 30 million. The ability to hasten the pilot phase award will substantially enhance the negotiation ability of the government vis-à-vis the consortium and systems integrator.

The consultants strongly recommend that the Government of India establish a Special Purpose Vehicle [SPV] to implement Nishan. The SPV's equity structure will represent the financial commitment of the government and stakeholders from the systems integrator, vendor and technical community.

3.1.9 Benefits

Though Nishan offers no benefit on commencement, yet is essential to enhance internal security. It is increasingly appreciated that national resources are not optimally configured, whether relating to revenue collection, planned expenditure, subsidies or even utilization of public utilities. A biometric-based national identity system will be a powerful deterrent to this sub-optimal manner of resource utilization. Nishan would also have a direct impact leading to increased revenues and cost savings by increasing tax collection and checking abuse of subsidies and public support systems. The system would enable methodical crosscheck of population who are not only not taxed but avail of subsidies in various forms.

3.1.10 Financial Feasibility

The total project capital expenditure over ten years works out to Rs.1,584 crores, which is excluding the Rs. 600 crore required for data collection centers. In addition to capital expenditure, Nishan's recurring expenses are on account of card and consumables, network and application management costs that amount to Rs 1,800 crore. To sum up, project costs aggregate Rs 4,000 crore, excluding establishment, management, cost of capital, legal and fiber connectivity charges.

3.1.11 Revenue Model

To fund the Rs. 4,000 crore project cost, revenue for the proposed SPV be from the following:

The Government of India pays out Rs 5 per card issued by the SPV
Each citizen pays out Rs 50 per card for new enrolments and Rs 100 per card for replacements, excluding the residents of sensitive areas and remote rural areas, which account for 15 percent of the population. It is assumed that 20 percent of the population will not be required to pay for first card issuance.
Government agencies such as passport or transport, who could pay for speedier verification through the Nishan database

The very poor in urban and suburban areas who cannot afford the card fee can avail of a subsidized free card through the local administration or local police station after necessary procedures and processes.

It also expected that Nishan represents crucial IT infrastructure and will avail of zero taxation benefits. The card fees inflows from the citizens alone will not be able to sustain the project and will eventually result in erosion of capital. Therefore, for long term sustainability of Nishan project, the citizen card fees will need to be supplemented by pay out of at least Rs 5 per card from the government.

3.2 Kerala Ration Card

Kerala government has initiated smart card based ration card from October 2001. Thus far, around 2,500 ration cardholders in Kerala's Capital, Thiruvananthapuram, have been covered by the smart ration cards. The initiative plans to build up a digital database of the State's 70-lakh ration card holders, with the Kerala Civil Supplies Department rolling out a pilot project in five ration shops in the capital.

Users will have to shell out Rs 40 for a smart card compared to Rs 15 for an ordinary card, but once the project is implemented across the State, the cost is expected to come down to around Rs 20 per card. The total cost of the project is estimated around Rs 20 crore.

The system envisages installation of a smart card reader (like a credit card reader) at the ration shop. When the card is swiped at the reader, the bill would be automatically printed and it would ensure that no sale could take place without a bill. The data in the smart card can be uploaded through a network or be physically transferred from the reader through appropriate output devices to a database. This would also eliminate the issue of bogus cards. However, the priority of the Department is not substituting the conventional cards with smart cards, but creating a comprehensive database of all the ration cardholders as well as the particulars of their family members. Once the database is ready, the same can be loaded onto a chip and issued as a smart card, which will help make the entries electronically.

This system would also make alteration of information on the ration card over the counter, instead of the four visits to Taluka Supply Office (TSO) at present. Moreover, every time the database gets altered, the software would automatically revise the allotment to the ration dealers and thereby ensure accurate allocations without wastage. This would also allow

monitoring of off-take in sensitive areas such as tribal hamlets and immediate measures for ensuring food grains availability can be initiated, if needed. This would ensure better targeting, prevent diversions and more effective use of subsidy.

The smart card is planned not as a more effective ration card, but more of a citizen card where more information can be loaded such as driving license details, land data etc., over a period of time. In the medium term plan, the State is aiming at creating a strong back-end database and testing the smart card. Once proved successful, the Department would go ahead with the project.

3.3 Social Security Number - USA

Social Security Administration (SSA) was initially set up under the Department of Health & Human Services. Later, it was established as an independent agency. The social security covers a wide range of benefits that encompass:

- Unemployment insurance
- Old-age assistance
- Aid to dependent children
- Various forms of medical care.
- Cost of living allowances
- Health coverage to senior citizens
- Vocational rehabilitation services
- Employment services
- Supplemental Security Income programs for needy aged and blind/disabled individuals

The SSA handles huge amount of funds, which requires an efficient system for tracking as well as distribution. This requirement is served through a Social Security Number given to every individual in the United States. Over a period of time, the reliable SSN system built by the SSA, began to be used by other government agencies as well as the private sector. SSN was never meant to be a source of identification. The SSA was apparently unsuccessful in preventing government encroachment into this territory.

Year	Disbursements of social security benefits (Billion US $)
1980	120.5
1990	247.8
1995	332.5
1996	347.1

Year	Disbursements of social security benefits (Billion US $)
1997	362.0
1998	375.0
1999	385.8

SSN is now used as if it is both a representation of identity and a secure password. SSN is also widely used as an identifier to tie multiple records together about a single individual. Many institutions, including hospitals and some banks and brokerages use client's SSN as a secure representation of their identity. This is practical since the SSN cannot be changed, even though there is a change in address, name, or phone number. Other institutions, notably banks, use SSN as if they were secret passwords that only the owner would know. As SSN are widely used representations of people's identities, appearing on driver's licenses, mailing labels, and publicly-posted progress reports at universities, their broad availability becomes more apparent.

The SSA assigns a social security number to every individual. The SSN is a 9 digit number in the following format

AAA – GG – SSSS	A:	Area number
	G:	Group Number
	S:	Serial Number

The area number is assigned in to geographical locations. Each state has a block of area numbers. For instance, California State has area numbers ranging from 602 to 626. The group number is an order in which the SSN is issued in a particular area. These can be used to ascertain chronological ordering in a region. The serial number in the SSN is assigned in a chronological order within each area and group number.

3.4 Texas Electronic Service Delivery Project

The Texas Electronic Services Delivery (TESD) Project was undertaken to explore strategies and develop a road map for expanding the state's current electronic benefit transfer (EBT) system into an electronic services delivery (ESD) system that would allow Texas to retain and strengthen its position as a leader in technology. Texas has attempted to make the delivery of services more efficient and to make those services more accessible to the public. The charge for the TESD project was to create a 10-year strategic plan for enhancing the use of ESD in Texas. The largest current application of ESD is the Lone Star Card used to deliver food stamps and TANF benefits.

The state of Texas has planned to migrate from the magnetic stripe card and develop a multi-technology card, with a magnetic stripe, an integrated circuit chip, a bar code, a finger image, and a picture identification-all on a single card. This approach would enhance the functionality of a single card, provide maximum flexibility and convenience for the populations using the cards, and enable the state to take greater advantage of the possibilities for ESD.

Current ESD Activities in Selected Texas State Agencies

Agency	Current ESD Uses
Department of Public Safety	Texas Driver License - has magnetic stripe and bar code. Finger images are being collected.
Employee Retirement System – Tex Flex	ERS implemented a magnetic stripe FLEXcard for accessing funds from employees' reimbursement accounts
General Services Commission – State Procurement and Travel Card	Custom State of Texas purchasing and travel cards with state seal.
Texas Department of Protective and Regulatory Services	Judicial Web site puts information about children in PRS custody in the hands of judges.
Department of Human Services – Food Stamp and TANF Programs, Long Term Care	Currently deliver Food Stamp and TANF benefits using the Lone Star magnetic stripe card. Also use finger imaging on all applicants for these programs. Long term care facility information available to consumers on the Web.
Texas Department of Health - WIC Program, Vital Records database, Vendor Drug Program	Electronic smart card system for WIC,TANF and Food Stamps. Internet used to issue and update a variety of professional licenses. Internet to access vital records. Vendor drug electronic claims payment system with on-line claims adjudication.
Texas Rehabilitation Commission	Electronic case file system - contains case information viewed by vocational rehabilitation counselors.

Texas Department of Transportation	Some large local transit systems have fare cards and readers.
Department of Mental Health	Statewide electronic client record system in state hospitals and state schools.
University of Texas at Austin	Smart card pilot for building and computer access for students and faculty.
University of Texas Medical Branch at Galveston	Smart card systems for employee ID; campus security, procurement system, systems security, and on-campus use for food, library, and other purchases.
Texas A&M University	Magnetic stripe card for campus meals, controlled access and debit card

3.5 Population Information Management System of Israel

Israel has implemented a National Population Information Management System (PIMS), which provides up to date, comprehensive, reliable and effective management of the information about the National Population.

The PIMS implementation is based on a Central Data Repository that holds all information about the country population and associate matters, and Local/Regional Data Entry & Retrieval Offices. The Local/Regional Offices are deployed countrywide and connected to the Central Data Repository via data communication links. The tactical & operational benefits of PIMS are:

- *Integration with existing procedures*- PIMS has been architected according to the working procedures of the government and public agencies involved in processes of creating, gathering, processing and managing information about the country's population.
- *Enhancing productivity* - The PIMS provides support for various processes. It guides the clerks to perform their tasks efficiently.
- *Decision support* - It also provides the required information and decision support tools for the government agencies and officials entrusted with population management tasks.
- *Up-to-date information* - Since the PIMS by inception integrates into daily working of governmental organizations and agencies, its databases are updated on an ongoing basis.
- *Security & privacy* - PIMS has been designed and built while taking the security considerations into account, especially with features for controlled manipulation of data and information access.
- *Law Enforcement* - PIMS also serves as a data provider for Law Enforcement Agencies and Services, Tax and Revenue Agencies, Customs, National Bureau of Statistics, Municipalities, etc., thus facilitating better cooperation and interoperability of government and public agencies.
- *National Information Center* - PIMS serves as national information center for civil registration and demographic information, and provides de-facto infrastructure standard for numerous governmental and public computer systems that need to access the information stored within the PIMS databases.

Therefore, PIMS' impact on Israel's development and economy extends beyond its natural and original purpose, and it becomes one of the supporters and facilitators of effective operation and processes within governmental and public organizations and agencies. PIMS encompasses the following major subsystems/components:

- *The Population Registry* - The Population Registry is the heart of PIMS and it provides the main database of the system. The Population Registry manages information about all known persons in the country. Every person in the country is assigned a unique Person Identification Number (PIN). The demographic, biometric as well as additional data (e.g. family ties, legal status, etc.) pertaining to every person is stored in this database. This data is updated whenever relevant events concerning the person are reported - for instance; birth, death, change of marital status, exiting/entering the country, etc. The Population Registry ensures that the data within its' databases is correct and consistent.
- *Identity Document Production* - The Identity Document production subsystem manages the task of producing National ID Cards and Passports as well as monitoring and controlling the production process, including issue and renewal of ID Cards and Passports, maintaining a list of stolen and lost Passports, etc. It does so by utilizing information in the Population Registry databases and by producing identification documents. The ID Cards and Passports produced include the owner's photograph and relevant personal information, conform to international standards, are wear and tear resistant, and carry within them encoded security and owner biometric data.
- *Migration Monitoring* - Migration monitoring and control subsystem provides various features for maintaining information on foreigners requesting for the extension of their stay in the country for restricted time periods or who desire to become citizens of the country.
- *Border Control* - Border Control subsystem provides features for monitoring and control of entries and exits through the national Border Checkpoints (e.g. Airports, Seaports, Railroad and Highway crossings). If required, this subsystem can also manage the process of issuing exit Visas for the country's citizens, and entry Visas and Residence Permits for foreign citizens, interested in short or prolonged stay in the country.
- *Election Management* - Election Management subsystem connects to the Population Registry's databases, provides the necessary tools, for conducting elections on national, regional and municipal scales.

Additional subsystems can be incorporated within the PIMS, for instance; Firearm Control and Licensing, Motor Vehicle and Drivers License Registration, etc.

3.6 Taiwan Identity Card

The Taiwanese project is based on a national computerized resident administration system, a national ID scheme, and a national health insurance scheme. According to the current resident administration regulations in Taiwan, a Taiwanese national should carry his/her ID card which is subject to verification at any time. Moreover, the health insurance ID is a legally compulsory paper-based ID.

The national ID is widely used by persons applying for jobs, consulting doctors with their health insurance plans, obtaining a credit card or passport, encashing a cheque; casting their votes etc. Currently, Taiwanese citizens not possessing a national ID would encounter various difficulties during the course of their daily lives.

The project was originally planned under a government contract; to be led by a consortium joined by private sector enterprises. The Taiwanese government proposed a smart card based citizen card plan that sought to combine the current national ID, the health insurance card, driver's license, digitized fingerprints, digital signature functions, among other personal data. Although at the outset, it was undecided whether financial functions would be available although potential contractors plan to include additional features like electronic purses and debit card in future. The Taiwanese Finance Ministry even gave serious thought to the feasibility of revising domestic financial regulations to support these financial functions and attract banking and financial institutions towards this project.

One of the most prominent characteristics of the smart card based national ID project in Taiwan is its proposed BOO (Build-Operate-Own) strategy. The gist of the BOO strategy is that each of the governmental agencies involved in the smart card based national ID project do not have any dedicated budget specially earmarked for this purpose. In other words, the original plan of the project envisaged that private sector investments would drive electronic governance and promote electronic commerce. Under the BOO regime, the building and maintenance of systems would be undertaken by a commercial consortium in exchange for exclusive rights to operate the system and the provision of value-added services associated with the system. The nature and scope of the value-added services associated with the national ID system would be negotiated by the government and the consortium. In addition, projects like the creation of a comprehensive electronic national database of medical records would prove to be very attractive not only for the private sector's R&D, but also for government health care policymaking.

3.7 Smart Social Security Card of Spain

Spain's Ministry of Labour and Social Affairs is replacing its current paper-based Social Security Card, designed in the 1940s, by a new technically sophisticated form of identification. The project, named TASS (Tarjeta de Afiliaci a la Seguridad Socia, means "social security affiliation card") and piloted in 1996, is now under nation wide implementation and is expected to conclude in about four to five years.

The card, which is a contact type smart card, contains both a microchip and a magnetic strip. The magnetic strip is for maintaining compatibility with the currently used healthcare cards. Apart from personal data and specific data required for accessing different government services, the card also stores fingerprint biometrics of the cardholder for one-to-one comparison to establish the true identity of the cardholder before access is granted.

An inbuilt security mechanism enables each related institution to access only the common data and institution-owned data on the card. The system uses a security access module, which enables the writing of data on partitions of the card.

The whole project will involve the issuance of 40 million cards. Implementation was first started in Andalusia with seven million cards issued, making up 17% of the Spanish population. Service kiosks have been installed to provide citizens with information, both on a local and nation-wide level, as well as access to information on their rights, obligations, etc. Through a kiosk, a cardholder can gain access to his entire work history, request certificates and benefits, etc. Within the scope of employment, the cardholders can also request

certificates, renew employment requests, and comply with presence control requisites that allow them to prove that they are unemployed and that, therefore, they are eligible for unemployment benefits. In the healthcare area, cardholders can inquire details of the doctor assigned to them, request for an appointment, change the doctor, etc. The kiosk enables cardholders to make requests for a whole range of services at a single location.

Taking the advantage of today's smart card technology, this new Social Security Card protects individual privacy, yet allows increased access to government services and use between different agencies providing social benefits and healthcare facilities.

3.8 The Learning from Citizen Systems Cases

An analysis of these case studies results in a few observations that could be used as inputs to facilitate planning for the citizen card in Gujarat.

Benefits related learning:

- The employment of a citizen card would not resolve all problems in the area of its implementation. Despite social security funding running into billions of dollars, the United States SSN has not been able to provide sufficient social security to all of its citizens.
- The citizen card concept would need to encompass additional benefits and advantages for an effective pull approach to the large section of the population.

Implementation related learning:

- Successful implementation by a central agency leads to other agencies and departments relying on that system for their activities.
- The citizen card system would be an elaborate process requiring several years for its implementation and benefits to become visible - it took more than five years even for smaller countries like Spain (whose population size is similar to Gujarat).
- Successful and closely-knit systems for several departments are implementable by countries with small population. For a large population, very few examples of closely integrated systems exist, which have more application specific systems that are also being used for other purposes such as identity.
- The successful citizen systems have been implemented as a beneficiary card and as an identity card. The success of the system depends to a significant extent on the utility it provides to the citizen than to the administration or the government.
- Innovative implementation mechanisms such as employing a BOO concept or using the card as an ATM / Debit card could make the system cost effective. However, the fact remains that these systems are expensive and involve large capital as recurring costs.
- Implementation of citizen card systems have taken place after the completion of a pilot project

Technology related learning:

- Although the citizen card system might not be dependent on the card technology such as paper card or magnetic stripe card or a smart card, the citizen card system at some point of time would have to transition to a smart card based system. Globally, almost all systems are shifting / planning to shift to a smart card.

Information and Data Capture

- Information capture and maintenance of such a large population is a daunting task and would require substantial commitment in terms of finance and time.
- Citizen card systems were implemented globally using primary data collection

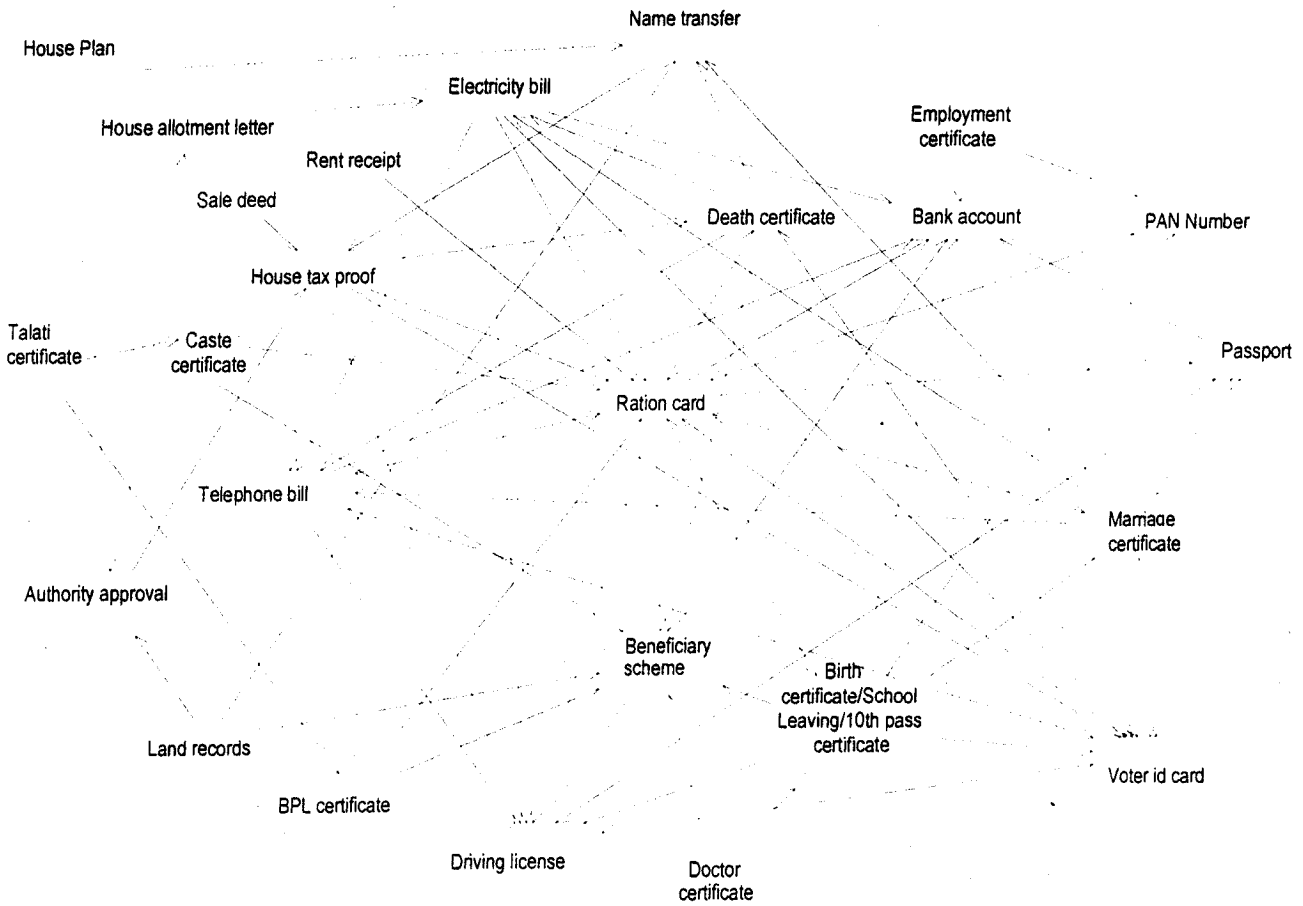
4 Functionality of the Citizen Card

4.1 Proposed Functionality

The citizen database exists with several departments, which are not interconnected. These departments have citizen's data in different formats and at different locations. In addition, these citizen databases may have several records that are not authentic. Getting a specific report that spans across multiple departments on a set of citizens is a mammoth if not an impossible task.

The citizen card would have to cover more than a single function. This will ensure that this card does not become a new ration card or a new identity card – and remains a multipurpose citizen card. The citizen card could be a replacement of the several cards and documents that the citizen is presently required to possess for several purposes. Based on the cybernetics influence diagram shown below, an analysis pertaining to the most common citizen-government transactions and the type of documents required was undertaken.

Figure 4-1 Cybernetics Influence Diagram



This diagram demonstrates the complexities in the interrelationships within the current identification systems. This exercise brought out the fact that the most commonly used documents are:

• Address proof – ration card, other	• Place of birth proof - birth certificate
• Date of birth proof – school leaving certificate, passing certificate for 10th, birth certificate	• Domicile certificate
• Caste certificate	• Land record
• Income certificate – BPL certificate,	• Inheritance certificate

The citizen card should be designed to accommodate as many of these functions as possible. The citizen can therefore benefit from having a single card possessing all the aforementioned functions.

The function of land records and inheritance certificate do not seem feasible as they are complex documents and may or may not be related to a specific person. Hence, it is recommended that land record and inheritance certificate should not be included in the citizen card. The other functions which can be included along with their feasibility would be analyzed in the following sections.

4.1.1 Ration Card

The citizen card could function as a ration card. This would require online or offline terminals for authenticating and recording transactions at the ration shops. The offline system being cost-effective, is more preferable. The online system is not really required as the commodity distribution data can be updated after the shop hours through batch transfer. The introduction of the citizen card as a substitute to the ration card would render the ration card 'paper booklet' redundant. The paper booklet at present provides little value to the citizen and is a means of storing and authenticating records. However, the most important aspect of the ration card lies in its utility as an identification document. The citizen card will be an effective substitute as far as identification requirements are concerned.

The citizen would give the card to the shop operator at the ration card shop. Every shop would have a terminal, which would be able to read the card and record the transaction. The capture of card number could be automated through magnetic stripe in the card or a chip on the citizen card. The stored transaction records would be authenticated and updated at a central database on a periodic basis through a dial-up connection. A bill would be printed for the record of the citizen as well as the shopkeeper.

The central database would have records of the total amount allocated which would be sent to each of the shops in addition to the citizen database. Individual consumption of commodities can thus be tracked in this manner. This system can be made fraud-resistant by using automated card readers for capturing the card number. The card number should be entered only through the card reader.

The system could provide significant advantages over the current system. Since the issue of ration would be registered on a central database, the commodity distribution could be

tracked down to the individual family. This could enable savings by reducing misuse of subsidy. In addition, the subsidies could be redirected to the population that requires it the most.

4.1.2 Identity Card

The card could function as an identity card for access as well as for availing various services. First level card security features would include photograph and special printing that are visible to the naked eye. This could also be used by various agencies such as police for identification of suspects. This would also require the card to be mandatory rather than optional in the initial years.

4.1.3 Beneficiary Card

The citizens obtain several benefits and subscribe to several schemes of government at various levels. The citizen also has to apply for obtaining several certificates and documents. For these services, the citizen has to apply at the respective office - usually the district panchayat office, collector, mamlatdar, taluka panchayat office or ULBs.

These applications at present require the applicant to submit several documents; many of which are common for most applications. The citizen using a citizen card unique ID number would be able to just give his citizen card number instead of the commonly used documents. This number could be verified on a database. This would be done to check the details, authenticate or help in decision making about the applicant's eligibility to various schemes, etc. this data base would be the citizen database.

The citizen would not be required to submit certain proofs or documents for this purpose such as birth certificate, proof of address or any other document previously submitted to the same office. The citizen need not provide other documents as proof which have been used as a part of the citizen card.

The benefits can be monitored giving a clear picture of who gets what. This amount can be cross-checked with the actual disbursement- bringing to light the inefficiencies in the system.

4.1.4 Driving License

The driving license system presently uses a plastic card with a memory chip having a 1KB storage capacity. This card also has a photograph, personal details and other driving license related details printed on it as well as on the memory chip. These cards provide a high level of security, though their features are not fully exploited.

The use of citizen card as a driving license has an issue of concern that would have to be resolved for successful major drawback that it is an authorization document for a very specific case. In some cases of traffic offences, the card owner would have to forfeit his driving license by law. If the citizen has a multipurpose citizen card that is also a driving license, the citizen could stand to loose the other benefit from the cards, which could even mean a loss of his identity proof. A system could be evolved where the card chip states that

the driving license has been cancelled and the card owner retaining the card. This would require some changes in the vehicle traffic laws to include electronic cancellation of card without forfeiting it physically.

4.1.5 Financial Transactions - Banking, Credit Worthiness, etc

The citizen card would have a unique identity number, a photograph, Name and functional ID numbers (ration card number, voter ID number, Bank account Number, driving license number, etc) This card could provide access to ATMs and also function as a debit card.

This card would be given along with a savings bank account without minimum balance requirement. The various payments such as municipal taxes, electricity bill, telephone bill, etc could go through this account. All government payments to the citizens (salaries, subsidies) would happen through this bank account. The government would benefit from reduction in transaction costs and efficient distribution of subsidies.

The citizen would be able to operate this account from any of the ATMs and bank branches. The citizen could also use this as a debit card for payments. A voice response system could also facilitate transactions through phone securely using a through a password or code.

The Government could invite a tender from banks / consortium of banks to become partner of e-citizen initiative. The costs of the program (card and ATMs) could be borne by the bank either partly or fully. However, an issue of concern here could be that this system would require changes in the bank's existing system as well as substantial improvement in the banking infrastructure. The banks could gain by obtaining a huge customer base and huge transaction amount. This would provide the user with features that would drive towards higher penetration of the card.

4.1.6 Health Card

The citizen card could work as a health card for cases, dispensaries and referrals at various health care facilities. The citizen's health records at hospitals would be kept in a database, which would be accessed by physicians and health workers. The computerization would also enable referral by experts in specialized medical centers. This would ensure that the remote or less equipped health centers could take advantage of the best facilities without going there physically. The basic health information to be stored in the card such as:

- Blood Group
- Allergies
- Immunizations
- Major illness in past
- Basic Health profile

Data would be uploaded only through a doctor at the local health care center. This data could also be used for planning, preventive measures, emergencies, etc. The card would have to be updated after every visit to the health care center.

4.1.7 Utility Payments

Citizen card can facilitate utility payments for services such as telecom services, electricity municipal taxes and service charges for water, sewerage, etc. This would make payment mechanism simple and efficient for essential services. In addition this would reduce the hardship the citizen has to undergo for the payment of these services. The utility payments could also be made through a single window for various services effectively increasing the customer / citizen interface offices. For example a customer can pay municipal taxes as well as water charges through the same office without presenting various documents, etc.

4.1.8 Criminal Records

Criminal information can be mapped to the citizen information and verified though the citizen card. This would make identification of suspects and other anti social elements reliable and efficient. This would also enable monitoring of criminal elements across the state and help in curtailing crime. The authorized personnel would be able to check the citizen card of an individual against the criminal database for records of crimes committed. This criminal record would then enable identification of probable suspects for any investigation or other security issues. However, this function would have to provided at a later date when the citizen card system has almost total coverage and its use widespread. Initially the introduction of this function could make the citizens reluctant to go for the card due to the perception of misuse by law enforcing agencies. This function would require the computerization of criminal records as a prerequisite to its implementation

4.1.9 Legal Records

Computerization of legal records and its identification uniquely with a citizen would help in enforcing authenticity of legal records across various legal offices. All legal records would have citizen id. This would ensure that affidavits and other legal documents are available to all authorized offices for verification. At several places the legal documents required would not have to be physically submitted as they can be linked to the respective citizen card number. This would greatly reduce the effort of both the government as well as citizens for producing and authenticating legal documents. Along with criminal database, the citizen card based legal records could help law enforcement and efficient monitoring of suspects.

The list of functionality can go on and is limited only by imagination but the crux lies in picking up the functionality that has wider citizen implications and is cost effective in the immediate run and popularise the concept of possessing a multipurpose citizen card. This multipurpose card can take on the additional functionality as and when the concerned department is ready with the database in the format compatible with the citizen card system.

4.2 Prioritization of Functions

To implement the project with least resistance by the citizen and low impact to the Government working, the functionality would have to be prioritised. The functions would have to be selected in such a way that it ensures faster and more successful implementation. The various factors for considered for prioritizations are listed below:

- Benefits to citizens
- Penetration
- Acceptability by citizens
- Cost
- Preparedness of departments

The more the benefit that a citizen sees in taking the card, more would be the popularity of the concept and lesser the resistance. The perceived benefits would leads to a higher penetration rate and the card benefits would encourage acceptability of the card. Functionality like financial transactions, tracking of legal and criminal records etc are important milestones in achieving the purpose of the administration but they also impact the privacy issues/personal issues. Introducing this functionality in the citizen card would initially increase resistance and curtail the popularity of the card. Hence it is suggested that benefits where citizen depend on Government for favor should be taken up first. Here not only can the Government force the use of citizen card but also cover larger population. Additional benefits like use of this card as a substitute for commonly used certificates would increase the penetration and use of card. The other functions can be relegated to later stages and added at a suitable point in time in future. In addition issues such as the preparedness of the department as well as the cost versus return to the Government would be the key success factors and determine the priority that a particular function could be accorded.

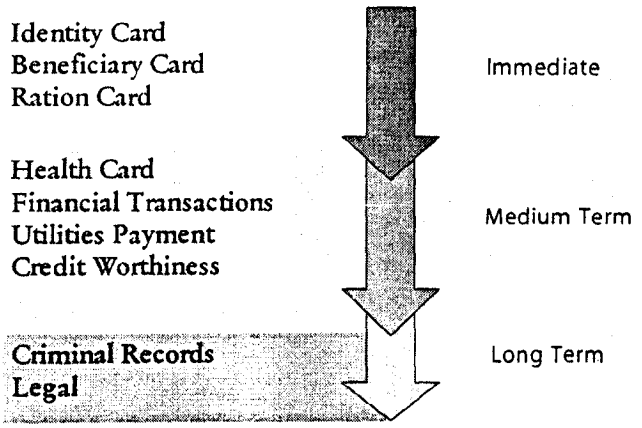


Figure 4-2 Prioritization of Citizen Card Functions

Some of the citizen card functions that would favorably resolve the above issues would have to taken up in the short term. Other more complex functions that require greater investment in infrastructure should be taken up in the medium term. In the long term, functions that

depend on penetration to a large extent for their success should be taken up. The figure above shows the various functions that could be taken up in short, medium and long term.

4.3 Current Status of Departments

The citizen card system relies on the fact that the departments have their database computerized. Though several departments have initiated the computerization of their database, the task is far from over. This issue is significant, as the extent of computerization of departments would to a large extent determine the viability of the proposed functionality. The proposed system would have to take into account, the preparedness of the departments. In addition, the initiatives by the department should also be capitalized. The various citizen databases and the suitability of their use in citizen card system is discussed below:

4.3.1 Food and Civil Supplies Department

In the food and civil supplies department, the ration card application has been computerized. The citizen applies for a ration card at the taluka level, where it is verified and sent to a district level center. This center enters the details of the application into a database and prints the ration card. The list of ration cardholders is also printed and sent to the fair price shops. The ration card has a very high coverage with nearly all families in the state being covered. All these factors make the ration card database relatively suited to the citizen card system. However, the ration card is a family card and not an individual card and the databases of ration card exists in Gujarati.

The Ration card system covers approximately one crore families representing almost the entire population of Gujarat State.

Ration card database captures information like family head's name, address, name of other members of family, age, relationship with family head, occupation, annual income, caste, nationality and area of land possessed. It also contains information pertaining to the items required by the family (for e.g. Kerosene, food grain and sugar). Information related to cooking gas connection like number of connections, agency's name, consumer number etc. are also stored in the database. Ration card authorities have tried to capture details of other databases like Voter ID, PAN, sales tax number, but they have not been able to obtain much information as most of the data is migrated from old manual database.

4.3.2 Transport Department

The driving license system in the state today has a database which is used to make smart cards with printed photograph for holding information of the individual. Though the system has a large amount of information on an individual, the smart card is a small proportion of the total driving license database. An advantage in the driving license database is that unlike the ration card database, the photograph of the individual is ready. Additionally, driving license database is functional and the smart card and its features can be used.

Total number of vehicles registered in Gujarat is around 55 lacs.

Similarly, the transport department is in the process of computerizing vehicle registration (Ahmedabad and Vadodara have already been computerized) and issuing an optical card

with a microchip. Though this database has the details of vehicle owners, the database is not a citizen database and would not be suited to citizen card system considering the low vehicle penetration.

Driving license database has personal details like name, father/husband's name, permanent address, current address, birth date, identity proofs, blood group, type of health deficiency (if any) etc. stored in it. This database also stores details of type of vehicles for which license is issued, date of issue, expiry date, details of driving license etc..

4.3.3 Election Commission

The voter id database has an approximate coverage of three crore people and also has photographs included. The election card system is also in Gujarati. If the proposed system is to be in English, keeping in mind the requirement to integrate with a possible national id setup, we would need to use transliteration software. The transliteration software currently available has an approximate failure percentage of 10%, which could lead to additional effort in creating the database. The citizen database of election card has the date of birth as well as the photograph, which could be used for identity purposes. The database of the election commission is computerized and is kept at the taluka level from where the list and other details are generated.

Election commission's database contains details like name, father/mother/husband's name, permanent address, age as on cut off date, election ward etc.

4.3.4 Industries and Mines Department

Industries and mines department has many boards and corporations. Citizen interface of industry and mines department is mainly through its various corporations. Some of them like GSFC, GIIC, GIDC etc. have been computerized. Some of these corporations are also having computerized database of entrepreneurs, SSI units etc. but a centralized database doesn't exist for this department. The database in the industries and mines department covers a very small section of the society, offering minimal citizen services - hence it would not be appropriate for developing the citizen card system.

4.3.5 Agriculture and Cooperative

Agriculture and cooperative department deals with agriculture, animal husbandry and cooperatives of the state. Approximately 70% of the total population of the state are covered by this department. Though this department provides various citizen services, the department is not computerized and also doesn't have centralized manual database. Entire data of this department is scattered either district wise or taluka wise in terms of beneficiaries of various schemes. This department could be one that could provide significant benefits from the citizen card system.

4.3.6 Home

Home department has direct interface with citizens in terms of police functions and has initiated computerization. Currently, manual FIR records from all police stations are sent to

State Crime Records Bureau (SCRB) at Gandhinagar, where it is entered into computer systems. However, due to massive database of FIR and Language problems, database of very few FIRs exist. And currently manual data is spread across the state in various police stations. SCRB is also having software developed by National Crime Records Bureau (NCRB) for crime and criminal information, which is not being used effectively at present. Though the home department doesn't have a citizen database, they could be one of the more important users of the citizen card system.

4.3.7 Social Welfare

Social welfare department is one of the government departments with very high citizen interface. Social welfare department runs various schemes for welfare of SC and SEBC. It also looks after the welfare of physically handicapped persons. Child and women welfare was also part of this department (however, a separate department has been created for this function). So in effect, social welfare department covers more than 35% of the total population consisting of SC and SEBC. Due to various beneficiary schemes undertaken by this department, it has a database of all the beneficiaries. This data is stored manually and is scattered across districts and talukas of the state. The department had plans of introducing a computerized beneficiary card about two years ago and a feasibility report was also prepared for the same. However, due to various reasons, this project could not be started. This department is ideally suited to be a part of the citizen card system taking into view the coverage and services provided.

4.3.8 Education

Education department has a separate commissioner for schools and colleges. It also has various universities as well as boards under its jurisdiction. Commissioner of schools and Commissioner of colleges have a computerized database of various schools and colleges in the state. Most of these colleges and universities are maintaining a computerized database of their students. The database of secondary and higher secondary boards is also computerized; however very few schools are having a computerized database.

Therefore, the education department has a computerized database of many students through its various bodies but it is vastly scattered across the universities, colleges, boards and schools.

4.3.9 Tribal Development

The Tribal welfare department also has a very high citizen interface, which is similar to the situation in the social welfare department. Functioning of both the departments is almost similar and beneficiary schemes undertaken by both the departments are also similar. This department covers approximately 15% of the total population. Its database is also manual and scattered across various districts and talukas of the state. The Tribal welfare department has initiated a smart card project for the tribals and has also launched a pilot in a village having a population of 500 persons. However, the project is yet to commence. This department is ideally suited to be a part of the citizen card system, taking into account, the coverage as well as the range of services provided.

4.3.10 Labour and Employment

The Labour and employment department interfaces with citizens through the ITI and employment exchanges. These employment exchanges have a computerized database of all the registered unemployed individuals. The citizen card system could effectively use this data to provide benefits associated with employment.

The database of an employment exchange has details like name, father/husband's name, permanent address, correspondence address, age, education qualification, name of school/college/university, type of job required etc. stored in it.

4.3.11 Revenue

The Revenue department deals with land records, land transfer, land acquisition etc. One of the main citizen centric activities of this department is land record. Revenue department has done a lot of work in computerization of land records. Data entry of land records has been completed in 114 talukas (out of total 225) of the state and it is scheduled to be completed in another 46 talukas by this year-end. The department is planning to enter records of all the talukas by next year-end. Out of these, records are operational in seven talukas currently, where citizen can obtain computerized print outs of their land records. Gandhinagar office is currently connected to all the districts and soon the WAN is going to be operational to all talukas too. Though the computerization of records is progressing at a rapid pace, the database doesn't have actual citizen information. However, the land records information could be used with citizen card system for more effective administration as well as providing beneficiary services.

Revenue department's database is for land records. They have computerized records of form 7/12 and 8-A. so, it has details like land owner's name, partner's name, age, occupation, area of land, type of land, use of land, boundary identification of land etc. stored in it.

4.3.12 Census

The census department undertakes a complete survey of the entire population of the country and records important personal and other information. This information is collected after every decade and information such as age, literacy, employment details, socio-economic parameters are recorded. This information has been used up till now solely for planning and statistical purposes. During the information collection, the citizens are not required to present proof of information. This makes the census data unsuitable for a system as critical as citizen card. The reliability of the census data would be in greater doubt if it were declared that the information provided would be used for citizen card. This would prompt the citizen to manipulate information making the database unsuitable for the citizen card system. The census has a computerized database of the entire state population.

According to 2001 census figures, the population of Gujarat is approximately 5.1 crore.

Census database is very huge and contains many details. Some of the details in census database are name of village, area of village, population of village, facilities, land use, increase in population, type of cultivation, type of workers etc.

4.3.13 Health and Family Welfare

Certain administrative functions in health and family welfare department have been computerized. Computerization has been initiated in the department and hardware has been procured. Information in electronic format exists for Employees State Insurance Corporation (ESIC). The ESIC infrastructure could also be used with the citizen card for benefit disbursement. The ESIC already has an identity card which contains the personal details as well as details of the family. However, the coverage of this database is not as high as ration card system and covers a very small section of the society.

ESIC's database contains details like family head's name, family members' name, relationship with family head, birth date, permanent address, hospital number etc.

4.3.14 Pension and Provident Fund

Pension and Provident Fund has been computerized and citizen database is available for the persons who are registered at the office. However, the Pension and Provident Fund office covers a small section of the society.

4.3.15 Birth and Death Registration

Registration of births and death takes place at the municipal body level in a city or town. In case of a village, the mamlatdar keeps the records of the births and deaths in that village. This database is heavily fragmented and is not computerized.

4.3.16 Utilities

Several utilities such as power, water supply, sewage, telephone, etc have a customer database. Some of the utility bills are being widely used for address proof, etc. Use of this database could be difficult for citizen card system, however these utilities can use the citizen card system for providing better services to the weaker sections of the society.

In addition to these, there are several other citizen databases, which do not have as high population coverage as these, but could be an important source of data. Also, the use of these databases would be presuming that all the information in the database ids correct, which might not be the fact. This also prevents the government from using the citizen card database for critical applications.

Though different citizen databases are available with different departments, none of these databases are complete with respect to information and population coverage. A combination of these could create a database with high coverage and containing all the important information.

4.4 Existing System

The citizen database exists with several departments, which are not interconnected. These departments have citizen data in different formats and at different locations. Getting a specific report spanning across multiple departments for a set of citizen is a mammoth if not an impossible task. Even though several citizen databases exist, none of them cover the entire population. In addition, these citizen databases may have several records that are not authentic. The various citizen database and the suitability of their use in citizen card system is discussed below:

- The ration card applications in Gujarat have been computerized and are in Gujarati. The application for ration card is made at the taluka level, where it is verified and sent to a district level center. This center enters the details of the application into a database and prints the ration card. The list of ration cardholders is also printed and sent to the fair price shops. The ration card has a very high coverage with nearly all families in the state being covered. Though the ration card is a family card and not an individual card, the database exists for the individual family members. All these factors make the ration card database relatively suited to the citizen card system.

- The driving license system in the state today has a database that is used to make smart cards with printed photographs for holding information pertaining to the individual. Though the system has a large amount of information on an individual, the smart card is a small proportion of the total driving license database. An advantage in the driving license database is that unlike the ration card databases, the photograph of the individual is ready. Additionally, driving license database is functional and the smart card and its features can be used.

- The voter id database has an approximate coverage of three crore people and also has photographs included. The election card system is also in Gujarati. If the proposed system is to be in English, taking into account the requirement for integration with a possible national ID setup, we would need to use transliteration software. The transliteration software has an approximate failure percentage of 10%. The citizen database of election card has the date of birth as well as the photograph, which could be used for identity purposes. This information could be used for developing a citizen card possessing the ration card feature after identifying the unique persons in the ration card database as well as the election database. However, since the two databases lack any unique common key, this could be a difficult task.

- In addition to these, there are several other citizen databases, which do not have as high population coverage as these, but could be an important source of data. Also, the use of these databases would be presuming that all the information in the database ids is correct, which might not be the fact. This also prevents the usage of citizen card database for critical applications.

At present, several citizen databases are available with different departments – ration card, voter ID card, diving license, etc. Though none of these databases are complete with respect

to information and population coverage, a combination of these could enable a database with high coverage and contain the important information.

This database could be leveraged to prepare the citizen card instead of several documents that a citizen is required to carry. This card would contain all the essential details that are on the ration card, identity card, etc that makes its use possible as a multifunctional card. The card would have a citizen number as a unique identifier.

The proposed function of the citizen card

Based on the commonly used functionality and documents required by the citizen, it is recommended that the citizen card could offer the functions of a ration card, identity card and a beneficiary card. The citizen card should not add to the existing number of cards/documents with the citizen. This means that at least one card/document would have to be replaced with a citizen card. Since the ration card fits into this gap with the maximum benefits to citizen as well as government, it is recommended that the ration card be taken up as the primary citizen card function. As the card would carry the identity of the individual as well as other details, it could also function as a single document for several beneficiary schemes. The beneficiary schemes would still require documents such as Land record, Inheritance certificate, etc. These documents are not individual specific and their incorporation into the same citizen card would be a complex exercise.

As we learn from several years of social security number system in the US, a reliable and successful model of identity encourages other agencies to adopt the same rather than reinvent a new system. In the case of citizen card for Gujarat, a ration and beneficiary card would lead to other agencies and departments adopting it for their reference. For identification, a photo identity document would be indispensable.

5 The Proposed System

5.1 The Citizen Card

The citizen card can be conceptualized as either a virtual card, with only a number or as a plain paper based photo card or even a card with a magnetic stripe / microchip. The card could also be an optical card storing large amount of data. The function of the citizen card could have a significant impact on the type of card that could be employed. The various options and their functions are presented in the following section.

5.1.1 Card Technology

The various types of the card technologies available is discussed in the subsequent sections

Magnetic Stripe Card
The data in the magnetic stripe is usually coded using two or three tracks. The standard covering this area is ISO 7811. These cards are widely used by financial institutions. There are many visual security features to prevent reproduction of these cards.

It is not that difficult and/or expensive to have the equipment to encode magnetic stripes. Even if it very difficult to counterfeit a magnetic stripe card, it is far from impossible.

Integrated circuit memory cards (IC Memory cards):
IC Memory cards are used for single function application, are inexpensive, and typically used in phone card type prepayment applications. Access to data is managed by a security module in the chip which guards against the data being erased or written to. In payment cards, reducing the card's value is done by the chip and is irreversible. After use the card is discarded. The simple technology enables these cards to be manufactured very cheaply.

At first it may seem an obvious candidate for moving on to smart card technology. However, extra investment may be required to overcome incompatibilities in terminal infrastructure, and differences in programming APIs. A later migration to microprocessor card technology may also prove costly in the long-term due to the nonstandard proprietary nature of memory cards.

Integrated Circuit Processor Card (IC Processor cards):
Microprocessor cards are able to provide read/write function and enhanced security with a CPU. They are more expensive than memory cards. With microprocessor cards, it is possible write and update the data, once the card's access conditions are met. The way a microprocessor card's internal architecture is designed bears a striking resemblance to PCs. The familiar building blocks of a PC are present in this type of smart cards: CPU, ROM, RAM, I/O port and in this case an EEPROM rather than disk for storage.

Usually the card uses an ISO 7816-defined file structure to store and protect the data. This file structure and protection mechanism enables different applications to store data in a

single card with "fire-walling" between the applications. Microprocessor cards are extremely versatile and have found a wide portfolio of applications.

Optical Memory Cards

For applications where a very large amount of storage capacity is required, optical memory cards are available, which can store for instance X-ray images of a patient. These cards usually have a microprocessor chip embedded and use the smart card security to protect the optical data from unauthorized access. The optical card provides some megabytes of write-once/read-many (WORM) storage. Data can be read by appropriate devices and is not protected, unless it is encrypted.

Table 5-1 Card type details

Card Type	Maximum Data Capacity	Cost of Card (US $)	Cost of Reader and Connection (US $)
Magnetic Stripe Card	140 bytes	0.20 to 0.75	750
Integrated Circuit Memory Card	1 Kb	1.00 to 2.50	500
Integrated Circuit Processor Card	8 Kb	7 to 15	500
Optical Memory Cards	4.9 Mb	7 to 12	3500 to 4000

More details of smart card are given in Annex 8.

Paper / Plastic card

Apart from the data storage format on the card, the card itself could be either paper based or made of plastic. Though globally laminated paper cards are the norm, it easily evident that there is a significant move towards plastic cards from paper based forms of identity. Almost every country that has paper identity cards is either considering or moving to plastic cards.

The paper format has an obvious disadvantage, which is the availability of equipment [laser color printers and scanners] to reproduce on paper at a nominal cost. Rapidly advancing scanning and printing technology [specifically finer resolution capabilities for both] do allow duplication of paper documents that are more than likely to pass a cursory examination. Though plastic cards can also be produced fraudulently, the fact is that they are significantly more difficult to reproduce.

Another aspect that helps in determining the appropriate card format is subjective and is concerned with the perceived image of the card format. The success of the citizen card will be derived primarily from how the public at large, including the administrative machinery views the card document. Therefore, even if it costs a few rupees extra it will be worthwhile to ensure that the card has first level security features that are visually appealing and have a novelty value. Both paper and plastic formats can meet this criterion, though it must be admitted that the plastic format is far more appealing. The benefits of a plastic card are:

- First level security
- Impossible to produce in a desk-top environment
- Ongoing technological enhancements a result of widespread standardized usage

Clearly, better technology and security is the preferred option, albeit at a marginal and

incremental cost.

5.1.2 Desired Security Features

Card Security Levels	Security Features
First Level:	Security features such as photograph, ghost images, holograms, security thread, special printing that are visible to the naked eye
Second Level:	Security features that are apparent with simple tools such as a magnifying glass or ultra-violet light i.e. micro-printing or UV printing
Third Level:	Security features that require either forensic experts and/or expensive laboratory level testing to ascertain authenticity

Firstly, the card' first level security must be effective. While a card format might have overall higher security, one must appreciate that third-level security is no good if the second level is insufficient, which is again no good if the first level is weak. This is true, as the first level would account for an overwhelming majority of the total number of authentication. In the present scenario of the citizen card for Gujarat, the first level will account for 99 percent of the entire authentication that occur. Therefore, the choice is clearly between the first level security features that a plastic or paper format can provide.

5.1.3 Summary of comparison

As mentioned before, the citizen card can be conceptualized as either a virtual card, with only a number or as a plain paper based photo card or even a card with a magnetic stripe / microchip. The card could also be an optical card storing large amount of data.

Table 5-2 Summary of comparison of types of Cards

Citizen Card as a Number

Card would be a unique citizen number - the 'card' would not be issued
Citizen Card Number could be used for availing services and verification of identity and tracking
The unique number would facilitate tracking of services availed by the citizen
Negligible cost of 'card' - only cost of application and networking
The number alone will not suffice identification - the system would require a reliable verification mechanism, through network

Citizen Card as a Photo ID Card

The card would have personal details and a unique citizen number along with a photograph
Number could be used for availing various citizen services and for verification of identity and tracking
The unique number would facilitate tracking of services availed by the citizen
Lower cost of Card
Details printed in English and Gujarati and the number in English only.
The card could contain the following in print :

Full Name
Date of Birth
Number
Photograph
Address

Citizen Card as a Photo ID card with magnetic stripe

The card would have a magnetic strip in addition to the Photo ID card
The magnetic strip would enable capturing of data - faster service and reducing frauds
The card would have information printed as well some information on the magnetic stripe
Higher Cost of Card – around Rs. 15
Less amount of data can be stored
Lower scalability to future requirements
Damage due to exposure to magnetic fields
Magnetic stripe readers would be required at offices
In addition to information on Magnetic stripe:

Full Name
Caste
Does the person belong to a BPL family
Address
Date of Birth
Number

Citizen Card as a Smart Photo ID Card

The card would have information stored on a chip
The smart card would be only a memory card
Facilitate offline transactions as the information could be updated on the chip instead of a database at the office
Provide high security and would be extremely difficult to duplicate
Smart card readers/writers would be required at offices
Higher amount of data can be stored
Higher scalability to future requirements
No damage due to exposure to magnetic fields
High Cost of Card - More than Rs. 50

Large volume of information can be stored on the card by using optical card technology - at a higher cost

5.1.4 Selection of the citizen card

Type of card

The desired system requires a card which will facilitate automated capturing of citizen information or card number. This could only be possible through a magnetic strip card or a smart card. However looking at the future increase in functionality and data storage requirements, the consultants recommend the usage of the Smart Card for the citizen card application. A smart card as a citizen card would have the following advantages compared to other cards:

Technology

- Larger amount of data can be stored
- No damage due to exposure to magnetic fields
- It has all the security features and it would be extremely difficult to duplicate the smart card.
- It facilitates offline transactions as the information could be updated on the chip instead of a database at the office and so it reduces dependence on the network.

Function

- All the information could be read from smart card only and so no connection to the network would be required. It would be helpful in various functions like identity, health emergency, checking criminal records etc.
- Bank transactions would also become possible by loading information on smart card.
- Identity of pensioner could be established by reading smart card and bank would not be needed to establish connection with the central database. This would help in reducing dependence on network.
- As acceptability of card increases more and more functionality would be added on the card and with the high storage capacity of smart card, it would be easy to increase functionality details.

Scalability

- Higher scalability to future requirements

5.1.5 Citizen card numbering

Based on research of existing National ID systems and discussions with implementation experts, it is apparent that alphanumeric codification is rarely resorted to. The reason is fairly simple and derives from the fact that querying a number is easier and faster than searching an alphanumeric. A codification strategy is essentially a tradeoff between simplicity i.e. random number generation and a code that indicates more information than just a PIN, for instance:

- Often the gender corresponds to whether the last digit of the code is odd or even
- Some digits refer to a birth date or postal pin code

The advantages of having more than a randomly generated number are fairly obvious and are:

- An individual is expected to easily recall birth date or postal code and therefore has to only memorize lessor [by six] digits than otherwise and the number of digits of the random code are reduced
- Data storage and query facilities are enhanced

However, the tradeoff is in the disadvantages, which are:

- Complex codification is relatively cumbersome to maintain
- Enhanced querying implies increased application complexity
- Complex codification often translates into larger number of digits than a simple randomly generated code

As the citizen card the database will have enormous size, it will have to be partitioned. The citizen card number codification will also have to indicate that the record belongs to a particular partitioned database. Obviously query and retrieval will be greatly facilitated. The second component of our codification strategy is to either indicate birth date/year of the record holder, as it is easy to recall and reduces the number of random code digits or indicate the postal pin code of the enrolment station or residential address.

For indicating a birth or postal reference, we have four options:

- Six digit birth date - Will require additional six-digit code
- Two digit year of birth - Will require additional eight-digit code
- Three digit Julian birth date [indicates date and month] - Will require additional six-digit code
- Six digit postal code - Will require additional eight-digit code

The consultants are in favor of a simple and brief code and recommend the following PIN codification options for the citizen card:

□□ (2 digit year of birth)	□□ (2 digit partition code)	□□□□□□ (6 digits random code)	❶ *Last digit even number male*
□□□□□□ (6 digit birth date)	□□ (2 digit partition code)	□□□□ (4 digits random code)	❷ *Last digit even number male*
□□□□□□ (6 digit postal code)	□□ (2 digit partition code)	□□□□□ (5 digits random code)	❸ *Last digit even number male*

All the above three options are feasible for the citizen card and meet the criteria of simplicity and retrieval requirements. However, option two that specifies six digit birth date will not be applicable to the significant number of people who only know their approximate age. If we surmise that only literate people know their date of birth, then for 40 percent of Indians, the

six-digit birth date will serve little purpose. Therefore, option one with a two-digit year of birth is preferable to option two.

India's vast postal system and the ubiquitous area PIN code is another remarkable starting point. It is a safe assumption that every Indian, including the illiterate know or can easily find out and remember their postal PIN code. More importantly, the postal code is an important field level tool for security agencies, who will be able to immediately ascertain [from the code] the person's residential or enrolment location - the latter is preferable because it is static data, while address can change and the citizen card number must be lifelong and unchangeable. The only disadvantage of option three is that it is a longer [13-digit] code. The consultants recommend option three PIN codification.

The card should have the details printed in English and Gujarati and the number in English only. Though biometrics is not planned to be used recommended for the initial stage, biometric information would be collected which can be used at a later stage. This would also require large-scale deployment of biometric readers increasing the cost of the system. The level of security provided by biometrics would be useful depending on the transaction type and value. The choice of smart card would facilitate use of biometrics in future.

5.2 Overview of the System

The Citizen would come to the user of the system at the local office at taluka level and would make request for any benefits/schemes by swiping the card. The system would seek two sets of information, one for validation of the citizen and second details about the benefit required by the citizen.

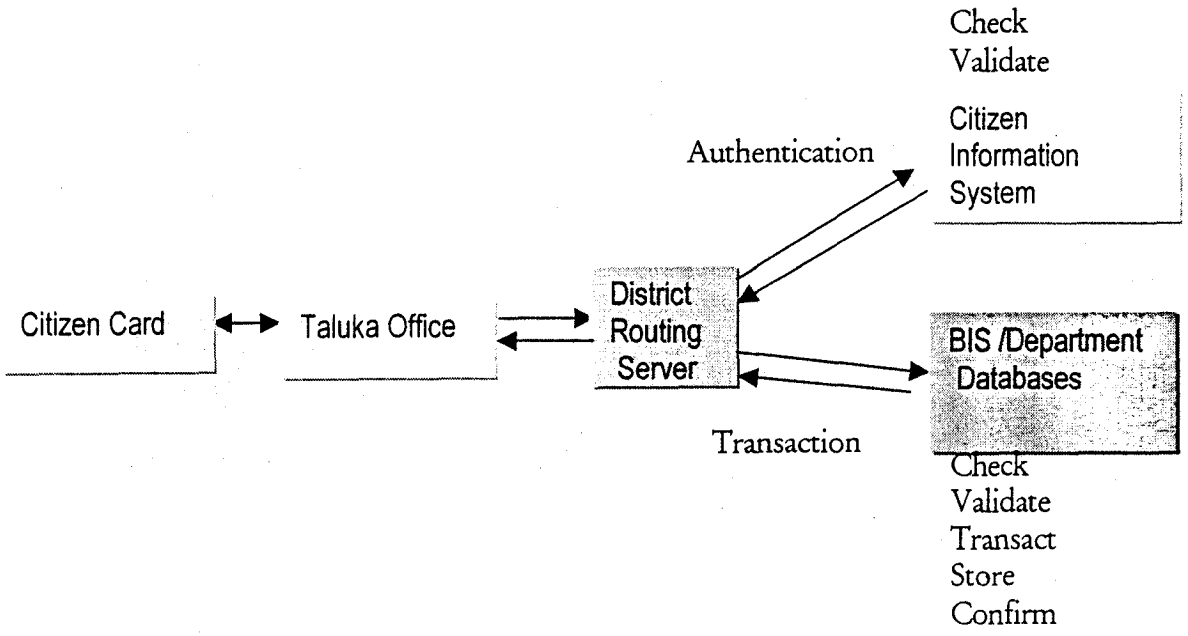


Figure 5-1 Overview of the proposed Citizen Card System

The information is read and validated by the system with the citizen database. After validation of the citizen credentials, the information is sent to the beneficiary database for approval and confirmation for the delivery of the benefits to the citizen. After the transaction is approved and recorded by the beneficiary database, the user of the system gets a transaction approved message after which the user disburses the benefit to the citizen.

Various beneficiary departments at taluka office would be connected to taluka routing server and taluka office routing server will in turn be connected to the district routing server. District routing server would first connect to the Citizen card database for checking the authentication and citizen credentials. Once authentication is done by the Citizen card Database, the request would be routed to the beneficiary system database which in turn would link to beneficiary database/respective department database based on applied benefit/scheme. Further checking would be done at the beneficiary/department database to find out whether applicant is eligible for applied scheme/benefit. Once eligibility is checked against the quota or the criteria, further processing would be done at beneficiary information system/department database. The request would be processed, recorded, data updated and transaction report sent to Citizen card database and the user at the taluka level.The entire process is described graphically in the figure overleaf.

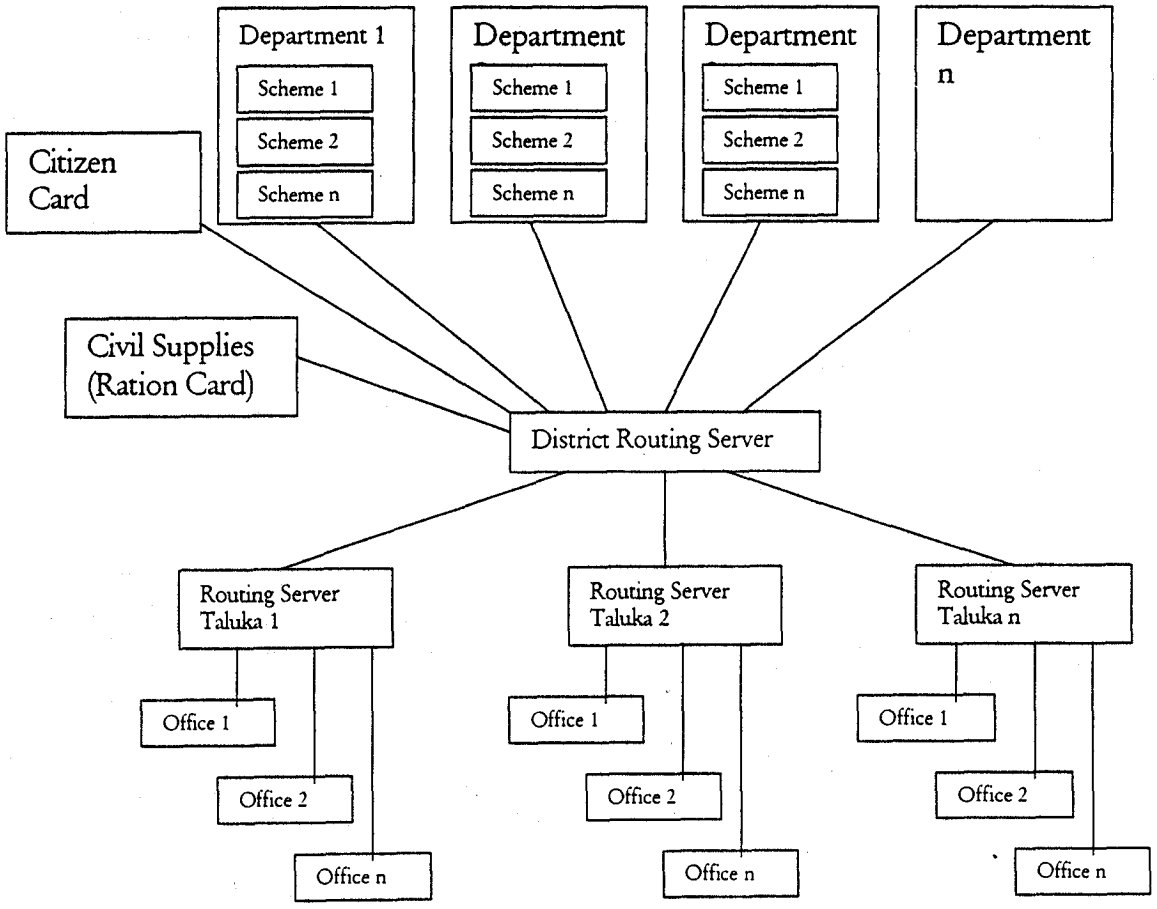


Figure 5-2 Process of Citizen Card system

Upon receipt of the transaction report, the taluka office would disburse the benefit/service to the citizen. In some cases, where financial support spread over a longer period is required to be given, like pension or scholarship, the citizen card would be loaded with the information, which could be further read and processed by the Banks.

In future, when computerization and networking would have reached at village level, citizen card could be used to electronically enter the beneficiary number at the respective department office at village / taluka / district levels. This in turn will connect to citizen card database and verify the common details. From citizen database, it will be connected to BIS / respective department databases through beneficiary IDs and will verify the department records. Once verification is over, citizen will be issued transaction receipt and database at the district level would be updated either online or in batch mode. Once the transaction is complete, the district office would issue payment through banks.

5.3 The citizen card System

The complete Citizen Card System would comprise of the following components:

- Citizen Information system
- Beneficiary Information System which also includes Ration Card System (comprising of the system at the ration shop and the central ration information system)

The citizen card system would facilitate citizen interface with the citizen information system and the beneficiary information system for requesting, authenticating, recording and approving grant of benefits to the citizen. The citizen card system includes the mechanisms for routing the flow of the request across the system. The citizen information system is the actual repository of the citizen card details. It holds the citizen card id, name, address and other basic details of the citizen. This high security system would be maintained carefully and allows only authorized access. The beneficiary information system would have information on the beneficiaries under various schemes including ration card system. Detail of both systems is described in following sub sections.

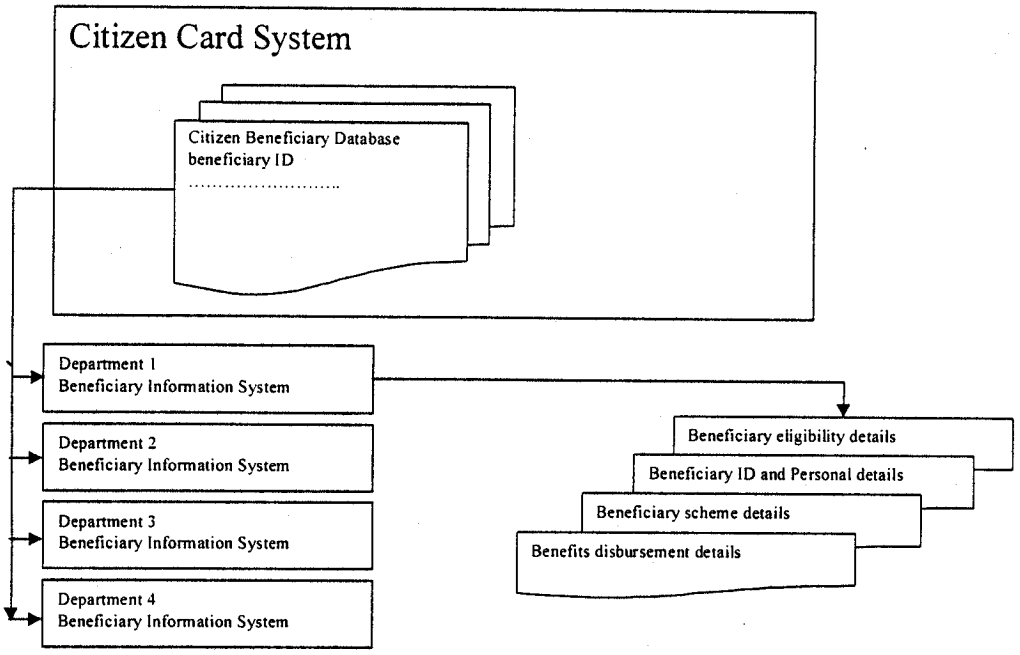


Figure 5-3 Citizen Card System

5.4 Citizen Information System

The citizen information system would be a repository of citizen information owned and managed by the citizen card authority. It would have basic information about the citizen including the details of his family, qualifications, numbers of the various beneficiary schemes/ration card number, various departmental reference numbers etc. This system would enable different departments to obtain specific information related to their area after authorization from the citizen card authority.

The citizen information with the citizen card authority would not be shared with other departments. The departments requiring specific information on an individual would have to contact the citizen card authority, which would then provide only the requested information to the department after proper authorization. Guidelines would have to be framed for regulating the information access to other agencies and departments. These guidelines should ensure that personal information is handled with discretion and not made freely available as this could result in widespread opposition to the project.

For instance, if the civil supplies department wants to know about ration card holders who are below the poverty line or owns a motor vehicle, they would request the citizen card authority to get them the data. The citizen card authority would get the citizen card number from the ration card number provided by the civil supplies departments and would use it to get the relevant RTO ID.

It is important to note that unless the citizen card database has the citizen id of other departments, the function of monitoring across departments would be lost. This function could be made attractive to the citizens by using it to facilitate services instead of

monitoring. The service could be used for providing the benefits to the eligible citizen rather than asking them for proofs of eligibility, etc

The citizen card system would have the database of all the citizens at the district along with their respective beneficiary Ids such as agriculture department ID, social welfare ID, etc. When citizens will apply to any department for a particular beneficiary scheme, they will not be required to submit several certificates for eligibility proof, address proof, etc. – the details of which are stored in citizen database. However, certificates (such as affidavits, inheritance certificate, etc) will still have to be submitted, as its details may not stored in the citizen database. Filled-in forms will be submitted in the same way as is done in the current cases.

The features of the citizen information system are:

- Store citizen card information
- Database/system auditing/usage tracking – access timestamp tracking, enabling auditing, system logs
- Add information of newly issued cards.
- Delete/Update status of card as stolen/expired etc. Update information of issued cards based on reported changes.
- Allow query of citizen card information to authorized users.
- Act as a central reference for validation of citizen card authenticity.
- Backup/archival
- Empty fields for giving benefits to departments/schemes not covered in the initial phase of the project

The indicative list of the various fields that would be captured for the Citizen Information system is placed at Annex 9.

5.5 Beneficiary Information System

The benefits and subsidies provided to the citizen need to be monitored to give a clear picture of who gets what. This information can be used to target the benefits in a more scientific manner and highlight the inefficiencies in the system.

The Beneficiary Information System (BIS) would have details of citizens related to their eligibility criteria, personal information etc for various beneficiary schemes under the departments. BIS would have department wise separate master databases and have scheme wise transactional tables. The master database of the department would validate the eligibility of the citizen with respect to the particular scheme, the transaction database would transact and based on the balance quota in the citizen's account, approve the request and update its database.

There are following three possible types of the benefits that a citizen can seek using the citizen card:

- Repeat Benefits without approval: Benefits that are given to all eligible citizen without under going an individual application and approval process, like ration to all citizen.
- One time Benefits with approval: Benefits that are given to all the eligible citizen subject to specific approval from the department after a due application procedure like subsidy for million wells scheme, agricultural inputs etc
- One time approval but repeat benefits: Benefits that are disbursed over a period of time and are given to all eligible citizen after a one time approval process after due application procedure, like pension, housing loan etc

For disbursement of benefits that do not require specific approval, the Citizen card system would send the required beneficiary number from CIS to the BIS where after due authentication the transaction receipt is printed at the citizen interface for the user to disburse the benefit.

For disbursement of benefits that require specific approval, the citizen card system would take the information in the stipulated form at the user interface and forward the same to BIS through CIS. The CIS would store the meta-data and send the application to the BIS and ultimately to the concerned department database. The application after due approval, populates the master database of the department and create a transaction table for the eligible scheme. The citizen, after the expiry of the stipulated period (generally the time taken in the approval process) comes for taking the benefit. The one time benefit to him is disbursed by the user in the manner similar to the disbursement of benefits not requiring approval, as mention in thew foregoing section (case (i)). For repeat benefits, the user is either able to write the entitlement of the benefits with due dates on the smart card or disburses the benefits over the approved period in the manner similar to the disbursement of the repeat benefits not requiring specific approval.

Back-office Computerization

As discussed above, for implementation of Citizen Card for disbursing benefits requiring approval by the respective departments, the back office computerization would have to be done. The process as stated would be that the citizen swipes his card in the system and feed the information like the benefit he wants to avail and fill in the required form on the system. The system gives a unique tracking number for future reference as well as maintaining trails of the request.The request would after validation from CIS go to the BIS and reside on the BIS database. This BIS database is expected to be integrated with the departmental computerization to facilitate online flow of the application to the approving authority through the departmental hierarchy and update the BIS automatically upon approval or rejection as the case may be. However till such time the departments' back office is computerised, the approval to various applications for grant of the benefits can be done by the departments in the following manner:

- The application is sent via e mail to the concerned official by the BIS, who thereafter process the application on email

- A print out of the application can be taken by the department from the BIS, the application is process manually and the status as approved or rejected along wit details

manually data entered into BIS ,whereafter the citizen card system could work on its own.

Ration Card system

This would be one of the databases of the beneficiary information system. However, the delivery of the benefits differs in this case. Unlike other department/scheme benefits, which are administered through the Government offices, ration is disbursed through a network of Fair Price shops. In this case the FPS owns a Point of Sales (POS) device. This POS provides an offline link with the beneficiary information database. The details of the working of the ration card system are discussed in later section of this chapter.

Features of BIS

The beneficiary information system would have details of citizens related to their eligibility criteria, personal information, etc. The card number would provide access to the government office providing the service, to look up the citizen details and process the application faster. Similarly, the citizen card would prove a person's identity for collecting the benefits. The features of the beneficiary information system is given below:

- Connect databases of the beneficiary departments
- Validate and check eligibility for the benefit from the department Master table
- Check availability of the benefit and the quantum of benefit to the citizen w.r..t the quota and criteria
- Record transaction, update data in the Database and send transaction receipt to the user for disbursement of the benefit in the scheme transaction tables.
- Store department wise information on the applications sent for approval for getting specific benefit.
- Can seek information on a particular citizen from the citizen database subject to limitations and process
- Can take on more databases of the departments in future and make the disbursement of benefits under those departments card enabled.

Ownership

The ownership of the Beneficiary information System would lie with the Departments. Each department to have its own server and database connected to the beneficiary information system terminals at the office providing benefits through a local and district routing server. BIS/Department server will host the application and database for the beneficiary scheme. The BIS/departmental server would record the benefits availed and generate reports of benefits provided under various categories.

Interface between BIS and CIS

As mentioned earlier, the Beneficiary ID would act as a link between the citizen information system and the beneficiary information system. For the details of the design of the system, please refer the Annex 7 & 9.

5.6 System Architecture

The citizen card system could either be based on a distributed system or a centralized system. Both these systems have their relative merits and the choice of any particular architecture would depend on the requirements in addition to the cost. The technological options available are:

5.6.1 Centralized System

In the centralized system, single server would be located at one place preferably at Gandhinagar. Offices from district as well as taluka would be connected to this single server through GSWAN.

The centralized system would have obvious advantages of a single centrally located server that would be easy to maintain along with lower hardware costs. The centralized system could also leverage on the network infrastructure of GSWAN. This would considerably reduce the disadvantage of high network costs and high network uptime.

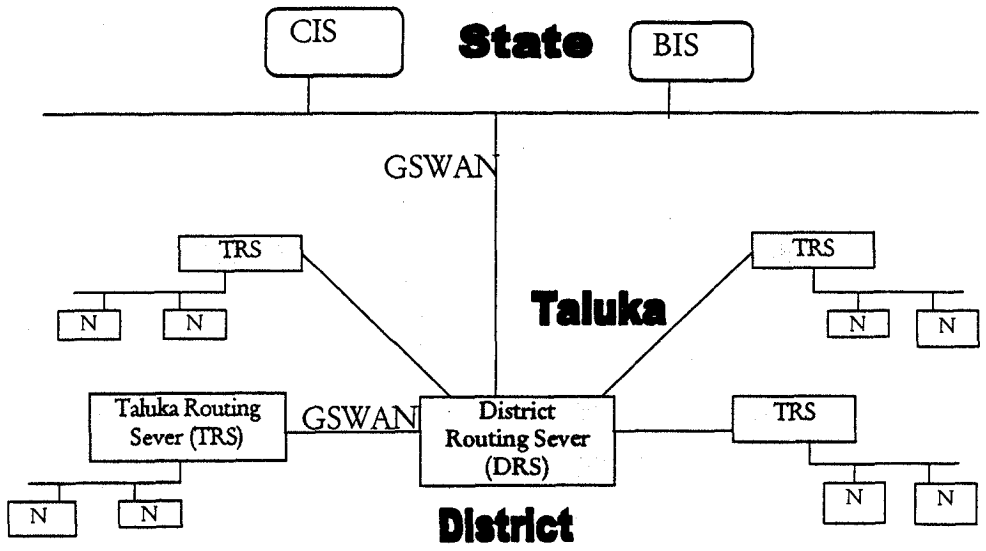


Figure 5-4 Centralized approach for Citizen Card System

As shown in the above diagram, the terminal at the user end would be a thin client, which would communicate with the CIS and BIS at the state level through a taluka/local routing server (TRS) and a district routing server (DRS). The TRS would route the information from the local office to the DRS, which in turn would route it to the correct department server.

The offices at the local level would be connected to the TRS through a LAN. TRS would be connected to GSWAN through a leased line or an OFC. TRS and DRS would be connected through GSWAN. Similarly, DRS would also be connected to CIS and BIS through GSWAN. The disadvantage of this system is that the system would be completely dependent on the service of the GSWAN. Any downtime in the GSWAN would also result in the downtime for the citizen card system.

5.6.2 Distributed System

In the distributed system, the CIS and BIS servers would be located at each district. In this case, various offices at taluka level would be connected to the server of their respective districts.

As shown in the diagram below, the terminal at the user end would be a thin client, which would communicate with the CIS and BIS at the district level through a taluka/local routing server (TRS) and a district routing server (DRS). The TRS would route the information from the local office to the DRS, which in turn would route it to the correct department server located at district. The offices at the local level would be connected to the TRS through a LAN. TRS would be connected to GSWAN through a leased line or an OFC. TRS and DRS would be connected through GSWAN. Similarly, DRS would also be connected to CIS and BIS through leased line or an OFC. Data from district CIS and BIS would periodically update CIS and BIS at state level through DRS and state routing server. DRS would be connected to state routing server through GSWAN.

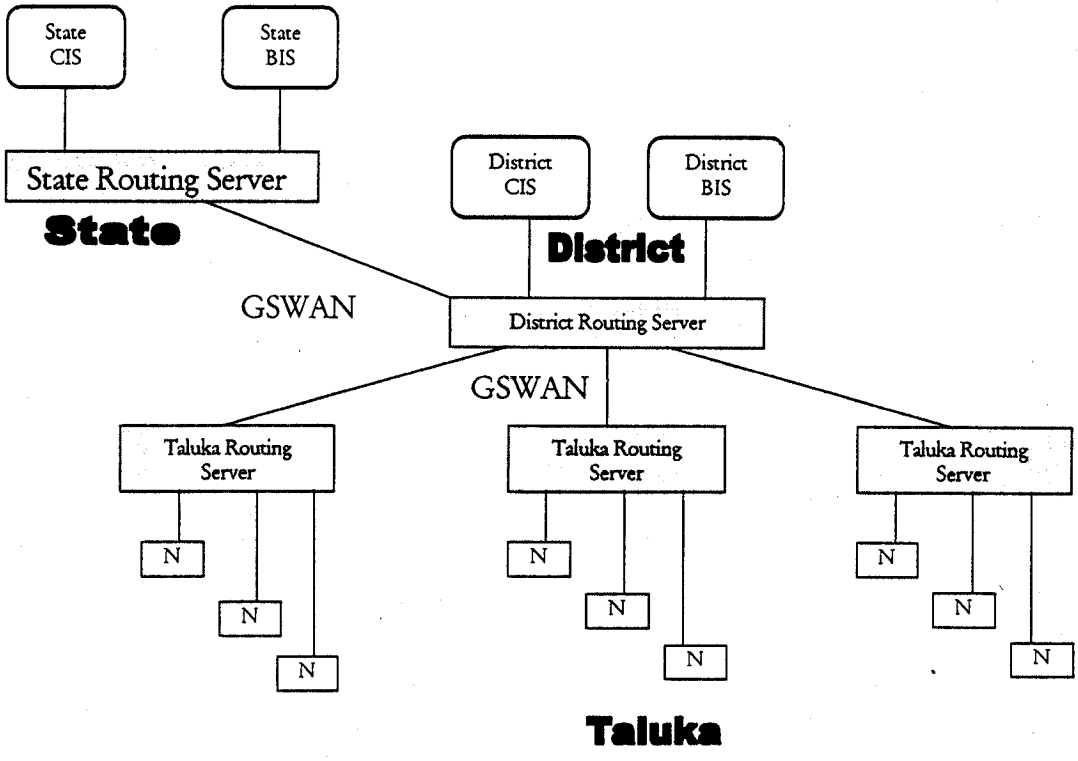


Figure 5-5 Decentralized approach for Citizen Card System

Most of the proposed functions are performed today at taluka or district level. In addition, data communication and transactions between the state level and the district / taluka level is much less as compared to transaction within district and taluka. Hence, a distributed architecture with a central server located at the district would be better suited. However, this would lead to higher costs for hardware as well as their maintenance. The distributed architecture would also make it difficult for software upgrades and version control. This could be a major effort in later years when more functions would be added or while upgrading the system.

Recommendations

The option for a centralized system looks more attractive, for obvious reasons of data integrity, ease of maintenance and upgradation in the applications. However, certain components would have to be kept at the district level. This would include a Remote Access Server (RAS) to which all the ration shops would connect through a phone line. The dial up of the ration shops to the district headquarters would be more feasible than all of them dialing to a central server. Here it would be very important to keep the recurring costs down by lowering the long distance communication. Long distance data communication would not only have higher cost but also lower reliability.

5.6.3 Options and recommendations for BIS

Even as we consider the option of a centralized server for its obvious cost advantages, there are options for the BIS /department database. The department disbursing benefits could have the following options:

- A single database with table level access control
- Different department database in a single server
- Different department database in different servers

For resolving the database ownership and data sharing issues between departments, the option of different department database in different servers looks most attractive. Each of these departments have large amount of data. In case a single database with table level access control is considered, issues related to administration of the database could arise. Activities of one department could take precedence over another and impede the project. However this is the least cost option and should not be eliminated. In case a citizen card authority is formed, which can take over the administration of the citizen database as well oversee the departmental database administration, then this would be the best option.

If all the databases are on a single server, then the system becomes very complex and would require expensive hardware. However, this would eliminate the issue of administration and control of the database, as there would be individual system administrators for each departmental database.

The option of each department owning its server and having its own administration and maintenance would make the department complete owners of the system. This could also

take advantage of any existing hardware with the department and reduce the project costs and hence is recommended.

5.7 System Software

The citizen card system would require a high reliability and availability during office hours. In addition, the system would have to be designed to handle heavy peak loads as several benefits are sought in very small time duration.

This scenario leads us to consider employing the software application on Unix platform for the database. Unix provides high reliability and availability over other platforms but at the same time, the disadvantages of Unix are high cost and proprietary hardware.

The choice of database for the system narrows down to Oracle and MS SQL Server as other products have lower probability of continued support. Any other product that may not enjoy vendor support and should not be preferred, as it would require a much higher cost in future. At present, the database market is dominated by Oracle and MS SQL Server with some market share by IBM DB2. The products that would find continued support from vendors are Oracle and MS SQL Server. However ,it is to be noted that DB2 and MS SQL are not easily compatible with Unix.

Oracle as a database has several advantages over MS SQL Server and is usually preferred for systems having high reliability and availability. Though MS SQL Server has also been used at a few locations for large systems, such cases are rare and the general industry trend is in favor of Oracle in addition to its technical advantages.

The system would require application server for which it is recommended that IBM Websphere be used. In addition, it is recommended that Apache web server be used.

5.8 Network Architecture

The citizen card system would consist of PCs connected to the central server by GSWAN. At each taluka level, the offices disbursing benefits to the citizen, would have a Local Area Network (LAN). This would be connected to the GSWAN through a leased line. This would require at each office at taluka a router (two port) and two modem pairs as shown in figure below.

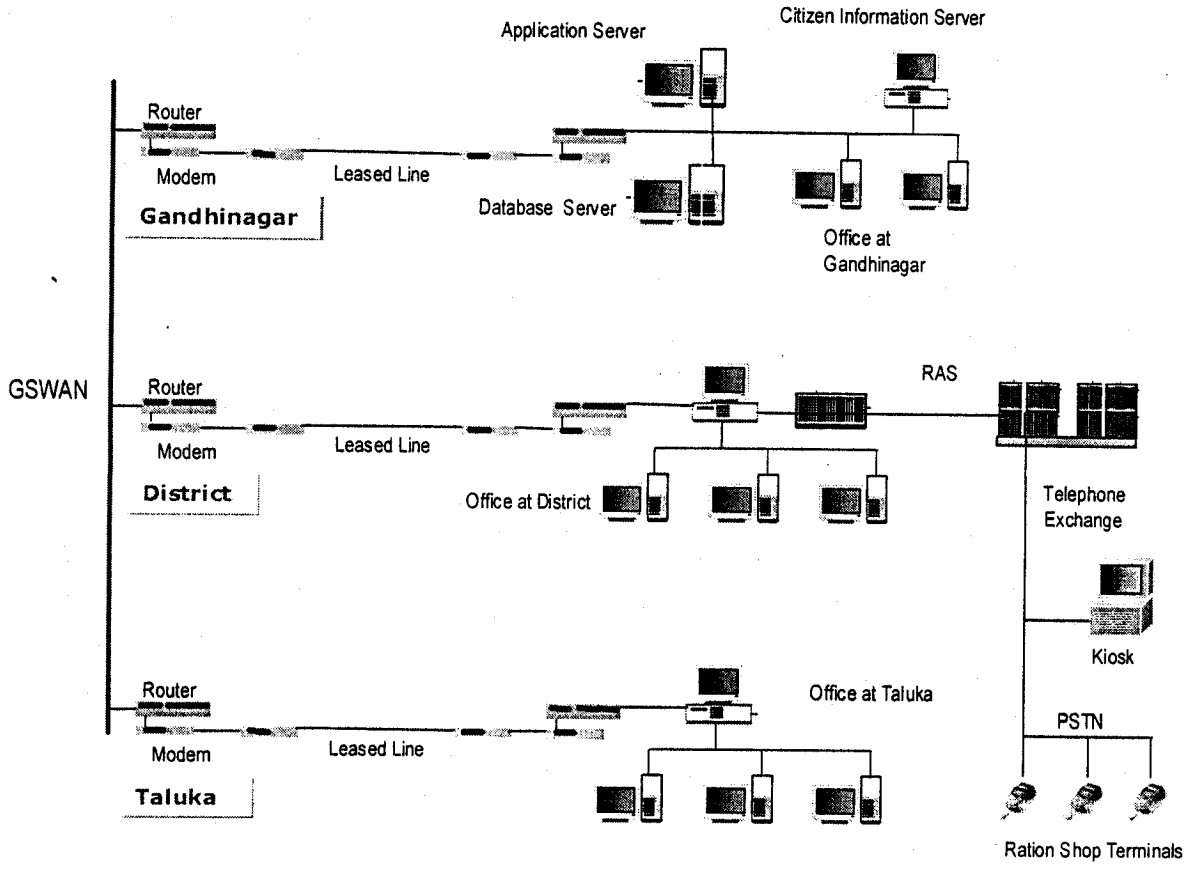


Figure 5-6 Network Architecture for Citizen Card System

Similarly, at the district level, the district office would be connected to the central server through the GSWAN. In addition, the district would have a RAS that would enable the ration shops to link to the central database. The POS device at the ration card would dial up to the central server through PSTN.

At Gandhinagar, the servers- Database server, application and web server and the Citizen information server would be connected to the district and taluka offices through leased lines as shown in the diagram.

The hardware setup for the citizen card system would require a central server for data storage and application server. In addition, there would be a RAS at the district level. The clients would be PCs, which would be connected to the central servers through GSWAN and Leased lines.

With the system platform based on Unix, the hardware would be specific to the operating system. For the database server and citizen information server, a Unix based server with 64 bit processors would be preferred. However, for the application and web server, a Microsoft

Windows 2000 / Pentium based server should be considered in the light of lower costs and lower processing requirements.

District Routing Server and Taluka Routing Servers connecting to GSWAN would also be provided.

Storage of large volume of data would have to be maintained with provision for backup and disaster management. This would call for storage area network, which would also be co-located at a place, which is geographically away from Gandhinagar and less prone to disaster. This could also be located outside Gujarat so that in case of any emergency such as earthquake, the data is not lost and benefits and relief to citizens can be provided at a short notice.

5.9 Security

Adequate security framework would have to be built around the citizen card system. Though the system would not be available to anyone outside the network, the security design should take into account future access through Internet.

The security policy would have to be defined for the Citizen information system and the beneficiary departments at the beginning of the project. The Security Policy has "rules" that the security features enforce (for e.g. every user must have a password, or only a resource owner can change the access list for the resource). The specific rules will vary with different security levels. The security policy should typically cover the following:

Accountability Policies

These policies include the identification and authentication policies. For e.g. who is accountable to do what? For e.g. a Secretary can dispose a file.

Access Control (mandatory and discretionary)

Access control policies can be classified as: discretionary, where users within certain policy constraints, are allowed to grant access to others to objects they own, create and destroy objects and so on; or mandatory, where untrusted entities, such as user, are not allowed to manage object privilege or object creation and destruction.

Data Confidentiality Policies

These policies define the type of data confidentiality protection to be supported by the system for data sent over the networks, and the granularity of that protection.

Data Integrity Policies

Policies related to the concurrency of data during transactions, across distributed databases would be defined.

Security Management Policies

These define the scope of the security administration and separation of administrative duties that pertain to security. This would include security against internal and external threats.

System Recovery

Adequate recovery strategy for Backup, Recovery, Disaster, etc. would have to be addressed.

The data in government departments is confidential in nature. The breach of this confidential information may lead to the loss of credibility and a major embarrassment to the Government. Hence, the security is an important aspect that would have to be addressed.

5.10 Examples of working of the Citizen Card system

This section explains the way the citizen would use the system and how the system would facilitate transaction. At the taluka level, the card would be swiped through a card reader and authenticated by the Citizen Card System.

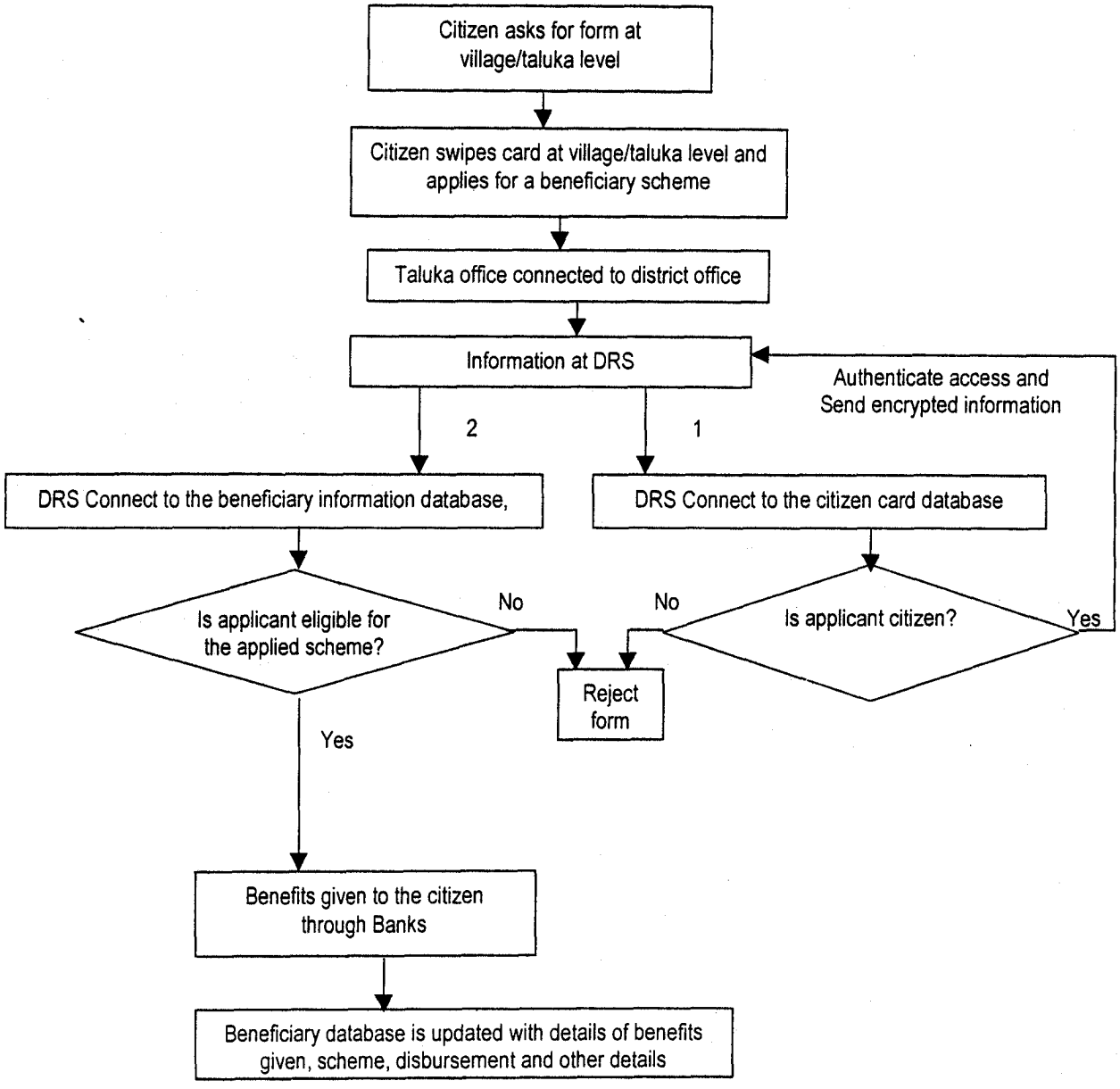


Figure 5-7 Example of Working of Citizen Card System

5.10.1 Ration Card working

The ration card would have centralized information of all ration cardholders, which could be connected to the POS terminals at the ration shop. These terminals would contain information regarding the ration cardholders of that particular shop.

At the ration card shop, the citizen would give the card to the shop operator. Every shop would have a POS terminal, which would be able to read the card and record the transaction of the citizen. The process from reading of the card to the delivery of the ration is explained in the workflow diagram. The stored transaction records of the POS would update the central ration card database on a periodic basis through a dial up connection.

Several Point Of Sale (POS) devices are available that support multiple card technologies (magnetic stripe as well as smart cards). Some POS devices available in the market are portable and support authorization from the central server on pre programmed time. These devices have a storage space of 1 to 2 MB for storing records when not connected to the phone line.

The primary advantage of POS devices over PCs is their relative simplicity, ease of use and small size. This means that the POS devices have much less downtime and maintenance requirement. In addition, the POS device is an integrated device having modem, phone, dial pad, LED/LCD screen and printer. The portable devices have a rechargeable battery and a storage media. As compared to a PC, the POS device has a very small space requirement.

The central database would have records of the total quantity of ration allocated and sent to each of the shops in addition to the details of the citizen for ration card purposes. This would enable tracing of the commodities consumed by individuals. This system can be made resistant to fraud by using automated card readers for capturing the card number. The card number should be entered only through the card reader. The figure below explains the proposed system for the use of citizen card as a ration card.

The system could provide significant advantages over the current system. Since the issue of ration would be registered on a central database, the commodity distribution could be tracked down to the individual family. This could enable savings by reducing misuse of subsidy. In addition, the subsidies could be redirected to the population that requires it the most.

The features of the information system stored at the ration card shop are:

- Maintain a list of ration card holders for that particular shop
- Connect to central system and securely reload card holder list through necessary authentication process
- Read the information stored in the citizen card that has been swiped.
- Validate whether the ration card is a valid card by verifying information against the database stored in the POS
- Screen/ interface to accept ration type/ration quantity

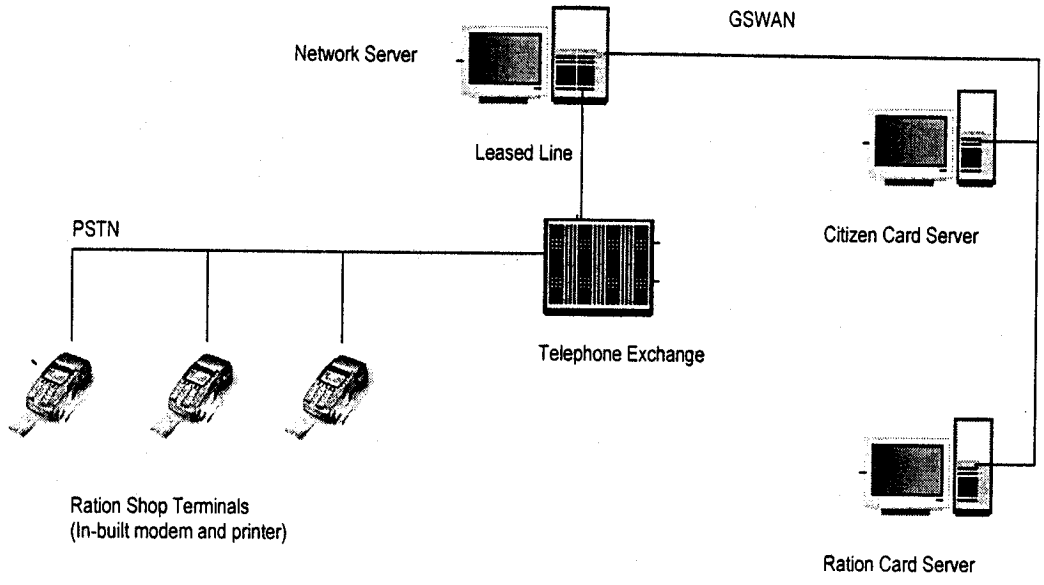


Figure 5-8 Ration card system

Verification of ration quota availability

- Record transaction and generate receipts upon issue of ration/ receipt of stock
- Receipt printing at the Ration shop
- Connect to database/ send encrypted data/ confirm complete data transfer/secure key/etc.

The elements that broadly make up the central ration information system, a part of the beneficiary information system, are given below:

- Maintain a listing of all the valid ration shops and cardholders for each shop.
- Maintain information of total stock, distribution and allocation to each family for each ration shop, distributed stock that has been returned unused-family wise as well as shop wise, stock that is spoilt/stolen/etc.
- Consolidated information of total ration issued in each ration shop for each period.
- Allow query of ration system information
- Reports on ration usage patterns such as Amount of ration lost /total commodity consumption for a period of time/ ration usage per shop
- Administrative activities - backup, archival, etc
- Encryption/ authentication/ tracking /auditing

The delivery of the ration to the citizen involves two steps, first step validates the citizen card and disburses benefits in the offline mode while the second step keeps the POS data updated and in sink with the beneficiary /ration card database. The flow chart of the process involved is given as follows:

How will the citizen card work at the Ration Shop?

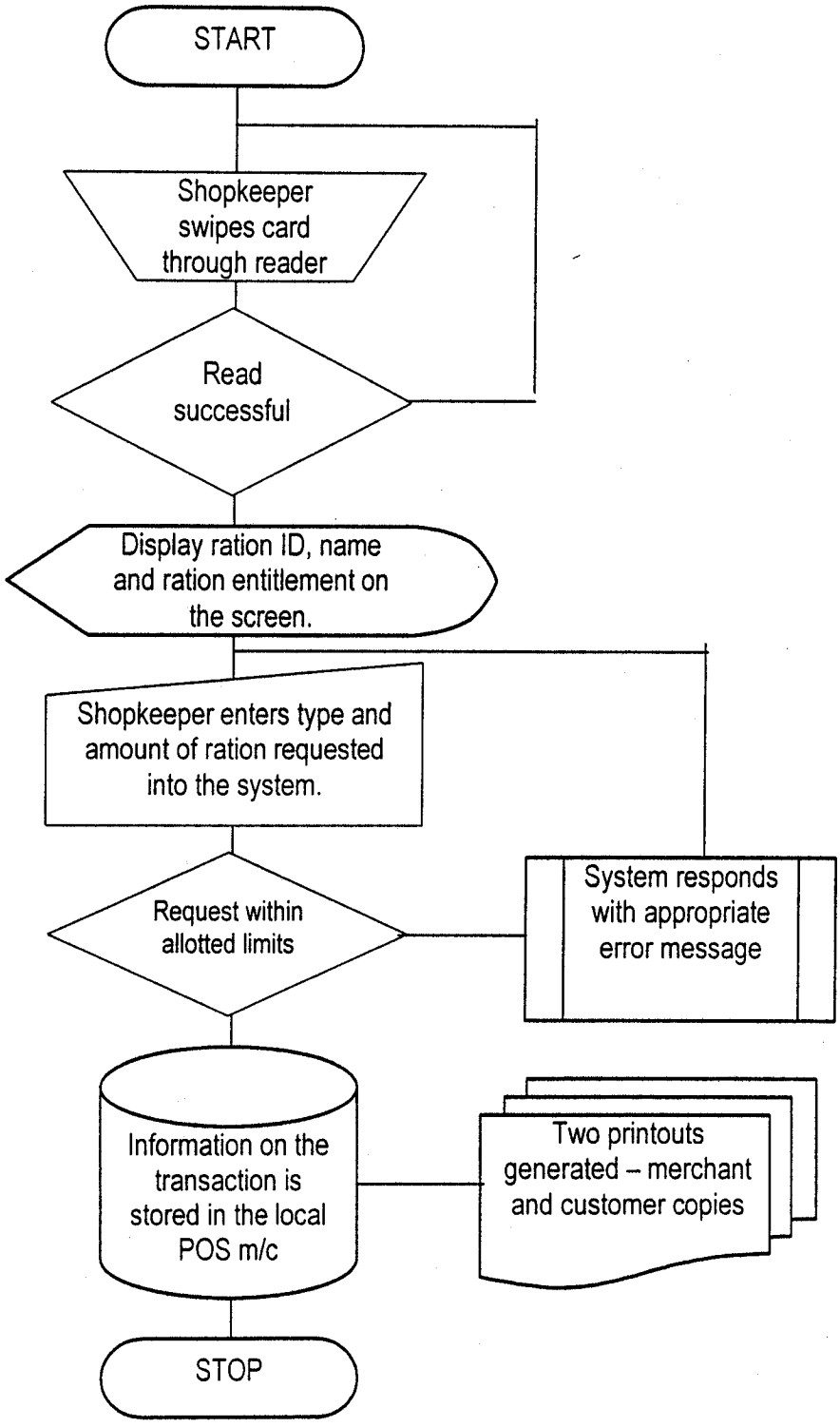


Figure 5-9 Ration card system methodology

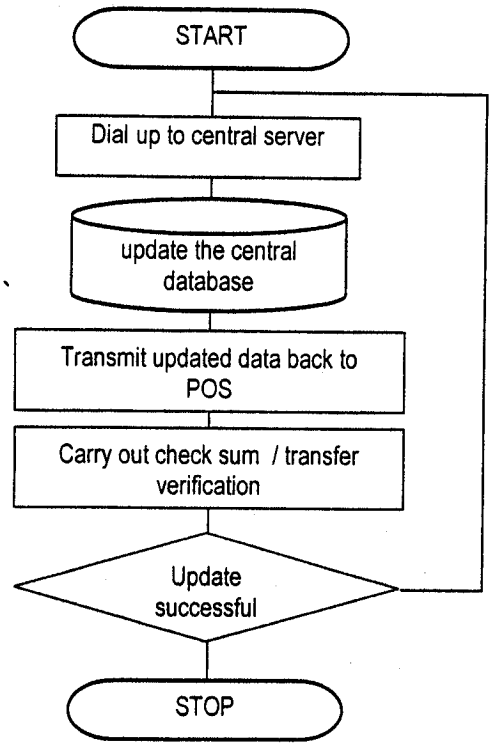


Figure 5-10 Central Server Updation

5.10.2 Disbursement of Pension using citizen card

Citizen would approach taluka office and would authenticate himself through the citizen card. The request is routed through the taluka routing server and the district routing server to the CIS server. The CIS server would check and authenticate the identity of citizen. After that, the request is routed again through the local routing server and the central routing server to the beneficiary information system server hosting pension application. Here citizen's request would be validated, checked and authenticated for pension. The pension request would be approved or rejected for payment based on this checking. The process for submitting application would be as explained earlier. Once the request is approved, the BIS would get updated and upon second query, after the stipulated time, the information and the data of the approved pension along with disbursement dates would be loaded to Smart Card. Citizen would then go to the bank for payment where the citizen card would be read by swiping the card and the payment would be made to the citizen based on the data on the smart card. As pension is a recurring event, citizen would not be required to go to the Government office every month. Once the payment approval is stored on the smart card, he would have to go bank every month and his smart card details would be updated with every transaction at the bank only. Bank would also update the pension department database through backend connectivity. However to facilitate such transactions, tie up with banks would have to be made for payment and transferring data.

5.10.3 Disbursement of Irrigation Assistance

Citizen would approach taluka office and would authenticate himself through the citizen card. The request is routed through the local routing server and the district routing server to the CIS server. The CIS server would check and authenticate the identity of citizen. After that, the request is routed again through the local routing server and the district routing server to the beneficiary information system server/irrigation department database. Based on the pre-defined workflow, the application would be validated and checked. Based on checking, request would be approved or rejected. This information would be manually loaded on the BIS and CIS, if the back end of the department is not computerized and automated. The citizen is expected to revisit the taluka office for enquiry after a stipulated time (generally equal to time taken by the departments in the approval process). Upon the swipe of the card along with the required information, the amount approved as subsidy would be either disbursed by the desk clerk of the taluka office. Alternatively, the same information could be loaded on the smart card. The citizen would go to the bank for payment where the citizen card would be read and the payment would be made. However to facilitate such transactions, tie up with banks would have to be made for payment and transferring data.

Similarly, all other benefits under various beneficiary schemes would be administered through the local taluka office, where the citizen is expected to swipe the card. The details of the various schemes are listed in Annex 5. The following is the indicative list of various department databases and the transaction tables of the beneficiary information system that can be covered under the citizen card system:

- Agriculture (crops, irrigation, fertilizers, seeds etc.)
- Animal husbandry (milch cattle, fodder, drinking water and housing facility for cattle etc)
- Fisheries (boat, net, storage etc.)
- Housing (material, loan etc.)
- Education (scholarships, books and other study materials etc.)
- Social welfare (loans for various purposes under various schemes)
- Tribal welfare (loans for various purposes under various schemes)
- Women and child welfare (loans for various purposes under various schemes)
- Health and family welfare (medicines, treatment under various drives etc).

6 Program Implementation

6.1 Overview

The citizen card implementation would be a herculean task. Implementation issues encompass the Implementation agency for the project, the government department that would implement the project or private sector participation. The implementation time frame is also a critical factor for the success of the project. The key drivers for successful implementation of the citizen card are:

- Implementation institution
- Populating the database
- Resolving the various implementation issues
- Phasing and implementation methodology of citizen card
- Extension in geographical spread and functionality of citizen card

6.2 Implementation institutions

An implementation institution would be required to manage the citizen card system. The institution would also be responsible for the task of card issue, maintenance, database creation, security, privacy and any other development ventures related to the citizen card.

Since the citizen database contains highly sensitive information about individuals, the consultants recommend that the functional database should be physically and logically separate from the core citizen information to avoid any possibility of security infringement by users of the functional information. The citizen database should be restricted to only specific authorized users and the implementing institution would need to identify these authorized users, drawing the guidelines for the secure usage of the system. The functional database would be the combined responsibility of the department concerned and the implementation institution. The implementation institution should also have a customer grievance cell as well as a cell handling legal issues.

The Citizen Card Authority would also have to ensure that the citizen card is compatible with the national identity card system when it is launched. The citizen card would have to be a coordinated effort between various government departments.

The following subsection describes the options for implementation agencies for the Citizen Card:

6.2.1 Citizen Card Authority

A separate legal identity could be setup handling all the issues as mentioned above. In addition, The citizen card authority would also have to deal with instances of new cards, changes to existing cards, duplicate cards, stolen cards, etc. The Citizen Card Authority, which was responsible for the issue of cards, would also be responsible for the above cases.

The citizen database would be updated by the Citizen Card Authority along with other databases linked to the citizen card system. For the case of stolen cards being misused, the card would have a status that would render it unusable for electronic service delivery. The authorized personnel at the places where the stolen card is being used would be instructed to seize the card so that it can be turned over to its owner.

The advantage of having separate authority would be the following:

- Abuse of the database would be prevented
- Privacy of the database would be maintained
- Scaling up of the functionality encompassing other departments

6.2.2 District Development Officer

The District Development Officer (DDO) could also be the agency for card issue, maintenance, database creation, security, privacy and any other development ventures related to the citizen card. Since the major share of the citizen card function would be related to welfare measures, the DDO could be the ideal implementing agency. Moreover, the DDO has an existing implementation structure in place for the welfare measures so the conflict of interest wouldn't be there.

6.2.3 Gujarat State Disaster Management Authority

Gujarat State Disaster Management Authority has been coordinating relief and rehabilitation in the earthquake affected areas of Gujarat. During this period, a comprehensive citizen database was built for relief measures. Since this data is linked to welfare and has been collected recently, the citizen card based on this data could be initiated at a rapid pace.

6.3 Populating the Database

The implementation of citizen card would be made simple if an existing citizen database is used as the base. For the initial citizen database, the consultants recommend usage of the existing databases. This data could be further refined and validated.

There are two options for populating the database:

6.3.1 Populating the database using existing database

For the initial citizen database, the consultants recommend usage of the existing ration card and the voter identity database. This data could be further refined and validated through additional data capture process or through other databases such as electoral database, driving license, etc. Though this database would not be perfect, this database could be gradually refined over a period. The figure below describes the methodology for the same.

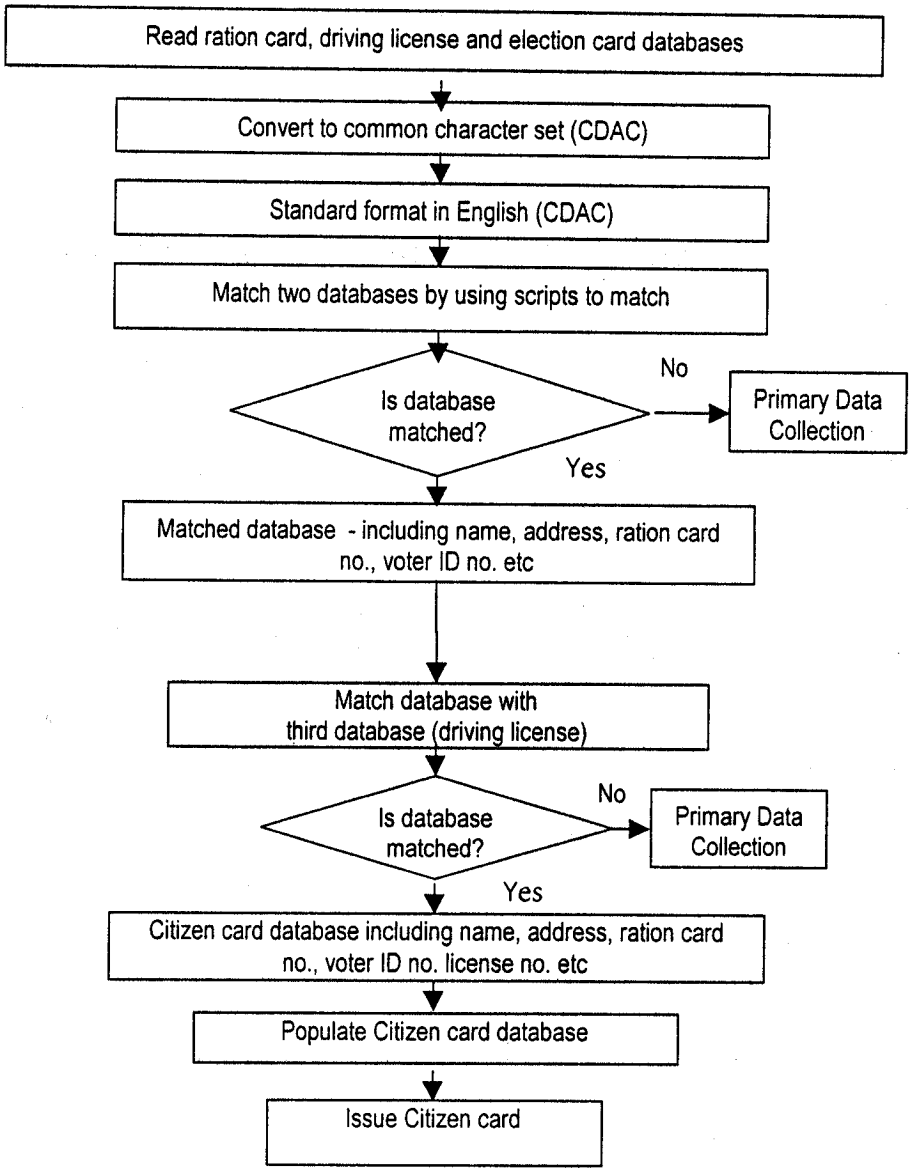


Figure 6-1 Populating the Citizen card database

6.3.2 Primary Data Capture

Alternatively, a primary data capture process could be initiated. It should be noted here that this process, though having much higher accuracy of records, would be much more expensive than the process of compiling citizen database form the existing functional databases. This could be market based where private entrepreneurs could be selected to prepare a database of citizens.

This market based data capture model would be inherently cheaper than a government administered planned approach. A privately managed data capture operation will fully exploit the economies of small-scale – exploiting the abundance of cheaply available human

resources and maintenance of infrastructure at a minimal expense. Since the primary data collection is a gigantic exercise, the citizen card could be kick started based on the ration card data. Later on, depending on the experience with the accuracy of the refined ration card data, the citizen database could be updated with a primary data collection exercise. Here, it is important to note that the speed as perceived by the citizen takes precedence over that of the entire process. Hence, the time for the citizen using the card after announcement of the project - 'time to market' should be minimized.

The following have to be taken care of while collecting primary data:

- This database should include scanned documents such as birth certificate, land ownership documents, etc.
- The data collected should also include the photograph, finger and palm print of the citizen.
- A mechanism of primary data collection would have to be formulated, to capture details of individuals who are not covered in the records.
- In addition, the primary data collection would also have to include the new addition, changes, etc.
- The primary data collection could be undertaken through a network of fixed and mobile data capture centres.
- The data capture centers could have equipment for scanning documents, digital photograph, biometrics capture, etc. in addition to the data entry of the individual. The data from these data capture centers could be used to build a comprehensive citizen database that could be used for citizen card.

6.3.3 Database for the Beneficiary Information System

The initial database for the Beneficiary Information System would start with creation of master data for schemes and then with creation of transaction data. As mentioned earlier, the beneficiary information system is not just an information system, it is also a management system covering various other aspects of the departments.

Only when the database creation of the beneficiary information system is complete, the citizen card system would be able to yield results. Please refer the Annex 7 for indicative database design for Beneficiary Information System and other Departments.

6.4 Implementation Methodology

In the initial years, it would be required that the card is voluntary and the citizens are motivated to obtain a card on the benefits it provides. Promotion of benefits and projection of the image of a card as a service facilitator would be critical to the success of the project. The citizen would have to be communicated, the benefits that they could derive from having the card. Making the card compulsory could be counterproductive as this would make the citizen card just another card – ration card, election ID card and now citizen card.

6.4.1 Rolling out pilot

Once the initial CIS and select schemes database is created, the pilot rollout can be undertaken. The target population should be a couple of talukas where the number of potential users of the benefits of the cards is high. This would have a higher impact and provide publicity to the project and its benefits. This could also be a learning platform for the scaling of the pilot to the entire state. The number of services and functionality provided through the card could be progressively increased in the pilot taluka. The project could be scaled gradually to other talukas where also the number of potential users is high. A mix of rural and urban regions should be selected for the citizen card pilot project. The detailed methodology regarding the pilot is mentioned in the Chapter 8.

6.4.2 Rolling out full phase

The full-fledged implementation of the project can be undertaken after the success measurement of the pilot has been undertaken. The schedule for the implementation is given in the subsequent section.

6.5 Extending functionality and reach of citizen card

Once the system is implemented, bottlenecks identified and removed, the citizen card system would stabilize and then the extension in functionality of the citizen card could be worked out. For this extension, the new department database would have to be created and linked with the Beneficiary information system, Citizen information system and kiosks etc. the linkage would depend upon the reach and functionality of the proposed extension.

The extension of the citizen card to the village level could also be undertaken. the future application at the village level may communicate with the system on dial-up lines or any other feasible mode of communication. This would take into account issues related to Networking, Link with existing databases and their updation frequencies and mode.

6.6 Implementation Plan

Given the fact that the availability of citizen database is critical to the success of the project, the consultants recommend that a pilot should be initiated at a location where the citizen database is readily available. After analysis of various government departments and their citizen database, it is clear that citizen database, which represents the true picture, doesn't exist. However, a location which can be easily monitored and functions tested for a refined citizen database of manageable size. It is there fore recommended that a pilot be taken up at Gandhinagar taluka for a group of 50,000 persons. The phase wise implementation schedule and population coverage is given in the table below

Table 6-1 Project Implementation Plan

	District	Total Population	Pilot Phase	Phase I	Phase II	Phase III	Phase IV
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Kachchh	946319			946319		
2	Banas Kantha	1551763					1551763

	District	Total Population	Pilot Phase	Phase I	Phase II	Phase III	Phase IV
			Year 1	Year 2	Year 3	Year 4	Year 5
3	Patan	732803				732803	
4	Mahesana	1139372				1139372	
5	Sabar Kantha	1291718					1291718
6	Gandhinagar	827533			827533		
7	Ahmedabad	3601194		2610085	991109		
8	Surendranagar	939391				939391	
9	Rajkot	1957759		621339	1336420		
10	Jamnagar	1186485		310129	876356		
11	Porbandar	332849				332849	
12	Junagadh	1518025				1518025	
13	Amreli	863843				863843	
14	Bhavnagar	1530944		320898	1210045		
15	Anand	1151161				1151161	
16	Kheda	1254479				1254479	
17	Panchmahals	1255427					1255427
18	Dohad	1013932					1013932
19	Vadodara	2256661		875855	1380805		
20	Narmada	318731					318731
21	Bharuch	849464				849464	
22	Surat	3097762		1675393	1422369		
23	The Dangs	115761					115761
24	Navsari	762135				762135	
25	Valsad	874622				874622	
		31370135	50000	6413700	8990957	10418145	5547333
	% of Total			20%	29%	33%	18%
	Cumulative			20%	49%	82%	100%
	Implementation time period (months)		12	12	12	12	12
	Cumulative time period (months)		12	24	36	48	60

Assumptions:

- The implementation plan is based on the assumption that all citizens above the age of 16 years would be issued the card.
- The time frame for data collection and authentication is not included in the implementation phases. It is assumed citizen database would be available at the time of start of the project. This time frame could vary depending on the availability of the database in electronic format.
- Citizen card will be issued to domicile citizens of Gujarat only. Migrating citizens will not be issued citizen cards until other state Governments develop similar system and database.

Implementation locations:

The project is planned to be completed in four phases after the pilot implementation. The population figures are derived from the census report.

- Phase I: Initially the implementation is planned in the large cities of Ahmedabad, Vadodara, Surat, Rajkot, Jamnagar and Bhavnagar. These cities have better infrastructure and would make the results visible. The municipal corporation areas and the adjoining areas would be catered to in the first phase.
- Phase II: In the subsequent phase the districts in which these cities lie could be covered along with Gandhinagar district.
- Phase III: The next phase would concentrate on districts with better infrastructure.
- Phase IV: Last phase on the more underdeveloped districts.

This is to ensure that the system is not plagued by problems of infrastructure and connectivity in the initial years. The response and feed back in the initial years would be critical to the success of the project.

Implementation Plan

Table 6-2 Annual plan for Citizen Card Implementation

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Resource Requirement*	3	54	76	88	47	25	26	27	28
Population Covered	50000	6413700	8990957	10418145	5547333	New	New	New	New

Phase	Pilot	Phase 1	Phase 2	Phase 3	Phase 4	Post Implementation Phase
Locations	Strategically Selected location	Ahmedabad Rajkot Jamnagar Bhavnagar Vadodara	Kachchh Gandhinagar Ahmedabad Rajkot Jamnagar Bhavnagar Vadodara Surat	Patan Mahesana Surendranagar Porbandar Junagadh Amreli Anand Kheda Bharuch Navsari Valsad	Banas Kantha Sabar Kantha Panchmahals Dohad Narmada The Dangs	

* In Rs. Crores

The resource requirements are from Citizen Card Implementation Authority point of view, it doesn't include the available infrastructure with the departments or the items, which could be purchased directly by the respective departments. The detailed costing has been included in the respective section of the report. Please refer the Section 7 and the Annex 6 for the same.

6.7 Implementation Issues

6.7.1 General Issues for the Project

The success of project would depend on a number of issues. Some of these implementation issues are discussed below:

Database Creation
The accuracy and time frame for data collection would be a key factor for the success of the project. Inaccurate data would significantly reduce performance of the system and lead to rejection of the project by the users of the system.
Population mechanism for creating citizen card database would have to be decided. Necessary permission would have to be obtained for using databases of ration card, RTO, election commission etc. from respective departments. Some of these departments might also require amendment in legal provisions governing privacy of their respective database before sharing it with citizen card implementation agency. Generating citizen card database from matching ration card database with election card database and RTO database may not be accurate due to issues like different formats of databases, Ghost cards etc.., however balance must be maintained between accuracy and the speed of data collection.

Primary Data Collection
Citizen card database could also be generated from fresh data collection. A mechanism of primary data collection would have to be formulated, to capture details of individuals. However, a long process generating accurate data would lead to the perception of nonperformance of the project even before its operation

Citizen Card Implementation Authority
Government will have to decide about citizen card implementation authority. It can be one of the existing agencies or Government will have to make necessary legal provisions to create new agency. Role of implementation agency would be very important considering various issues like privacy, charges etc. that are involved in citizen card implementation.

Project Management
Project management would be a significant issue requiring attention for overall success. All the other issues would be dependent on the efficient project management.

Security of Database
Security of citizen card database would be a key issue, since it contains highly sensitive information about individuals. Security policies would have to be framed. The citizen database would have be restricted to only specific authorized users and the Citizen Card Implementation Agency would need to identify these authorized users, drawing the guidelines for the secure usage of the system.

Process Re-engineering
The citizen card would require some changes in the present system. A through analysis of the process would have to be undertaken and the critical processes re-engineered. Re-engineering would have to take several issues such as change management and employee

satisfaction. Change management process would have to undertaken to ensure smooth transition to the citizen card oriented service system.

Privacy
Privacy issues would have to be taken care during the implementation of the project. Several projects related to citizen database have been unsuccessful mainly because if citizens privacy concerns and threat of misuse of data. Strong framework and restrictive access to citizen information could ensure that privacy issues do not impair the project

Data Migration
Government departments have a large amount of data in various formats - distributed across diverse locations. This database would have to be linked to the citizen card system do derive greater benefits from the system

Standardization
Effective use of citizen card would take place if only standards are laid down on various issues such as hardware, software, operating procedures, etc. Guidelines would have to be made for future enhancements and expansions also. Standard would have to be set keeping in mind compatibility of citizen card system with proposed national system.

Recovery of Charges
Recovery of charges would be crucial and sensitive issue. If charges are not recovered then the system would face a threat of degradation due to lack of O & M support. Charges should be fixed based on a realistic and a financially viable scenario.

Citizen Interface
Citizen interface for the services would have to be augmented. The perception of the public of the system would go a long way in the success of the project. This makes the citizen interface critical

Prioritization
Prioritization of would have to undertaken for implementation based on:

- popularity and benefit from various schemes
- geographical location
- population coverage

Socially and economic backward sections of the society would have be identified and benefits would have to be directed towards who needs the benefits most. Prioritization will help in phased implementation so that the project is executed without major problems

6.7.2 Legal issues for citizen card

There would be several legal issues that would have to exploit the complete range of functions planned. These issues are given below:

Laws would have to be formulated governing the use of citizen card as a valid identity card, ration card, or any other function that the government finds appropriate. This would have to

be addressed for high acceptability of the card. Laws would also have be formulated for establishing a citizen card authority for managing the citizen database, manufacture and issue the card and coordinate between the various agencies for the function that the card my be put to.

The subsequent section discusses some instances where legal issues arise.

For financial transactions, RBI guidelines for use of smart card / magnetic stripe cards for banking and financial transactions would have to be followed. Following any other mechanism may make transaction illegal.

In case at a future date the citizen card functions as a driving license, the motor vehicles act would have to be amended to allow the license to be a multipurpose card. The driving license should not be physically seized on any instance or violation of any traffic law. The card could be declared 'seized or cancelled' in the memory chip only. Since the driving license is valid all over the country, a legal issue would arise on the seizure of citizen card based driving license outside Gujarat.

The citizen card is planned as a service delivery mechanism for several beneficiary schemes. The delivery mechanism of the citizen card may not be compatible with the laws for these delivery mechanisms and schemes. An indicative list of these laws is as follows:

- Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995
- Protection of Civil Rights Act, 1955
- Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act 1989
- Panchayati Raj Act
- The Essential Commodities Act, 1955
- The Prevention of Black Marketing and Maintenance of Supplies of Essential Commodities Act, 1980

It is to be reiterated that implementation of citizen card may involve issues which could be challenged in the court of law. Thus suitable preventive action would be necessary for hassle-free implementation. Citizen card authority and implementation agency would have to take legal department into confidence before embarking upon full-fledged implementation.

6.7.3 Integration of Citizen Card with NISHAN

The Ministry of Home Affairs, Government of India is planning to implement a National Identity Cards System in India - NISHAN. This system is planned for purely identification purposes with no direct benefit to the citizen. The system however like the citizen card system would have a nation wide network.

In order for the citizen card to be compatible with NISHAN, the citizen card must be compatible on function terms as well as technological terms. In case of the citizen card, it was kept in mind the special function of NISHAN and the planned technology for the system. The features of the citizen card that would make it compatible with NISHAN are:

- *Identity* Providing basic citizen details along with photograph printed on the card in a tamperproof manner

- *Citizen Card Number* The recommended codification of the citizen card is in line with that of NISHAN. The recommended codification for Nishan is shown below

□□□□□□	□□	□□□□□
(6 digit postal code)	(2 digit partition code)	(5 digits random code)

The NISHAN system requires high accuracy and authenticity of data, which is not available without a detailed primary data collection exercise. But in order to make the citizen card project more viable, other database would have to be used. This would reduce the compatibility of NISHAN with the citizen card. However in the interest of speedy project completion and better project viability, other existing databases would have to be used. This database could be refined at a later date saving costs and time.

6.7.4 Conclusion

The following is set of activities to be carried out for successful implementation of the citizen card project:

- Setting up an agency
- Creation of Database
- Identification of Beneficiary Department and schemes
- Purchase and issue cards
- Rollout pilot
- Test the success of pilot

7 Project Costs and Funding

This chapter talks about various costs associated with the projects and likely revenue.

7.1 The Card Cost

The card would be one of the most critical parts of the project and would also have the maximum share of costs. The recommended card would be a memory chip based plastic card (smart card) with the basic citizen details in the chip as well as printed on the card. The card would be 8Kb memory contact type card conforming to ISO 7816 standards for integrated circuit cards. This card should be same as the card to be used in pilot project. Indicative cost of the card is highlighted in the table below.

Table 7-1 Card Cost

Particulars	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Blank Cards	35	31,370,135	1,097,954,726
Printing for Personalization	5	31,370,135	156,850,675
Card Total			**1,254,805,402**

Total number of cards is based on population figure mentioned in section 6.6

7.2 Hardware Cost

The hardware for the project would include servers for the citizen information system and benefit information system, remote access server (RAS), POS devices at Ration shops, PCs at departments and networking equipment.

A citizen information server would be required, that would have a citizen database. In addition a beneficiary information server is also required, that will have the department database including ration card database and an application for updating the ration database based on the transactions. It is recommended that departments would have its separate databases at the beneficiary information server under the exclusive charge of respective departments. A web server would also be required.

At all 15,000 ration-shops, a POS device would be required along with a telephone connection. This would connect to the RAS, which in turn would connect to the application server.

Table 7-2 Hardware Cost

Hardware	Unit Cost (Rs.)	Nos.	Cost (Rs.)
POS device	25000	15,000	375,000,000
Telephone Connection	2800	15,000	42,000,000
Leased line modem pair	150000	502	75,300,000
Central Server H/W	6000000	2	12,000,000

Hardware	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Web-server	2000000	1	2,000,000
Routers HW	250000	251	62,750,000
Routing Server	1000000	25	25,000,000
RAS	600000	25	15,000,000
PCs	30000	2800	84,000,000
Total Hardware Costs			**693,050,000**

The two central servers would be for citizen information and beneficiary information system. All departments would have separate databases in the same sever (beneficiary information server). Some of this hardware cost could be borne by departments and additional equipment already available with the departments could be employed.

Indicative Server Hardware Specification
Four 64 bit RCIS CPU
36 GB x 4 hard disk space –with RAID 5
4 GB Ram
Backup DAT Device

7.3 Software Cost

The application software for the project would include application for all beneficiary schemes along with a system for ration card.

Scope Covered in the Estimates:

- Citizen card
- Various Beneficiary Schemes*
- Audit –Trail features
- Ration card
- Security Features
- Archival-Retrieval features

* Beneficiary schemes are detailed in Annex-5.

The estimate is also done based on the complexity level of the General characteristics of the system like:

- Data Communications
- Performance
- Transaction Rates
- End-User Efficiency
- Complex Processing
- Installation Ease
- Multiple Sites
- Distributed Processing
- Heavily Used Configuration
- On-line Data Entry
- On-line Updates
- Reusability
- Operational Ease
- Facilitate Change

The various components in the proposed system are:

- Citizen Information System development
- Beneficiary Information development
- Web enabling of Applications
- Routing logic for connecting scheme wise counters to departments
- Taluka level configuration of POS/PC for GSWAN and routing logic
- Provision of Web connectivity to Kiosk at village level at a future date

The system would comprise of following:

The Citizen Information System consists of
Citizen Database
Data from citizen database to be shared with departments
Receive request through WAN & route to CIS, Respective departments
List of Departments for which the requests can be serviced
Beneficiary information for which only IDs will be stored
Abstract of unlisted Departments/schemes.

The Beneficiary Information System has the following information
Master tables relevant to the Department
Information regarding the workflow of the various schemes considered
Various transaction based information
User Request tracking database
Inward Register
Worksheet Register
SLA Register
Schemes Issued Register
Approval Limit Register

The proposed system would also require software for running the system. This would include Database, Application Server, Web Server, Browser and Operating System. The cost of database, application server and operating system only would be considered as other software are available free of cost. The cost of operating system would be included as part of the hardware cost and is not considered separately. The costs of different software components is given in the table below:

Table 7-3 Software Cost

Software	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Application Software	30000000	1	30,000,000
System Software (Oracle)*	1900000	33 *	62,700,000
Application Server	800000	1	800,000
Web Server	0	1	
Development Tools			1,600,000

*To estimate the number of licenses (processor based licensing) required, the system is assumed to have 33 processors. This processing power is only indicative and estimated from the requirement of a single processor for each of the identified 8 departments as well as one each for all 25 districts.

7.4 Other Cost

The project would have several other costs, which have been detailed below.

Training Costs would be incurred for training the personnel in the application as well as the ration shop operators for the POS device. The training costs do not take into account, training required for imparting basic computer knowledge. The personnel to be trained would comprise of the 15,000 ration shop operators and 2800 users in departments. The 2800 department users would be based on one user for each taluka and two users per district for each of the ten beneficiary departments. In addition, there would be 50 other users for administration and monitoring. Training cost is mentioned in the table below.

Table 7-4 Training Cost

Item	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Training Costs	2000	17800	140,000

Data Collection and Refining Cost would have to be incurred. It is estimated that a single record would cost Rs. 3.30. This estimate is derived from the effort estimate for collecting data and refining the data from the existing citizen databases, which is shown in table below.

Table 7-5 Data Collection Cost

Item	Cost per record (Rs.)	Nos.	Cost (Rs.)
Data Collection and Refining	3.30	31,370,135	103,521,446

In addition to the above costs the project could have some other costs related to Air-conditioning for server room and power conditioning equipment for the computer hardware. Following table depicts these costs.

Table 7-6 Other Costs

Item	Cost (Rs.)
Air Conditioning	1,300,000
Power Conditioning Equipment	1,300,000
Others	2,600,000

The project would also require effort for implementation and this is estimated at 10% of the project costs excluding training costs. This cost would include project management, monitoring and implementation expenses. Implementation cost explained in the table below, is taken at 10% because citizen card is new concept and project of such a huge magnitude is not normal.

Table 7-7 Implementation Cost

Item	% of total cost	Cost (Rs.)
Implementation	10%	218,227,685

7.5 Recurring Cost

The citizen card project would also incur recurring costs apart form the fixed costs given above. The largest among these is the annual maintenance charges. These maintenance charges are estimated at 10% of the projects costs excluding the training and thes implementation costs.

The telephone charges are estimated at 10 calls per day for 300 days at the rate of Rs.1.5 per call for each ration shop. The telephone charges also include a fixed cost component of Rs. 500 per telephone connection per month.

It is estimated that approximately 5% of the cards would have to be replaced for which additional costs have to be incurred annually.

Following table gives indicative recurring costs.

Table 7-8 Recurring Costs

Item	Measurement	Cost / year (Rs.)
Telephone charges at the POS		78,750,000
Leased line charges	251 leased lines	6,275,000
Maintenance Charges	10% of total cost	89,187,145
Costs of card replacements	5% of total cost	62,740,270
Total Recurring Costs		**236,952,415**

7.6 Total Cost

Following table shows various indicative costs for citizen card projects. Total fixed cost for the project is Rs. 240. 13 crores and total recurring cost for the project is Rs. 23.70 crores per annum.

Table 7-9 Project Cost Breakup

Item	Cost (Rs. Lacs)
Card	12548
Hardware	6931
Application Software	300
System Software (Oracle)	627
Development tools	16
Application and web server	8
Training Costs	356
Data Collection and Refining	1035
Others	26
Implementation	2182
Total Fixed Costs	**24013**
Total Recurring Costs	**2370**

7.7 Project Funding

The project funding would come from sources such as:

- Corporate Sponsorships
- Sponsorships by banks, Financial Institutions, Insurance and Telecom Companies
- Charges for Card from Citizens
- Transaction Charges for ration from Citizens
- Transaction Charges for Beneficiary schemes from Citizens

These revenue sources could in a significant manner make the project viable. However, it is not expected that these revenue sources would be able to make the citizen card project self sustaining. In order to make the citizen card project self sustaining, the revenue requirements would be very high and the social benefit objective of the card would be lost. Generation of significant revenues out of servicing social projects would also be socially and politically unacceptable and would lead to failure of the project. Hence, a balance must be maintained on the revenues to be generated and funding from government for the citizen card project.

It should be noted that in addition to the direct revenues, there are several benefits that the citizen and the government would enjoy. Though some of these benefits can be quantified (saving in PDS commodities), the most significant benefit would accrue in terms of improved service delivery to the citizen.
The estimated revenues for the citizen card project are given in the table below:

Sponsorships

Corporate Sponsorships	Rs. 8 crores
Sponsorships by banks, Financial Institutions, Insurance Companies and Telecom Companies	Rs. 22 crores

The sponsorships for the card would be one-time payments for meeting the capital costs of the project. The corporate sponsorships are estimated to cover 80% of the printing and personalization of the card. Sponsorships by banks, Financial Institutions, Insurance Companies and Telecom Companies would bring in additional funds for meeting the costs. These companies could benefit form a ready and reliable database of individuals who could be potential consumers of their services. In addition, appointment of these institutions for payment of benefits could make project funding more attractive for them. This funding is estimated at 20% of the card cost of the project.

Charges from Card Users

Card users should be charged for the services they avail based on:

- quantum of benefit
- cost of providing the benefit
- ability to pay

A combination of these criteria is used in deriving the revenue for the citizen card project. A charge of Rs. 10 can be taken from each individual. However, those individuals having any person paying income tax in their family could pay Rs. 50 per card for every card issued. This would ensure that the card is valued and those who cannot afford to pay more are not burdened. At present, Gujarat has approximately 20 lacs persons paying income tax and assuming 75% of families have only one member paying income tax, the number of families with income tax paying members is estimated at 15 lacs. Assuming an average family size of 5, the total number of persons who would be paying Rs. 50 per card would be 10% of the total cardholders.

A transaction charge of Re. 1 per transaction could be charged for benefits, which are low in value per transaction. The benefit that is provided under this category is related to ration distribution. Other category of benefits, which is provided, would consist of payment of subsidies. In this case, 1% of the value of payment could be charged as a processing charge.

Charges for Card from Citizens not paying income tax	**Rs. 10 per card**
Charges for Card from Citizens paying income tax	Rs. 50 per card
Transaction Charges for ration from Citizens	Re. 1 per transaction
Transaction Charges for Beneficiary schemes from Citizens	1% of beneficiary payments

The estimated revenues from these sources would be annual and would depend on the implementation schedule and population coverage. The table below gives an estimate of revenues from charges considering a total coverage.

Table 7-10 Card Charges

Category	% of population	Rs. per card	Revenue (Rs. Lacs)
Charges per card for non Income tax payee families	90%	10	2,823
Charges per card for Income tax payee families	10%	50	1,569
Total Card Charges			4,392

Table 7-11 Transaction Charges

Type of charge	Charge rate	Revenue (Rs. Lacs)
Transaction charges per annum	Re 1	1,440
Transaction processing charges	1%	1,000
Total Transaction charges per annum		2,440

8 Viability of the Citizen Card Project

A driving factor in many beneficiary programs is the need to increase program integrity. There may be measurable financial savings through a reduction in funds lost to fraud or overpayment, which justifies an increased outlay to implement the citizen card. Even if these reductions are not quantifiable, the citizen card may be justified through an increase in public confidence in the integrity of a program.

8.1 Benefits to the Citizen

- *Better service delivery*

  Better service delivery to citizen could be facilitated through a common citizen database. This database could be used for more efficient citizen services. This would also simplify procedures for both the government as well as the citizens.
- *Increase individual - government transactional efficiency*

  The electronic delivery of services would enhance individual - government transactional efficiency by reducing manual entry of information and reducing paperwork.
- *Elimination of multiple cards and documents*

  The citizen has several existing cards – driving license, ration card, voter identity card etc. – these could be replaced by a single card.

8.2 Other Benefits to the Government

- *Security through Reliable and standardized method of identity*

  At present, there is no reliable and standardized method of identifying an individual. The identity of an individual is presently being proved with multiple 'Identity' requirements. Citizen card would enable tracking and secure identification of citizens. This could be used for identifying people for security.
- *Maximize tax collection and plug leakage*

  The citizen card could ensure that the tax collection is maximized with minimum leakage. This could be made possible by making it mandatory to list the citizen card number in all transactions. This would ensure that all transactions are tracked and tax leakage is plugged.
- *Optimize subsidies and public support systems*

  One of the most difficult issues that the government will have to address is that of the subsidies reaching the target section of society. This is an extremely difficult task and often, the subsidies are misused at the cost of the target population. The citizen card could bring into play, a mechanism for efficient and effective public support systems.
- *Statistical Information*

  There exists little infrastructure with the government to obtain recent and relevant statistics on social and economic parameters as well as the performance of various

welfare measures initiated by the government. The citizen card system could be a good beginning in this area by becoming a citizen's information repository.

8.3 Food Grains and Food Products

Taking the primary benefit of the citizen card as a system for electronic authentication of PDS, the citizen card could deliver enormous benefits. This benefit would arise out of reduction in the diversion of subsidized PDS commodities. The PDS system was given a subsidy of Rs. 8100 crores by the central government. In addition, the Government of Gujarat has allocated a subsidy of Rs. 119 crores under the programs given below:

Program Name	Rs. crores
Food for Poor Program	96
PDS - edible oils	15
Antodaya Anna Yojana	8
Total Subsidy	119

It is estimated that approximately 20% of the PDS commodities get diverted in Gujarat State. Though this is substantially less than the average Indian figure of 35%, it represents a substantial drain for the central as well as the state government.

The current off-take of commodities by Gujarat is around 3% of the total for the country. Going by these figures, the diversion of PDS commodities is huge by any means. The diversion figures are given in the table below:

Item	Rs. Crores
Diversion form State Government funds	23.80
Diversion form Central Government funds	46.43
Total Diversion/Losses	70.23

Given that the planned system is totally funded by the state government, a maximum saving potential of around Rs. 20 crores every year is possible for the Government of Gujarat

8.4 Kerosene Subsidy

Government of India had subsidized kerosene for distribution through the PDS to the tune of Rs. 8120 crores in 2000 -01. This is essential to provide affordable means of cooking fuel to the economically underprivileged sections of the society. However, a large proportion of the kerosene for PDS is diverted for other uses such as industrial, transport, etc.

The total allocation and lifting of kerosene for PDS in Gujarat for 1998-99 was 0.5 million tonnes. The corresponding figures for India are 6.1 million tonnes. The subsidy for the same period (1998-99) for entire India and for Gujarat amounts to Rs. 5770 crores and Rs. 474 crores. Assuming a diversion rate of around 20% would show losses amounting to Rs. 94.9 crores. Taking into account the present subsidy, which is significantly higher, the losses

would be even greater. Considering even the figure of Rs. 90 crore savings in subsidy from preventing diversion of kerosene, the benefit to government is enormous.

8.5 Viability analysis

The citizen card project has several benefits that cannot be easily quantified in financial terms. In addition, the project has benefits that are not revenues but savings derived from reduction in diversion of subsidies. Apart from these benefits, the citizen card would also generate revenues through various sources as described in the previous section.

Table 8-1 Project Cost Allocation

Costs	Funding Source	Cost	Funding %	Citizen card project funding requirements
Blank Cards	Central government/citizen	10980	70%	
	Banks, insurance, financial, telecom		20%	
	Citizen Card Project		10%	1098
Printing for Personalization	Citizen Card Project	1569	50%	784
	Corporate sponsors		50%	
Card Total		12548		1882
Hardware				
POS device	Citizen Card Project	3750	100%	3750
Telephone Connection	Telecom cos STD/PCO booths	420	100%	
Leased line modem pair	Departments	753	100%	
Central Server H/W	Citizen Card Project	120	100%	120
Webserver	Citizen Card Project	20	100%	20
Routers HW	Citizen Card Project	628	100%	628
Routing Server	Departments	250	100%	
RAS	Citizen Card Project	150	100%	150
PCs	Departments	840	100%	
Total Hardware Costs		6931		4668
Application Software	Citizen Card Project	300	100%	300
System Software (Oracle)	Citizen Card Project	627	100%	627
Application & web server	Citizen Card Project	8	100%	8
Training Costs	Departments	356	100%	
Data Collection & Refining	Departments	1035	50%	
	Citizen Card project		50%	518
Others	Citizen Card Project	26	100%	26
Implementation	Citizen Card Project	2182	100%	2182
Total Fixed Costs		**24013**		**10211**

The viability of the project would depend on the funding of the initial cost of the project. Citizen card project requires high capital investment and the revenues from all the sources

may not be able to yield a bankable rate of return.

A bankable rate of return may however be obtained theoretically by increasing the charges for services and card, but this could be socially and politically unacceptable. If different stakeholders and agencies fund the initial cost of the project, then the project could be financially self-sustaining.

As per the table above, funding requirement of the citizen card project would reduce by a significant extent.

8.5.1 Assumptions

The following assumptions have been taken into consideration for the viability analysis:

- Discounting Rate has been considered at 13.4%
- Cost escalation factor has been taken at 5%
- Debt Equity Ratio has been taken at 1.5
- Interest Rate and the Discounting Rate has been taken at 9%
- Required Return on Equity has been assumed to 20%
- Project implementation period has been taken as 5 years
- Time frame for calculation after implementation has been as 10 years
- Cash flow is considered for 15 years and it is assumed that all phases of the project mentioned would complete in first 5 years
- Investments would be made in first 5 years
- The first year investment would only be in pilot
- The investments made in the in second year to fifth year would be based on the population targeted and thus taken in the same ratio
- The distribution of recurring costs and transaction charge revenue is in the same proportion as the investment ratio for the second to fifth year (post pilot)
- There are 24 ration card transaction per year per card
- 10% of cards would be required to be printed again (for reasons like new, theft, loss etc.)

8.6 Approach

The financial viability for the citizen card project has been analyzed on the basis of the **Net Present Value (NPV)** of the project. **Internal Rate of Return (IRR)** has also been mentioned wherever the NPV is positive. Cash flow statements have been prepared (please refer Annex 6) for the analysis.

Investment

- The total fixed investment in the project is around Rs. 240 crore. Depending upon the number of target population, the investment has been taken in cash flow. Please refer the section on implementation schedule, where the percentage of population targeted in each year has been given. The investments shown in the cash flow are also on the same basis with cost escalation factor already applied over the figures.

- Following table shows the percentage of total cost (card cost, hardware cost and other cost) taken in each phase.

Phase	Percentage **
Phase I	20%
Phase II	29%
Phase III	33%
Phase IV	18%
Total	100%

* * Percentage is taken based on population to be covered in each phase. Population figure is taken from census report.

Recurring Costs

- The recurring costs have already been mentioned in the section on costs. These would increase as the number of implementation location increase and the rollout takes place at multiple locations.
- Cost escalation factor as mentioned in the assumptions is also applicable on these.

Savings for central and state government

- It is assumed that due to the efficient monitoring of various beneficiary schemes there would be savings under the various distribution schemes by government. The calculations for the same have already been shown in the section on project revenue.
- The savings have been considered on the basis of the target population covered.

Transaction charges

- The cash flow for revenue from the transaction charges is calculated on the basis of the number of annual users and annual usage and the transaction charge
- Escalation factor has also been accounted in the revenue from transaction charges

Revenue from Card Charges

- The cash flow for revenue from the card charges is calculated on the basis of the number of taxpayers and the number of non-taxpayers. Different card charges could be levied to these categories of citizen.

8.7 Analysis

The project manages to break-even after 10 years after considering the lowered fixed costs on account of funding from various sources and transaction charges given in earlier section. However this is after taking into account a return on equity of 20%.

To provide an in-depth analysis of the viability of the citizen card project, various scenarios have been considered. The broad difference in these scenarios is about the considering the various savings resulting out of the implementation of citizen card.

The following are the scenarios for which detailed cash flow analysis has been done:

1) Scenario 1 – Transaction charges and considering state and central savings
2) Scenario 2 – Transaction charges only (various combinations for the charges)
3) Scenario 3 – State savings and transaction charges (without considering the central savings)
4) Scenario 4 – Considering only state and central savings (with no transaction charges)

Scenario 1: Transaction charges and considering state and central savings

As already mentioned in the section on revenue model for citizen card, the state and central savings also represents a significant component. These components have been taken in this analysis to find out the total return out of the system. The detailed cash flow is represented in the Annex 6. The financial analysis under this scenario is as follows:

NPV	Rs. 502.09 crore	IRR	129%

Scenario 2: Transaction charges only

In this scenario only the transaction charges have been considered as the cash inflow. The central and state savings have not been considered. The scenario has been analyzed at various transaction prices. The details of these scenarios are as follows:

- Scenario 2a

Item	Price
Card charges for non tax payers	Rs. 10
Card charges for taxpayers	Rs. 50
Transaction processing charges	1%
Transaction charges for FPS	Re. 1 per transaction

If the transaction charges are kept at Re. 1 per transaction at ration shop and 1% transaction processing charges, the IRR of the project (taking into account all factors constant as above and funding from various sources) is negative and the project is not viable at any discounting rate. **The project NPV is Rs. – 32 crores.**

- Scenario 2b

Item	Price
Card charges for non tax payers	Rs. 10
Card charges for taxpayers	Rs. 50
Transaction processing charges	1.5%
Transaction charges for FPS	Rs. 1.5 per transaction

If the transaction charges are kept at Rs. 1.5 per transaction at ration shop and 1.5% transaction processing charges, the IRR of the project (taking into account all factors constant as above and funding from various sources) goes to 21%. The project NPV is Rs. 23.6 crores.

- Scenario 2c

Item	Price
Card charges for non tax payers	Rs. 25
Card charges for taxpayers	Rs. 65
Transaction processing charges	1%
Transaction charges for FPS	Re. 1 per transaction

If the card charges are kept at Rs. 25 for non tax paying family and Rs. 65 per card for tax paying families. Transaction processing charges are taken as 1% and charges per transaction at Rè. 1, the project **IRR comes to 17%.** However the card charges are on higher side and may not be politically and socially acceptable. **The project NPV is Rs. 7.4 crores.**

- Scenario 2d

Item	Price
Card charges for non tax payers	Rs. 15
Card charges for taxpayers	Rs. 60
Transaction processing charges	1.5%
Transaction charges for FPS	Re. 1 per transaction

Considering another scenario of card cost at Rs. 15 for non tax paying family and Rs. 60 per card for tax paying families. Transaction processing charges are taken as 1.5% and charges per transaction at Re. 1, project **IRR comes to 16%. The project NPV is Rs. 5.4 crores.**

- Scenario 2e

Item	Price
Card charges for non tax payers	Rs. 0
Card Charges for taxpayers	Rs. 20
Transaction processing charges	0.5%
Transaction charges for FPS	Re. 1 per transaction

In case, one considers a scenario where there is maximum acceptability on account of low charges, the project has an **NPV of Rs. - 66 crores.**

- Scenario 2f

Item	Price
Card charges for non tax payers	Rs. 10
Card charges for taxpayers	Rs. 50
Transaction processing charges	1%
Transaction charges for FPS	Re. 1 per transaction

Considering another scenario of card cost at Rs. 10 for non tax paying family and Rs. 50 per card for tax paying families, and transaction processing charges are taken as 1% and charges

per transaction at Re. 1, the project IRR comes to -1%. The project NPV is Rs. - 31.9 crores.

- Scenario 2g

Item	Price
Card charges for non tax payers	Rs. 25
Card charges for taxpayers	Rs. 65
Transaction processing charges	0.5%
Transaction charges for FPS	Re. 1 per transaction

If the card charges are kept at Rs. 25 for non tax paying family and Rs. 65 per card for tax paying families, and transaction processing charges are taken as 0.5% and charges per transaction at Re. 1, the project IRR comes to 4%. The project NPV is Rs. -15.5 crores.

- Scenario 2h

Item	Price
Card charges for non tax payers	Rs. 25
Card charges for taxpayers	Rs. 75
Transaction processing charges	1%
Transaction charges for FPS	Re. 1 per transaction

In case card cost is kept Rs. 25 for non tax paying family and Rs. 75 per card for tax paying families, and transaction processing charges are taken as 1% and charges per transaction at Re. 1, the project IRR comes to 18%. The project NPV is Rs. 9.9 crores.

- Scenario 2i

Item	Price
Card charges for non tax payers	Rs. 10
Card charges for taxpayers	Rs. 50
Transaction processing charges	1%
Transaction charges for FPS	Re. 0.50 per transaction

Considering another scenario of card cost at Rs. 10 for non tax paying family and Rs. 50 per card for tax paying families, and transaction processing charges are taken as 1% and charges per transaction at Re. 0.50, The project NPV is Rs. - 64.4 crores.

- Scenario 2j

Item	Price
Card charges for non tax payers	Rs. 25
Card charges for taxpayers	Rs. 65
Transaction processing charges	1.5%
Transaction charges for FPS	Re. 0.50 per transaction

If the card charges are kept at Rs. 25 for non tax paying family and Rs. 65 per card for tax paying families are taken, and transaction processing charges are taken as 1.5% and charges per transaction at Re. 0.50, the project **IRR comes to 12%. The project NPV is Rs. - 24.6 crores.**

Scenario 3: State savings and transaction charges (without considering the central savings)

Based on the previously mentioned scenario 1, the central savings are not been considered here. The rest of the components remain same and have been taken in this analysis to find out the total return out of the system. The detailed cash flow is represented in the Annex 6. The financial analysis under this scenario is as follows:

NPV	Rs. 92.61 crore	IRR	21%

The cash flow statement is given in Annex 6.

Scenario 4: State and central savings and no transaction charges

It is clear from the above analysis that the state and central savings represents a significant component of the cash flow and provides for high return. Under this scenario, the transaction charges are nullified and the financial analysis results are as:

NPV	Rs. 335.87 crore	IRR	94%

The cash flow statement is given in Annex 6.

8.8 Comparative statement of various scenarios

The following is the comparative statement for the various scenarios under Scenario 2:

Table 8-2 Comparative analysis of various scenarios

Scenario #	Card charges for non tax payers (Rs.)	Card charges for tax payers (Rs.)	Transaction processing charge	Transaction charge for FPS (Rs.)	IRR	NPV (Rs. Crore)
Scenario-2a	10	50	1.0%	1.0	-	-32.0
Scenario-2b	**10**	**50**	**1.5%**	**1.5**	**21%**	**23.6**
Scenario-2c	25	65	1.0%	1.0	17%	7.4
Scenario-2d	15	60	1.5%	1.0	16%	5.4
Scenario-2e	0	20	0.5%	1.0	-	-86
Scenario-2f	10	50	1.0%	1.0	-	-31.9
Scenario-2g	25	65	0.5%	1.0	4%	-15.5
Scenario-2h	25	75	1.0%	1.0	18%	9.9
Scenario-2i	10	50	1.0%	0.5	-	-64.4
Scenario-2j	25	65	1.5%	0.5	12%	-24.6

The best option would however be Scenario 2b, which would have a balance of medium burden on citizen as well as adequate return on investment.

Taking the Scenario 2b as the basis, the comparative of all scenarios is as follows:

Table 8-3 Broad Scenario Analysis

Scenario	NPV	IRR
Scenario 1 – Transaction charges and state & central savings	50,209	129%
Scenario 2 – Transaction charges only	2,364	21%
Scenario 3 – State savings and transaction charges	9,261	41%
Scenario 4 – Only state and central savings	33,587	94%

9 The Pilot Project

It is always advisable to test a concept that would involve considerable change in the system. In order to successfully test the concept of the citizen card, a pilot project is not only desirable; but is highly essential for testing the technological and functional aspects. Citizen Card systems all over the world have been scaled only after the pilot implementation The pilot project could provide useful insights into the system and its deficiencies that would have to be addressed in order to provide excellent service to the citizens. The pilot would enable assessment of the benefits as well as the risks involved in the project. Change management is an critical issue for the citizen card project and pilot would help formulate strategy for change management

The pilot project should take into account, the urban as well as rural section of the population, covering as many functions as feasible. The pilot should be initiated at a location, which has a high proportion of citizens that could benefit from the project. This means that the population, which would be availing subsidies as well as those paying taxes, should be in the pilot project area. The pilot project would pave the way for success of the citizen card project, when implemented across the state. Hence it is imperative that the pilot be planned to bring out the feedback and suggestions on the project, apart from testing the viability of the concept. The pilot project should be implemented at a location that has the required infrastructure, which will expedite the pilot implementation.

Perquisites for pilot project implementation requires that possession of the card be made mandatory and be given free of charge to the citizens. Promotion of benefits and projection of the image of a card as a service facilitator would be critical to the success of the project. Information pertaining to the benefits that accrue from possessing the card would have to be disseminated to the citizen.

9.1 Objectives of Pilot

The citizen card pilot system is proposed to achieve or improve the following aspects:

- Test the concept
- Check the acceptability by citizen, government and other stakeholders
- Establish the viability of the project
- Test the system with respect to the hardware, software and network
- Establish the benefits from the project

9.2 The Pilot Citizen Card Specification

The pilot for citizen card would comprise of the following:

Function of the card	• Identity Card (voter ID, birth certificate, proof of residence, etc) • Beneficiary Card • Ration Card
Card:	• Memory chip based Plastic card (Smart card) • Unique citizen ID number with photo and personal details
Hardware:	• At the ration card shop POS device with integrated smart card reader, modem, dot matrix bill printer, battery • Network server at the district nodes • Central Server for database
Database	• Centralized citizen card database • Centralized databases for benefits from various departments such as Civil Supplies (ration), Agriculture, Social Welfare, etc.
Network	• Leased lined connecting to the central servers • Telephone lines for each of the ration card shops • GSWAN connecting the district nodes to the central server
Geographical location	• Rural and Urban area in Gandhinagar Taluka
Number of Cards	• 50000
Ration Shop Coverage	• The system would cover 20 ration shops assuming that five persons per family would be given a citizen card

9.3 Location of the Pilot Project

The location of the pilot project would be critical to the success of the project and would help in resolving issues that might emerge later during full-scale project implementation. The sample size for the pilot project could comprise 50000 persons. Gandhinagar taluka is recommended as the location for pilot study as it has a mix of urban and rural population. In addition, Gandhinagar as a pilot location could allow for better monitoring of the system. The cost related details of the card are given in the tables below.

9.4 Cost of the Card

The card would be an important component of the pilot project that would influence the project cost to a great degree. The recommended card would be a memory chip based plastic card with the basic citizen details embedded within the chip as well as printed on the card. The card would be a 8Kb memory contact type card conforming to ISO 7816 standards for integrated circuit cards. Following table shows the cost of the card for pilot.

Table 9-1 Card cost for Pilot

Particulars	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Blank Cards	35	50,000	1,750,000
Printing for Personalization	5	50,000	250,000
Card Total			**2,000,000**

9.5 Hardware Cost

The hardware for the pilot would include servers for the application and database, remote access server (RAS), POS devices at Ration shops, PCs at departments and networking equipment.

A citizen database server would be required, that would have a citizen database. In addition a database server is also required, that will have the department database including ration card database and an application for updating the ration database based on the transactions. A web server would also be required for providing interface of application with users.

At the ration shop, a POS device would be required along with a telephone connection. This would connect to the RAS, which in turn would connect to the application server. Application server and department server would be physically same servers, it would be separate only logically.

The indicative server specifications are given in detail in Annex 3.

Indicative hardware costs are given in table below.

Table 9-2 Hardware Cost for Pilot

Hardware	Unit Cost (Rs.)	Nos.	Cost (Rs.)
POS device	25000	20	500,000
Telephone Connection	2800	20	56,000
Citizen Server H/W	1500000	1	1,500,000
Department Server/Application server H/W	1500000	1	1,500,000
Web Server	500000	1	500,000
RAS	600000	1	600,000
Router	250000	1	250,000
PCs	30000	20	600,000
Total Hardware Costs			**5,506,000**

Some of this hardware cost could be borne by departments and additional equipment already available with the departments could be employed.

9.6 Software Cost

The application software for the pilot would include application for 10 most commonly availed beneficiary schemes along with a system for ration card. The ten schemes that could be taken up are:

- Housing grant process
- Subsidy for bullock cart
- Manav garima
- Natural Calamity Assistance Scheme
- Scholarship for pre SSC students
- Subsidy for Piyat
- Assistance under national family welfare
- Medical assistance to SC/ST
- Financial assistance to BPL women
- Dikri Rudi Sachi Mudi

This is an indicative list and incorporation of additional schemes would only have a marginal increase in cost, as most of the schemes are similar in process.

Scope Covered in the Estimates:

- Citizen card
- Various Schemes
- Audit -Trail features
- Ration card
- Security Features
- Archival-Retrieval features

The estimate is also done based on the complexity level of the General characteristics of the system like:

- Data Communications
- Performance
- Transaction Rates
- End-User Efficiency
- Complex Processing
- Installation Ease
- Multiple Sites
- Distributed Processing
- Heavily Used Configuration
- On-line Data Entry
- On-line Updates
- Reusability
- Operational Ease
- Facilitate Change

The various components used in the proposed system are:

- Development of Citizen Information System
- Development of Beneficiary Information System
- Application development
- Web enabling of Applications
- Routing logic for connecting scheme wise counters to departments
- Taluka level configuration of POS/PC for GSWAN and routing logic
- Provision of Web connectivity to Kiosk at village level at future date

The system would comprise of following:

The Citizen Information System consists of
Citizen Database
Data from citizen database to be shared with departments
Receive request through WAN & route to CIS, Respective departments
List of Departments for which the requests can be serviced
Beneficiary information for which only IDs will be stored
Abstract of unlisted Departments/schemes.

The Beneficiary Information System has the following information
Master tables relevant to the Department

Information regarding the workflow of the various schemes considered
Various transaction based information
User Request tracking database
Inward Register
Worksheet Register
SLA Register
Schemes Issued Register
Approval Limit Register

The proposed system would also require software for administering the application. This would include Database, Application Server, Web Server, Browser and Operating System. Only the cost of database, application server and operating system would be considered, as the other software is available free of cost. The cost of operating system would be included within the hardware cost and will not be considered separately. The software component wise costs are given in the table below, however these costs are only indicative in nature.

Table 9-3 Software Cost for Pilot

Software	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Application Software	15000000	1	15,000,000
System Software (Oracle)	1900000	2	3,800,000
Application Server	800000	1	800,000
Web Server	0	1	0
Development Tools			200,000

9.7 Other Cost

The pilot project would have several other costs, which have been detailed below.

Training Costs would be incurred for training the personnel on the application as well as the ration shop operators for the POS device. The training costs do not take into account, training required for acquiring basic computer knowledge. The below table describes the training cost.

Table 9-4 Training Cost

Item	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Training Costs	2000	70	140,000

Data Collection and Refining Cost would have to be incurred for the target population. It is estimated that a single record would cost Rs. 3.30. This estimate, mentioned in the below table is derived from the effort estimate of collecting data and refining the data from the existing citizen databases.

Table 9-5 Data Collection Cost

Item	Cost per record (Rs.)	Nos.	Cost (Rs.)
Data Collection and Refining	3.30	50,000	165,000

In addition to the above costs, the pilot project could have some other costs related to Air-conditioning for server room and power conditioning equipment for the computer hardware, as explained in the table below.

Table 9-6 Equipment Cost

Item	Unit Cost (Rs.)	Nos.	Cost (Rs.)
Air Conditioning 3 tonnes	50000	1	50000
Power Conditioning Equipment	50000	1	50000
Others			100,000

The pilot project would also require effort in implementation and this is estimated at 10% of the project costs excluding training costs. This cost would include project management, monitoring and implementation expenses. Implementation cost shown in the table below is taken at 10% because citizen card is new concept and project of such a huge magnitude is not normal.

Table 9-7 Implementation Cost

Item	% of total cost	Cost (Rs.)
Implementation	10%	2,757,100

9.8 Recurring Cost

The pilot would also incur recurring costs apart form the fixed costs given above. The largest among these is the annual maintenance charges. These maintenance charges are estimated at 10% of the projects costs excluding the training and the implementation costs.

The telephone charges are estimated at 10 calls per day for 300 day at the rate of Rs.1.5 per call for each ration shop. The telephone charges also include a fixed cost component of Rs. 500 per telephone connection per month.

It is estimated that approximately 5% of the cards would have to be replaced for which additional costs have to be incurred annually. Indicative recurring costs are given below.

Table 9-8 Recurring Cost

Item	% of total cost	Cost / year (Rs.)
Telephone charges at the POS		105,000
Maintenance Charges	10%	2,557,100
Costs of card replacements	5%	87,500
Total Recurring Costs		**2,749,600**

9.9 Total cost

All the above costs of the project brings the total fixed cost to Rs. 3.05 crores and total recurring cost to Rs. 27 lacs per annum as depicted in the table below.

Table 9-9 Total Cost

Item	Cost (Rs.) lacs
Card Total	20
Total Hardware Costs	55
Application Software	150
System Software (Oracle)	38
Application and web server	8
Development Tools	2
Training Costs	1
Data Collection and Refining	2
Others	1
Implementation	28
Total Fixed Costs	**305**

Total Recurring Costs	**27**

9.10 The Implementing Agency

To establish a new citizen card authority for implementation would involve various legal and legislative issues. Therefore, implementation of pilot should be undertaken by one of the existing government authorities only.

District Development Officer

The District Development Officer (DDO) could be the agency for card issue, maintenance, database creation, security, privacy and any other development ventures related to the citizen card pilot. Since the major share of the citizen card function would be related to welfare measures, the DDO could be an ideal implementation agency. Moreover, the DDO has an existing implementation structure in place for the welfare measures.

9.11 Implementation Methodology

The pilot project could be taken up at a location that is a representative of the population of state. The choice of location should also take into account, the speed of pilot implementation. This would be critical, as the total time required for the pilot project should be kept to a bare minimum. It is emphasized that the target location should be chosen in a manner to maximize the number of potential users. This would have a higher impact and provide publicity to the project and its benefits. The location for the pilot should comprise of a mix of urban as well as rural population besides ensuring representation for people from various sections of the society. The choice of pilot in Gandhinagar taluka would provide this appropriate mix for the pilot in addition to providing better monitoring. A set of families from Gandhinagar taluka could be chosen for pilot.

Based on the feedback from the pilot, the number of services and functionality could be progressively increased in the pilot area. The project could be scaled gradually to other areas where the number of potential users is high.

9.12 Implementation Issues

The success of pilot project would depend on a number of factors. Some of these factors are discussed below:

Data capture and accuracy

- Accuracy of data for pilot project will be a major issue and balance must be maintained between accuracy and the speed of data collection.
- Citizen database from matching ration card database with election card database and RTO database may not be accurate due to issues like different formats of databases, Ghost cards etc.; while primary data collection will be time consuming and will delay the implementation.
- Government departments have a large amount of data in various formats - distributed across diverse locations. Usage of these databases would also become an issue. A common platform would have to be decided for integrating various formats.

Legal Issues

- Legal amendments would be required for the use of citizen card as a valid identity card, ration card, or other functions that the government finds appropriate.
- Central government permission might also be required for use of citizen card for certain applications within the domain of the GoI.
- Citizens or groups might decide to go to court against the implementation agency, if the privacy issues are not addressed properly and against Government for using data of election commission or census.
- For financial transactions, RBI guidelines for use of smart card / magnetic stripe cards for banking and financial transactions would have to be followed.
- The citizen card is planned as a service delivery mechanism for several beneficiary schemes. The laws governing these schemes would need to be amended to include the use of the citizen card.

Implementation agency

- Government will have to decide about citizen card pilot implementation agency. It can be one of the existing agencies or Government will have to make necessary legal provisions to create new agency.
- Citizen card pilot implementation agency would have to take necessary permission for using databases of ration card, RTO, election commission etc. from respective departments.
- Some of these departments might also require amendment in legal provisions governing privacy of their respective database before sharing it with citizen card pilot implementation agency.
- Pilot implementation agency would also be required to take permission of central
- Implementation agency would have to finalize fixed as well transaction charges.

- Pilot implementation would involve various costs and implementation agency would have to identify an appropriate mechanism to obtain the required amount.
- Pilot implementation agency decides to finance the pilot then necessary permission from finance department would also be required.

Standards and security

- Effective use of citizen card would take place only if standards are specified on various issues such as hardware, software, operating procedures, etc as many departments will be involved in pilot implementation phase.
- The citizen database would have be restricted to only specific authorized users and the pilot implementation agency would need to identify these authorized users, drawing the guidelines for the secure usage of the system.
- Recovery of charges would be a crucial and sensitive issue. Citizens may protest against proposed transaction charges as well as card charges.

Card users

- Socially and economically backward sections of the society would have to be identified and benefits would have to be directed towards those who needs them the most for successful implementation of the pilot project.

Departments

- The citizen card would require some changes in the present system. A thorough analysis of the process would have to be undertaken and the critical processes re-engineered.
- Some departments would require to change its various processes like application forms, submission of forms, attachments required, office where forms have to be submitted for smooth operations of citizen card system.
- Several issues such as change management and employee satisfaction would also have to be resolved.
- Most of the department users will not be familiar with computers and related system. They will have to train beforehand to use the system and training will also be required for smooth transition from manual to automated systems.
- Participation from departmental employees as well as ration shop owners would be a very important issue and they might not support this initiative due to various reasons.
- Sponsorship from various departments would have to be thought of, as private participation might not materialize during the pilot.
- Guidelines will have to prepared so that all future citizen centric applications are compatible with the citizen card system.

10 Success Measurement of Pilot

Success measurement of pilot can be gauged from the following parameters.

- *Government savings*

  Savings made by the government in food grains and kerosene distribution would serve as one of the major indicators for success of pilot project. Amount of savings would easily justify the use of citizen card.

  Ration card shop would update central database on batch mode and data from POS would be transferred to the central server. Pilot implementation agency could analyze these data every fortnight. They could obtain the historical data from Civil Supplies Department regarding supply of food grain to each ration card shop and distribution from various ration card shops. The actual savings would be available by comparing the past data with the data generated from the new system.

- *Benefits to target audience*

  Citizen card would help in accurately identifying beneficiaries of various government schemes. Actual advantages of various government schemes to these needy beneficiaries and savings accrued by plugging loopholes would highlight the success of citizen card pilot.

  Socially and economically backward sections of the society would have to be identified and benefits would be directed towards them. A survey could be conducted to assess beneficiaries' status and comparisons would be made on effective use of schemes for needy beneficiaries. Indicative survey form is shown in Annex 4.

- *Increase individual - government transactional efficiency*

  The electronic delivery of services would enhance individual - government transactional efficiency by reducing manual entry of information and reducing paperwork. In this manner, faster response time for various government services would also be an indicator of the success of pilot.

  Monthly survey of citizens covered under pilot would have to be undertaken either by approaching respondents (users) from door to door or at departments. Questionnaire could be filled by citizens at department offices or ration shops, when they visits these places to get various benefits. Stratified Random sampling method could be used to select the citizens for survey and to avoid any bias. Based on feedback from citizens, increase in efficiency would be measured.

- *Initiatives of other agencies*

  Success of Citizen card pilot would be measured from interest expressed by various agencies like banks, private companies, utility service providers (for instance; AEC, BSNL, cellular service providers) to tie up with citizen card authority.

These agencies would be willing to tie up only when the citizen card covers most of the population of the state and citizens are willing to accept and use it.

Media reports extending good coverage to the pilot would also be a good indicator of the success of the pilot project for the project implementation agency.

- *Eagerness of citizens*

  Based on success of pilot, citizens would be eager to use the citizen card for as many government and allied services like identity for various government work, utility payments, bank transactions etc. as possible. Citizens from other areas would also inquire about citizen card usage and its benefits, which in turn would indicate the success rate of the pilot.

- *Elimination of multiple cards and documents*

  The citizen has several existing cards – driving license, ration card, voter identity card etc. – and extensive usage of citizen card for all purposes would be a good pointer towards the success of the pilot.

  Survey of citizens would also identify the purpose for which citizens are using the citizen card. This would indicate whether or not, the citizen card is being accepted as a multi-purpose card.

Annex 1 Global Card Usage

	Country	Population (1995)	Document	Type of document
1	Argentina	33,100,000	National ID	Paper booklet
2	Bangladesh	128,090,002	Ration Card	Paper booklet
			Drivers License	Plastic Card
3	Brazil	160,881,977	National ID	Laminated paper bar code
4	China	1,203,525,741	National ID	Paper laminated Issuing plastic cards
5	Egypt	60,689,475	National ID	Paper laminated
6	Ethiopia	60,741,366	Town resident card	Paper laminated
7	Finland	5,000,000	Electronic ID [FINEID]	Smart card
8	France	58,117,632	National ID	Paper laminated
9	Germany	81,412,352	Municipal ID	Paper laminated
			Health Card	Plastic Card
10	India	937,013,196	Electoral Card	Paper laminated
			Drivers License	Paper changing to Plastic
11	Indonesia	203,636,601	National ID	Paper laminated
12	Iran	67,901,859	National ID	Paper booklet
13	Israel	5,100,000	National ID	Paper laminated
14	Italy	58,254,276	National ID	Paper laminated
			Drivers License	Plastic Cards
15	Japan	125,507,342	National ID	Paper laminated
16	Myanmar	45,109,408	National ID	Paper laminated
17	Nigeria	101,161,248	National ID	Plastic Card
18	Pakistan	132,554,167	National ID	Paper
19	Philippines	71,184,237	Social security [postponed]	Plastic Card
20	Russia	149,923,179	Drivers License	Plastic Cards
			Internal Passport	Paper booklet
21	S Africa	39,800,000	National ID	Debating paper or plastic
22	S Korea	45,556,372	National ID	Plastic
23	Spain	39,100,000	National ID	Paper laminated
24	Thailand	60,319,336	National ID	Plastic Card
25	Turkey	63,440,588	Drivers License	Plastic Cards
26	Ukraine	51,878,108	Internal Passport	Paper booklet
27	UK	58,303,592	Driving License	Paper laminated / Plastic Card
28	US	263,373,283	Driving License	Paper & plastic cards
			Electronic Benefit Transfer Cards	Plastic Cards
29	Vietnam	74,456,424	National ID	Paper laminated

Annex 2 Card System Vendors

Smart Card Vendor	Contact Details
Gemplus	Gemplus India PVT Ltd (Head Office) # 27, 80 Feet road, HAL III Stage, Indiranagar, Bangalore - 560 075, Phone: +91-80-5288247/57, 5213536/37 Fax: +91-80-5288259 Gemplus India PVT Ltd (Branch Office) # 5/7, 2nd Floor, Vasant Vihar, New Delhi - 110 057 Phone: +91-11-6153533/34/37/38 Fax: +91-11-6153539 vijay.parthasarathy@gemplus.com
Data Card	Datacard Group 11111 Bren Road West Minnetonka, MN 55343-9015 Phone: +1 952 933 1223 Fax: +1 952 931 0418 Email: info@datacard.com
Schlumberger	SchlumbergerSema Measurement & Systems India Ltd The Capital Court, 4th Floor, LSC Phase – III Olof Palme Marg, Munirka New Delhi – 110067 Phone: +91 11 610 6277 / 6711 / 6765 Fax: +91 11 610 5977 Email: indiamarketing@new-delhi.tt.slb.com SchlumbergerSema Measurement and Systems India Ltd. 7th Floor, MMTC Building C-22 Bandra Kurla Complex, Mumbai Tel: +91- 22 – 6527046 / 6527048 Fax: 91 22 6541534
Versatile Card Technology	Versatile Card Technology, Inc. 5200 Thatcher Rd. Downers Grove, IL 60515 USA Phone: +1 630 852 5600 Fax: +1 630 852 5817
ORGA	ORGA Kartensysteme GmbH Am Hoppenhof 33 33104 Paderborn Germany Phone: +49-5251-889-0

POS vendor	Contact Details
Verifone	Contact Person: Country Manager - Sales : Nagaraj V.S. VeriFone India Suite # 441 & 442, Atria Hotel No. 1, Palace Road, Bangalore 560 001 Tel: +91 80 220 8001 Fax: +91 80 220 8003
Hypercom	Hypercom Asia, Ltd. 21/F, Metro Centre II, 21 Lam hing Street, Kowloon Bay, Kowloon, Hong Kong China Phone: +852 2561 6800 Fax: +852 2561 5890 Contact: Jeremy Su Email: Info-ASIA@hypercom.com
Ingenico	INGENICO 9, Quai de Dion Bouton 92816 Puteaux Cedex – France. Tel : 33 (0) 1 46 25 82 00 Fax : 33 (0) 1 47 72 56 95
V-Star	V-Star Electronics Inc. 4F #6, HSIN KAI FA ROAD, N.E.P.Z., KAOHSIUNG, R.O.C (Taiwan) TEL/FAX: 886-7-3635110/3635109 E-Mail: jackey@vstar.com.tw
IVI Checkmate	IVI Checkmate – Ingenico 1003 Mansell Road Atlanta, GA 30076, USA Tel: (770) 594-6000 Fax: (770) 594-6003
Dassault / Thales	Dassault A.T. of America, Inc. 53 Perimeter Center, E. #175 Atlanta, GA 30346 Phone # 770-393-2311
Schlumberger	SchlumbergerSema Measurement & Systems India Ltd The Capital Court, 4th Floor, LSC Phase – III Olof Palme Marg, Munirka New Delhi – 110067 Phone: +91 11 610 6277 / 6711 / 6765 Fax: +91 11 610 5977 Email: indiamarketing@new-delhi.tt.slb.com SchlumbergerSema Measurement and Systems India Ltd. 7th Floor, MMTC Building C-22 Bandra Kurla Complex, Mumbai Tel: +91- 22 – 6527046 / 6527048 Fax: 91 22 6541534
Lipman Nurit	Lipman Electronic Engineering Ltd. 11 Haamal St. Park Afek Rosh Haayin 48092, Israel Tel: +972-3-902 9750 Fax: +972-3-902 9731 E-Mail: lipmani@netvision.net.il

Annex 3 Hardware Specifications

Database Server

Assumptions for sizing of database server:

1. Size of data considering storage of data for 5 years: 50 GB.

This includes disk space required for Operating System, Database System files along with data of various schemes of various departments, which are catered by the system.

2. About 100-200 concurrent users on the database server. These users can be through web-based applications and non-web-based applications.
3. The server will be used only as a data base server and there will be separate web/application servers.
4. Redundancy for HDD (hard disk drive) and PS (power supply) only is considered. Clustering / Hot-standby may be considered for the current application.

Following are the recommended specifications for the server:

Processor	1 64 bit CPU expandable to 8 (RISC Based)
Clock rate	450Mhz+
Cache	2 MB/CPU external cache, 64KB on chip cache
Memory	1 to 16GB memory support
Internal HDD	4x9 GB expandable to 4x40 GB Hot swappable
Storage Controllers	Ultra SCSI controller; supporting RAID 5 for redundancy
FDD	1.44 MB
CD ROM Drive	32x
Network Controllers	10/100 Ethernet supporting TCP/IP protocol
Backup Device	DDS 3 DAT Drive or CD Writer
Power Supply	Redundancy in Power Supply preferred
Operating System	64 bit Unix OS
Database System	Oracle 9I Enterprise Edition-19,00000
Budgetary Cost	Hardware + O/S : Rs. 15 Lacs

CIS Server

Assumptions for sizing of database server:

1. Size of data considering storage of data for 5 years: 100 GB.
2. This includes disk space required for Operating System, Database System files along with citizen information data ,scanned documents and bio-metrics
3. About 100-200 concurrent users on the database server. These users can be through web-based applications and non-web-based applications.
4. The server will be used only as a data base server and there will be separate web/application servers.
5. Redundancy for HDD (hard disk drive) and PS (power supply) only is considered. Clustering / Hot-standby may be considered for the current application.

Following are the recommended specifications for the server:

Processor	1 64 bit CPU expandable to 2 (RISC Based)
Clock rate	450Mhz+
Cache	2 MB/CPU external cache, 64KB on chip cache
Memory	256 MB ECC RAM expandable to 2GB
Internal HDD	4x9 GB expandable to 4x40 GB Hot swappable
Storage Controllers	Ultra SCSI controller; supporting RAID 5 for redundancy
FDD	1.44 MB
CD ROM Drive	32x
Network Controllers	10/100 Ethernet supporting TCP/IP protocol
Backup Device	DDS 3 DAT Drive or CD Writer
Power Supply	Redundancy in Power Supply preferred
Operating System	64 bit Unix OS
Database System	Oracle 9I Enterprise Edition-19,00000
Budgetary Cost	Hardware + O/S : Rs. 15 Lacs

Web Server

Assumptions for sizing of web server:

1. About 100-200 concurrent users on the web server through web based applications.
2. The server will be used only as a web application server and there will be separate database server and non-web based application server.
3. Only redundancy for HDD and PS is considered. Clustering / Hot-standby may be proposed for the application.

Following are the recommended specifications for the server:

	Intel Based
Processor	1 PIII expandable to 2 CPU
Clock rate	450Mhz+
Cache	512KB/CPU L2 Cache
Memory	128 MB SD RAM expandable to 1GB
Internal HDD	3x8 GB expandable to 3x20 GB Hot swappable
Storage Controllers	Ultra SCSI controller; supporting RAID 1 for redundancy
FDD	1.44 MB
CD ROM Drive	32x
Network Controllers	10/100 Ethernet supporting TCP/IP protocol
Backup Device	DDS 3 DAT Drive or CD Writer
Power Supply	Redundancy in Power Supply preferred
Operating System	Windows NT 4.0 Server with IIS
Budgetary Quote	Hardware: Rs. 4 Lacs
	OS: Rs. 0.5 Lacs for 5 user license + 25% ATS
Development Environment	Visual Studio v 6.0 Enterprise edition (Rs. 0.7 Lacs + Rs. 0.5 Lacs/Paper license for additional developers)
	MS Front Page 98 (Rs. 7000/- per developer)

Clients

Assumptions for sizing of Clients:

1. Clients will be offices of talukas or districts connected through GSWAN
2. The client will only have web-based applications and office automation tools.

Following are the recommended specifications for the client machine:

Processor	1 PIII CPU
Clock rate	450Mhz+
Cache	512 KB cache
Memory	32 MB SD RAM expandable to 128 MB
Internal HDD	20 GB
FDD	1.44 MB
CD ROM Drive	32x
Modem	33.6 Kbps Internet modem
Monitor	15" Color SVGA monitor
Operating System	Windows '98 with internet explorer
Budgetary Quote	Rs. 30,000

Annex 4 Survey form for measurement Pilot success

Personal Details:

1. Name:	
2. Address:	
3. Occupation:	
4. Sex:	
5. Age:	
6. Annual Income:	

Scheme Details:

From which government scheme are you benefited?	<scheme names>
Time taken for processing of your application for scheme	<days>
Distance you have to travel to reach government office for getting benefit	<Km>
First time benefit or regular benefit?	First / Regular
Any other previous benefit from any other scheme? Which scheme?	<scheme names>

Implementation Success parameters:

Previously time taken for processing of your application for scheme	<days>	Reduction in Time
Distance you have to travel to reach government office for getting benefit previously	<km>	Providing services at user end
For what purpose you are using citizen card?	<Purposes>	Facilitate multiple transactions
Which other cards are you using for interaction with government?	<Cards>	Future requirements
Which certificates do you still require to submit for getting government benefits?	<certificates>	Future requirements
Do you think that your application-processing time is reduced?	(Yes/No)	Efficiency
Do you think that distance that you have to travel to reach government office has reduced?	(Yes/No)	Reach
Do you think that number of certificates that you have to attach is reduced?	(Yes/No)	Simplified procedures

Annex 5 List of Beneficiary Schemes

1. National Family Welfare Scheme
2. Natural Calamity Death Assistance Scheme
3. Sardar Patel Avas Scheme
4. Repairing House
5. Smokeless Chula
6. National Pregnancy Scheme
7. Mother Welfare
8. National Vaccination
9. National Family welfare Scheme
10. ICDS
11. National Malaria Eradication Scheme
12. Milch cattle of SC educated Unemployed Scheme
13. Loan For Grass Bank
14. Loan For Cattle Shed
15. Assistance in Urea Treatment
16. Assistance to buy Pesticide and other crop for SC
17. Financial Assistance for Bullock Cart for SC/ST
18. Irrigation Assistance to Small SC Farmers
19. Financial assistance to SC/ST/OBC
20. Student Safety fund
21. State Scholarship for pre-SSC students
22. Scholarship for preprimary students
23. Scholarship for children of persons involved in unhygienic activities
24. Financial Assistance for Cottage/self employment
25. Self Employment for ST
26. Financial Assistance for agriculture equipment for Land Labourers
27. Dikri Rudi Sachi Mudi scheme
28. Free Medical Assistance
29. IRD
30. Land Grant
31. Irregularities in cyclone, flood
32. Housing Construction under Sardar Patel Housing Scheme
33. Non Smoke Chula and ventilation in rural house
34. Repairing of rural houses
35. Water distribution
36. Birth registration
37. Death register
38. Late registration
39. Late registration of birth and death
40. Change in birth date and name
41. Name transfer
42. School leaving certificate for students wanting to go outside state
43. Class promotion
44. Disease in animals
45. Cattle shed and Poultry farm assistance

46. Vaccination in animals
47. Promotional money for family welfare cases
48. Death during family welfare operation
49. Subsidy for Piyat facilities to SC/ST
50. Subsidy of bullock, bullock carts for sc/st
51. Fertilizer and seed assistance
52. Loss estimates
53. Crop estimates
54. Assistance of latest equipment for farmers
55. Seeds and Chemical Fertilizers
56. Assistance in house repairs to SC
57. Medical assistance to SC.ST
58. Scholarship to OBC
59. Caste Certificate
60. College card free ship
61. Bankable self employment scheme for upliftment
62. Bus fare/Electricity bill application.
63. Removal of Encroachment
64. Taran Mukti
65. Assistance during natural calamities
66. Grant of seeds

Annex 6 Cash Flow for Citizen Card Project

Scenario 1: Transaction charges and considering state and central savings

All figures in Rs. Lacs unless otherwise stated

	Pilot	Implementation Period				Post Implementation Period									
Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
Investment **	(304.7)	(2178)	(3073)	(3561)	(1896)										
Recurring costs		(28.9)	(509)	(1222)	(2048)	(2488)	(2612)	(2743)	(2880)	(3024)	(3175)	(3334)	(3501)	(3676)	(3860)
Revenue (transaction charges)		71	921	1900	3168	3843	4035	4237	4449	4671	4905	5150	5407	5678	5962
Diversion savings state		3.8	383	791	1318	1599	1679	1763	1851	1944	2041	2143	2250	2363	2481
Diversion savings central		20.3	2276	4695	7827	9495	9970	10469	10992	11542	12119	12725	13361	14029	14731
Revenues from card charges		5	892	1119	1449	772	439	461	484	508	534	561	589	618	649
Cash flow	(305)	(2106)	890	3722	9819	13221	13511	14187	14896	15641	16423	17244	18107	19012	19963

NPV	50209	IRR	129%

** Project cost is taken on a reduced figure considering grants from various sources as given in Chapter 11

Scenario 2: Transaction charges only (various combinations for the charges)

(This cash flow is for Scenario 2b)

All figures in Rs. Lacs unless otherwise stated

	Pilot	Implementation Period				Post Implementation Period									
Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
Investment	(304.7)	(2178)	(3073)	(3561)	(1896)										
Recurring costs		(28.9)	(509)	(1222)	(2048)	(2488)	(2612)	(2743)	(2880)	(3024)	(3175)	(3334)	(3501)	(3676)	(3860)
Revenue (transaction charges)		71	921	1900	3168	3843	4035	4237	4449	4671	4905	5150	5407	5678	5962
Revenues from card charges		5	892	1119	1449	772	439	461	484	508	534	561	589	618	649
Cash Flow	(305)	(2130)	(1768)	(1763)	673	2127	1862	1955	2053	2155	2263	2376	2495	2620	2751

NPV	2364	IRR	21%

Scenario 3: State savings and transaction charges (without considering the central savings)

All figures in Rs. Lacs unless otherwise stated

	Pilot	Implementation Period				Post Implementation Period									
Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
Investment **	(304.7)	(2178)	(3073)	(3561)	(1896)										
Recurring costs		(28.9)	(509)	(1222)	(2048)	(2488)	(2612)	(2743)	(2880)	(3024)	(3175)	(3334)	(3501)	(3676)	(3860)
Revenue (transaction charges)		71	921	1900	3168	3843	4035	4237	4449	4671	4905	5150	5407	5678	5962
Diversion savings state		3.8	383	791	1318	1599	1679	1763	1851	1944	2041	2143	2250	2363	2481
Diversion savings central		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Revenues from card charges		5	892	1119	1449	772	439	461	484	508	534	561	589	618	649
Cash flow 3	**(305)**	**(2126)**	**(1385)**	**(973)**	**1991**	**3726**	**3541**	**3718**	**3904**	**4099**	**4304**	**4520**	**4746**	**4983**	**5232**

NPV	9261	IRR	21%

Scenario 4: State and central savings and no transaction charges

All figures in Rs. Lacs unless otherwise stated

	Pilot	Implementation Period				Post Implementation Period									
Item	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11	Yr 12	Yr 13	Yr 14	Yr 15
Investment **	(304.7)	(2178)	(3073)	(3561)	(1896)										
Recurring costs		(28.9)	(509)	(1222)	(2048)	(2488)	(2612)	(2743)	(2880)	(3024)	(3175)	(3334)	(3501)	(3676)	(3860)
Revenue (transaction charges)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diversion savings state		3.8	383	791	1318	1599	1679	1763	1851	1944	2041	2143	2250	2363	2481
Diversion savings central		20.3	2276	4695	7827	9495	9970	10469	10992	11542	12119	12725	13361	14029	14731
Revenues from card charges		5	892	1119	1449	772	439	461	484	508	534	561	589	618	649
Cash Flow	(305)	(2177)	(31)	1822	6651	9378	9476	9950	10448	10970	11519	12094	12699	13334	14001

NPV	33587	IRR	94%

Annex 7 Beneficiary / Department Database

Beneficiary Card

Beneficiary ID
Department ID
Department name
Annual Income
BPL or not (Y/N)
Category
Category Details
Disbursement Amount
Number of disbursement
Family representative name
No of family members
Bank Name
Bank branch

Department office

Department office ID
Department name
Address line1
Address line2
Contact person
Contact telephone

Issuing office

Issuing office id
Issuing office name
Address line1
Address line2
Contact person
Contact phone

Family Members

Beneficiary ID
Member1 citizen id
Member1 name
Member1 age
Member1 sex
Member1 —
Member 2 citizen id
Member2 name
Member2 age
Member2 sex
Member2 —
.....

Transaction Details (Card)

Transaction id
Issuing office ID
Beneficiary ID
Department ID
Department name
Scheme number
Scheme type
Scheme name
Total number of transactions
Number of transaction
Total disbursement amount
Disbursement amount allotted
Number of disbursement
Transaction date

Agriculture department

Benefits to Farmers

Beneficiary ID
Department ID
Family representative name
Scheme number
Scheme name
Scheme type
Disbursement Amount
Number of disbursement
Type of farmer
Survey Number of land
Type of Land
Total area of land
Irrigated area
Type of irrigated facility required
Type of crop
Type of fertilisers
Quantity of fertilisers
Amount
Type of seeds
Quantity of seeds
Amount
Type of pesticides
Quantity of fertilisers
Amount

Animal Husbandry department

Department ID
Family representative name
Scheme number
Scheme name
Scheme type
Disbursement Amount
Number of disbursement
Number of milch cattle
Number of milch cattle required
Cost per milch cattle
Number of other cattle
Number of other cattle required
Cost per other cattle
Facilities available
Facilities required
Area of land required for facility
Cost of facility
Quantity of fodder required
Amount

Fisheries department

Department ID
Family representative name
Scheme number
Scheme name
Scheme type
Disbursement Amount
Number of disbursement
Number of boats
Number of boats required
Cost per boat
Number of fishing nets
Number of fishing nets required
Cost per fishing net
Area for storage facility
Cost for storage facility

Social/ Tribal Welfare department

Department ID
Family representative name
Scheme number
Scheme name
Scheme type
Disbursement Amount
Number of disbursement
Sex
Caste
Sub caste
Occupation
Annual income
Type of benefit

Women and Child Welfare department

Department ID
Family representative name
Marital status
Number of family members
Number of dependents
Scheme number
Scheme name
Scheme type
Disbursement Amount
Number of disbursement
Caste
Sub caste
Occupation
Annual income
Type of benefit

Education department

Department ID
Student name
Sex
Caste
Sub caste
Scheme number
Scheme name
Scheme type
School/college name
Current standard of study
Percentage of last year exam
Disbursement Amount
Number of disbursement

[illegible] Welfare department

[illegible]
[illegible] name
[illegible]
[illegible]
[illegible] type
[illegible] Amount
[illegible] Amount
[illegible]
[illegible]
[illegible]
[illegible] details
Type of [illegible]
[illegible] details
[illegible]
[illegible]
[illegible] given
[illegible] required
[illegible] amount

Annex 8 Smart Card Overview

Defined at its highest level, a smart card is a credit-card sized plastic card with an embedded computer chip. The chip can either be a microprocessor with internal memory or a memory chip with non-programmable logic. The chip connection is either via direct physical contact or remotely via a contactless electromagnetic interface.

History

The technology has its historical origin in the seventies when inventors in Germany, Japan, and France filed the original patents. Due to several factors, not least of which was the immaturity of the semiconductor technology, most work on smart cards was at the research and development level until the mid eighties. Major rollouts such as the French National Visa Debit Card and France Telecom provided the industry with high volume opportunities. Since then, the industry has been growing at tremendous rate is shipping more than one billion (1,000,000,000) cards per year (since 1998).

Technology

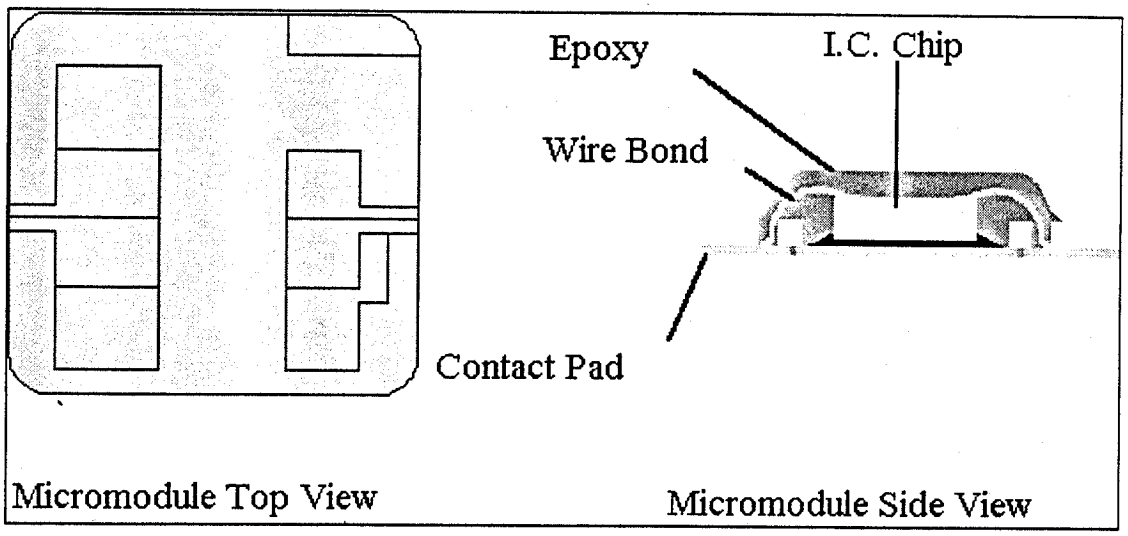
There are two general categories of smart cards: contact and contactless smart cards. A contact smart card requires insertion into a smart card reader with a direct connection to a conductive micromodule on the surface of the card (typically gold plated). It is via these physical contact points, that transmission of commands, data, and card status takes place.

Contact Smart Card

Image courtesy of Gemplus

This diagram shows the micromodule embedded into the plastic substrate or card. Prior to embedding, a cavity is formed or milled into the plastic card. Then either a cold or hot glue process bonds the micormodule to the card.

Below is a contact micromodule which is embedded into a plastic substrate.



Contact Chip Diagram, courtesy of Gemplus

A contactless card requires only close proximity to a reader. Both the reader and the card have antenna and it is via this contactless link that the two communicate. Most contactless cards also derive the internal chip power source from this electromagnetic signal. The range is typically two to three inches for non-battery powered cards, and this is ideal for applications such as mass transit which require very fast card interface.

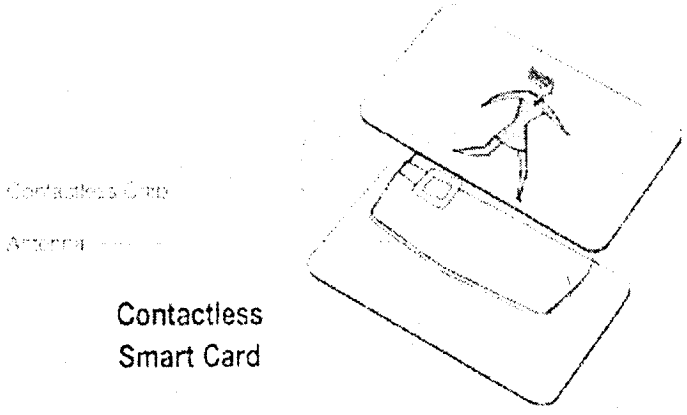


Image courtesy of Gemplus

This diagram shows the top and bottom card layers which sandwich the antenna/chip module. The antenna is typically 3 - 5 turns of very thin wire (or conductive ink), connected to the contactless chip.

Two additional categories, derived from the contact and contactless cards are Combi cards and Hybrid cards. A Hybrid card has two chips, each with its respective contact and contactless interface. The two chips are not connected, but for many applications, this Hybrid serves the needs of consumers and card issuers. Just emerging is the Combi card which in a single chip card with a contact and contactless interface. With Combi cards, it is

now possible to access the same chip via a contact or contactless interface, with a very high level of security. The mass transportation and banking industries are expected to be the first to take advantage of this technology.

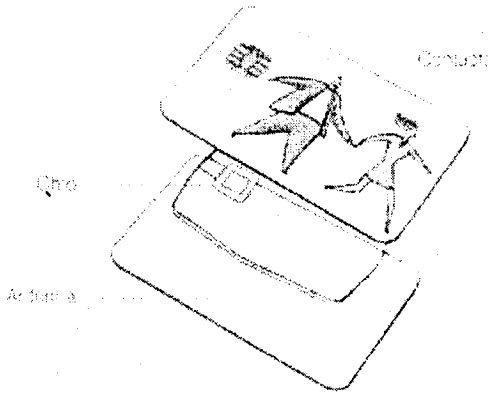
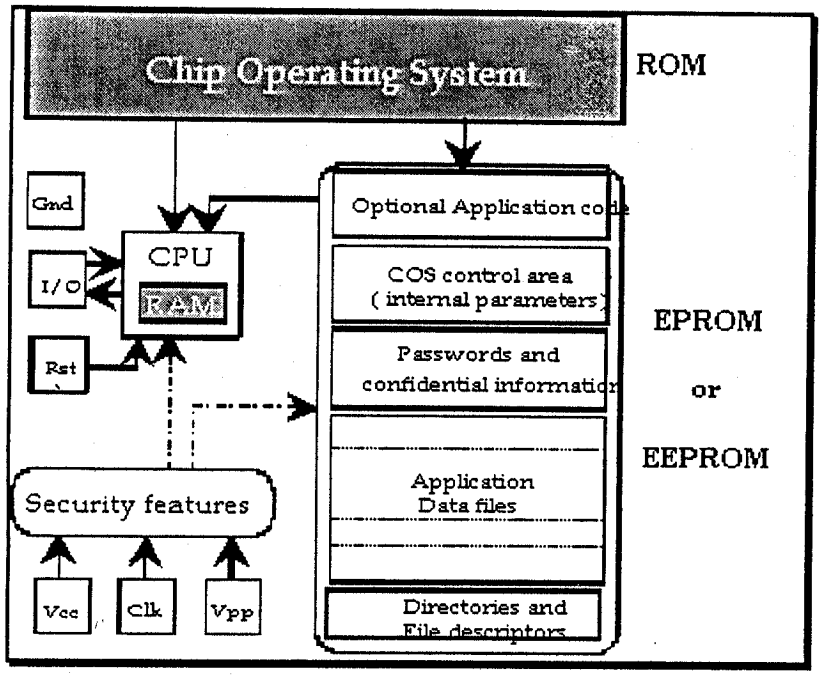


Image courtesy of Gemplus

This shows both the contact and contactless elements of the card. A Combi Card has only one chip while a Hybrid card has two.

The chips used in all of these cards fall into two categories as well: microprocessor chips and memory chips. A memory chip can be viewed as small floppy disks with optional security. Memory cards can hold from 103 bits to 16,000 bits of data. They are less expensive than micprocessor cards but with a corresponding decrease in data management security. They depend on the security of the card reader for their processing and are ideal when security requirements permit use of cards with low to medium security.

A microprocessor chip can add, delete and otherwise manipulate information in its memory. It can be viewed as a miniature computer with an input/output port, operating system and hard disk. Microprocessor chips are available 8, 16, and 32 bit architectures. Their data storage capacity ranges from 300 bytes to 32,000 bytes with larger sizes expected with semiconductor technology advances. Their ability to download not just data but applications is being advanced by Sun with JavaCard technology and Mondex with Multos.



Microprocessor Chip Diagram, courtesy of Gemplus

Standards

The basic smart card standard is the ISO 7816 series, part 1-10. These standards are derived from the financial ID card standards and detail the physical, electrical, mechanical, and application programming interface to a contact chip card.

Applications

The list of potential applications for smart card technology would be too long for this primer. Instead, listed below are some of the major applications seen around the world.

There are over 300,000,000 GSM mobile telephones with smart cards which contain the mobile phone security and subscription information. The handset is personalized to the individual by inserting the card which contains its phone number on the network, billing information, and frequently call numbers.

Almost every small dish TV satellite receiver uses a smart card as its removable security element and subscription information. There are over 4 million in the US alone between DirectTV, USSB and Echo Star. There are millions more in Europe and Asia.

The Financial industry has been quick to adopt smart card technology in various countries around the world. Every French Visa Debit card (over 25,000,000) has a chip in it. In Germany, about 40,000,000 banking cards have been issued. EuroPay, MasterCard, and Visa all have smart card programs for their bank members. In the Portugal and Singapore, the national banking networks have launched electronic purse projects. Proton has worked with its banking partners to issued over 25,000,000 electronic purse cards in several countries.

Various countries with national health care programs have deployed smart card systems. The largest is the German solution which deployed over 80,000,000 cards to every person in Germany and Austria.

There are over 100 countries world wide who have reduced or eliminated coins from the pay phone system by issuing smart cards. Germany, France, UK, Brazil, Mexico, and China have major programs.

Other applications for smart cards include computer/internet user authentication and non-repudiation, retailer loyalty programs, physical access, resort cards, mass transit, electronic toll, product tracking, national ID, drivers license, pass ports, and the list goes on.

Annex 9 Citizen Database

Citizen card id
First Name (Own name)
Middle name(Fathers name)
Last name(Family name)
Physically disabled Y/N
Contact info id
Marriage id
Blood group
Caste / Category
Date of birth
Place of birth
Issuing authority id
Ration id
Voter id
Driving license id
Health info id
Banking id
Insurance id
Income tax id
Beneficiary id
Education id
Issue date
Data entry operator id
Data entry date
Authorizing authority date
Authorizing authority id
Status
Comments