CHAPTER 6
FINDINGS, SUGGESTIONS AND SCOPE
FOR FURTHER RESEARCH

6.1 Introduction

This chapter first presents the important findings of the study. Next, the conclusion and suggestions arising out of the study are presented. It was observed during the course of the study that published research material on the subject of the study was strictly limited and a number of areas and aspects require wider and in-depth research in future. The scope for further research is therefore briefly discussed before concluding the chapter. For ready reference and convenience, referent table numbers of the study are given in brackets in the concerned paragraph of the chapter.

6.2 Findings: Perceptions regarding e-governance Services

The findings set forth in the following pages constitute a recapitulation in a short form, of what has been attempted at length in earlier chapters. This study mainly relates to the awareness and usage of e-governance services implemented by the PMC. It also compares the e-governance system with the manual system with respect to time required to avail PMC service, cost of availing service and efforts. Four out of five objectives and four hypotheses lay primary emphasis on this subject. The fifth objective flows from the employee’s perspective and it is focused on how easily they can deliver services after incorporating e-governance services. The researcher of this study has considered it necessary and useful to also look at the e-governance phenomenon at the national as well as international level. This unique approach has provided new insights, added to the important conclusions and enriched this study.

The researcher has analyzed the primary data to study the awareness of e-governance services implemented by PMC as well as the view of the employees and their ease of work after implementation of e-governance services and to suggest remedial measures. The researcher has done the assessment of e-governance services according to the citizen’s point of view as well as measured the efficiency of employees after incorporating e-governance services. The citizens’ views about the usage of e-governance services and the employees’ opinions regarding delivery of e-governance
services is presented in part I and part II respectively. Whereas the combined opinion of citizens and employees regarding e-governance services based on an analysis of the data is presented in part III.

6.2.1 Part I: Citizens
The Pune citizen is one who uses PMC e-governance services through the website www.punecorporation.org to interact with the Municipal Corporation (government). The PMC has made an exemplary effort to make the processes and interaction more efficient, user friendly and trouble free for citizens through the implementation of e-governance service. Citizens can make their regular transactions anytime, anywhere according to their convenience like birth & death certificate registration, assessment or payment of property tax, grievance redressal, online building sanction, download of tender forms and payment of water bill etc. by using the internet at home, in office or in a net café. The PMC also provides a civic facility kiosk, to citizens to avail e-governance services. All over Pune city there are 76 kiosks through which citizens can avail services. A kiosk is operated by a contract basis operator, who handles the whole transaction. The PMC has also given the facility to citizens to pay their property tax in various banks. According to their convenience citizens can avail the e-governance services and save time, effort as well as money.

The majority of the respondents are male in each category of education and occupation. It is seen that the response of male respondents is very high as compared to female respondents in each category of education and occupation hence there is a need to create awareness among females. The response from post graduate males is also satisfactory as compared to higher secondary and above as well as upto higher secondary educated adults. The businessmen’s response is higher as compared to housewives. A business occupation background for most males is less than a service occupation background. It is however, greater than a ‘housewives’ background. Only a few female respondents are in a business occupation. It is seen that males still outnumber females in all categories of gender, education and occupation. Awareness of e-governance services depends on the citizens’ age, education, gender and occupation.

- It is found that 83.74 percent young citizens are highly aware about e-governance services and out of them 60 percent citizens prefer to avail e-governance services
through the internet at home instead of cyber café or at office. (Table No.5.7 and Table No. 5.8)

- It is observed that 72.38 percent highly educated male citizens from service occupation are highly aware about e-governance services as compared to business occupation. (Table No.5.9, Table No.5.10 , Table No.5.11 & Table No. 5.12)
- 94.75 percent citizens have preferred to use ‘Assessment and Payment of property tax’ e-governance service as compared to other services.(Table No.5.18)
- It is found that 97.45 percent citizens agreed that the services implemented by the PMC through e-governance system are user friendly. (Table No. 5.19)
- Citizens are highly satisfied with the corporation website www.punecorporation.org by ranking parameters like 94.74 percent for ‘simple to use’, 92.51 percent for ‘easy to find information’ and 92.03 percent for ‘simple language’. (Table No. 5.20)
- 93.54 percent citizens have agreed that implementation of e-governance services makes their life very easy because at the click of a mouse they availed government services with a high predictability of outcome without standing in queues. (Table No. 5.21)
- Most of the citizens that are 94.12 percent have strongly agreed that due to the implementation of civic services through the e-governance system they got freedom from manual (traditional) cumbersome process and it is a better mode to avail civic services. (Table No. 5.22)
- 92.83 percent citizens agreed that without traveling anywhere they could avail civic services through the e-governance system at their doorstep. Hence they save their travel time and money. And only 6.21 percent citizens require a single trip to complete transactions due to the unavailability of the internet, low speed or a network problem.(Table No. 5.24)
- 92.66 percent citizens agreed that the manual system increases travel time and that they required at least two trips to avail civic services and even then the predictability of the outcome was very low. In rare cases, 7.34 percent citizens required 3 to 4 trips to complete the transaction. (Table No. 5.25)
- By comparing the number of trips for the e-governance system with the manual system, it is clear that, without any traveling 92.83 percent citizen’s availed e-governance services whereas for the manual system 92.66 percent citizens agreed
that they required at least two trips to complete the transaction without any surety of delivery of services. (Table No. 5.24 & Table No.5.25)

- 96.02 percent citizens agreed that by spending upto ₹ 20, they availed civic services through the e-governance system at their doorstep. (Table No. 5.26)

- 94.71 percent citizens agreed that in the manual system they required at least two trips and the cost of two trips was about ₹ 150 which is very high as compared to the cost of e-governance system. (Table No. 5.27)

- The mean of the cost of availing civic services through the e-governance system (15.97) is very low as compared to the mean of the cost of the manual system (93.56), hence it clear that the cost of availing services through e-governance system is very low as compared to manual system.

- It is found that through the e-governance system, 95.22 percent citizens agreed that within half an hour they can easily avail civic services at their doorstep and complete the transaction with a high predictability of outcome. (Table No.5.28)

- 95.20 percent citizens agreed that in the manual system, they required at least 2 trips to complete the transaction by spending 2 to 4 hours without any surety of delivery of services. (Table No. 5.29)

- By comparing the time taken for the e-governance system with the manual system, it is clear that within 30 minutes, 95.22 percent citizens avail e-governance services whereas for the manual system 95.20 percent citizens required on an average 4 to 6 hours to complete the transaction without any surety of delivery of services. (Table No. 5.28 & Table No.5.29)

- Through the e-governance system, without any travel, citizens availed civic services at their doorstep within half an hour by saving time, effort and money. (Table No. 5.24, Table No.5.26 & Table No.28)

- Comparative cost and benefit analysis of PMC governance system reveal that implementation of e-governance services reduced operational cost of delivering governance services as compared to the traditional system and thus revenues increased in very high proportion. (Table No.5.36)

- It is found that 68.56 percent citizens from Pune city are in favor of touch screen kiosks i.e. they are in favor of implementing unmanned kiosks. So ‘Anytime, Anywhere’ according to their convenience, they easily availed services by saving their time, cost and effort. Whereas only 31.44 percent citizens are not in favor of
implementation of unmanned kiosks due to illiteracy of computer and internet usage.

6.2.2 Part II: PMC Employees’
All the employees of PMC are educated, and they have all completed the Information Technology (IT) literacy course. All the employees of PMC have an adequate knowledge of computers with internet literacy. Due to the implementation of e-governance services, employees of PMC give better service to citizens by saving their time. Most of the employees in the PMC office are young female graduates in the age group 20 years to 30 years. They outnumber the males, in comparison to other age groups, where males outnumber females. All the employees in PMC are educated. Most of the employees are graduates followed by post graduates except for a few who have only completed their higher secondary education.

PMC employees are in favor of the implementation of the e-governance system as they feel that it reduces their stress level. They agree that implementation of e-governance services helps them to deliver better service to citizens by saving their time. Hence in a single day they can easily handle a large number of transactions and effectively satisfy more citizens.

- It is found that 83.93 percent PMC employees are highly educated and have successfully completed their IT literacy course. (Table No. 5.31)
- It is observed that 51.77 percent young employees from age group 18 years to 30 years are not satisfied with the training given during the implementation of e-governance services. (Table No. 5.33)
- 96.40 percent employees agreed that after incorporating e-governance services, their efficiency has increased and they can give quicker services to citizens and easily satisfy them through quality oriented service. (Table No. 5.34)
- 85.71 percent employees agreed that due to the implementation of e-governance services they can easily satisfy more citizens. This has been followed by an increase in service quality, increase in clarity of processes and increase in transparencies. (Table No. 5.35)
- 89.29 percent employees agreed that due to the implementation of e-governance services more transparency would be maintained in various transactions and
accuracy is possible in work. And also 89.28 percent employees agreed that this reduces the time of handling, accessing and searching of data and enables them to finish their work faster. (Table No. 5.35)

6.2.3 Part III: Citizens’ and Employees’

- It is found that 83.60 percent citizens agreed that they can avail e-governance services through the internet at their doorstep at a very fast speed whereas 82.13 percent employees agreed that due to the implementation of e-governance services they can deliver faster services to citizens. (Table No 5.21 & Table No. 5.35)
- 80.73 percent citizens and 89.29 percent employees agreed that the implementation of e-governance services maintains transparency between citizens and government and it helps them to reduce corruption. (Table No 5.21 & Table No. 5.35)
- 85.83 percent citizens agreed that without doing much documentation, they can avail e-governance services whereas 85.71 percent employees agreed that the paperwork has reduced while delivering services to the citizen. (Table No 5.21 & Table No. 5.35)
- 82.16 percent citizens agreed that delivery channel of e-governance system is very user friendly and a quick recovery of mistakes is possible. Due to the implementation of e-governance services, 85.71 percent employees agreed that there is an increase in problem resolution. (Table No 5.20, Table No 5.21 & Table No. 5.35)
- 94.74 percent citizens agreed that services implemented through e-governance system are simple to use where as 85.71 percent employees agree that there is an ease of access while delivering services to citizens through the e-governance system. (Table No. 5.20, Table No. 5.21 & Table No. 5.35)
- 97.45 percent citizens agreed that PMC web site www.punecorporation.org is the best delivery channel of e-governance services. Whereas 87.50 percent employees have agreed that usability of user interface of PMC website is very high. (Table No. 5.20, Table No 5.21 & Table No. 5.35)
- 83.60 percent strongly agreed that clarity and simplicity of e-governance services is very high whereas 91.07 percent employees agreed that there is an increase in the clarity of process after incorporating e-governance services. (Table No 5.21 & Table No. 5.35)
92.36 percent citizens were highly satisfied with the implementation of e-governance services whereas 85.71 percent employees have strongly agreed that the implementation of e-governance system helps them to satisfy more citizens while delivering services. This has resulted in increased morale and job satisfaction. (Table No. 5.20 & Table No. 5.35)

6.3 Conclusion

- Implementation of civic services through e-governance services is a new concept in Pune city and at the initial level; it makes successful transformation from the traditional (manual) system to e-governance system.
- Awareness of the e-governance services depends totally on the citizen’s age, education, occupation and internet literacy parameters. A citizen found that implementation of e-governance system is perceived as more significant than the manual system.
- Implementation of e-governance services help citizens to interact directly with government and understand government policies through which they can easily contribute to the decision making process. Consequently transparency would be maintained between citizens and government and this would help in growth of the nation.
- Implementation of e-governance services help citizens to avail civic services ‘Anywhere, Anytime’ according to their convenience.
- Housewives, relatively, do not seem to be very enthusiastic about the greater significance of implementation of e-governance services.
- Due to implementation of e-governance, citizens don’t feel the need to depend on any intermediaries or agents to avail civic services.
- Before implementation of e-governance services, People were lazy about traveling and going to the corporation office, so their names appear in the default list and they were heavily fined. The implementation of e-governance services will lessen this burden and their mental agony.
- PMC implements a number of e-governance services through its website www.punecorporation.org as well as through Nagari Suvidha Kendra (kiosk). Citizens find that the delivery channel of e-governance services are more user friendly and they are highly satisfied with it. But due to time limit of kiosks and
unavailability of operators, they want unmanned kiosks (touch screen kiosks) in future so they can easily avail services according to their convenience.

- There is no proper help desk to guide the process of availing services form Nagari Suvidha Kendra (kiosks). The official working hours of Nagari Suvidha Kendra are causing inconvenience to the working citizens. Hence most of the citizens are in favor of implementation of unmanned touch screen kiosks to avail governance services.

- 'Pune citizens’ have very positive attitude with this e-governance service. Assessment and payment of property tax is most widely used e-governance services and which will help PMC to increase their revenues but need to create awareness of other e-governance services.

- The implementation of e-governance services helps citizens to access services anytime, anywhere to interact easily with the government. Citizens have strongly agreed that e-governance delivers better services to them. Hence it is clear that there is a high impact of e-governance services on citizens

- Citizens found that the implementation of the e-governance system is perceived as more significant than the manual system with less travel and without standing in a queue for a long time they can easily avail civic services through e-governance. The cost of availing services depends totally on the number of trips required to complete the transaction, time required for each trip and cost of each trip. Hence, implementation of e-governance services helps them to reduce travel cost, time and effort and hence the total cost of the service.

- PMC e-governance projects are successful, implementable, usable, transparent, time effective, affordable and accurate from a citizen’s point of view.

- PMC employees are in favor of e-governance services and they feel that it reduces their stress level. Implementation of e-governance has helped employees to deliver better services to citizens by saving their time and effort. Hence in a single day they can easily handle a large number of transactions.

- All the employees are educated and have completed the IT literacy course. Most of the young employees are not satisfied with the training which was given during the implementation of e-governance services. They are not satisfied because they expect more from the software companies who train them. Employees training satisfaction ratio is very low and hence need to increase the number of training
sessions so that they could be easily satisfied and give better services to the citizens.

- PMC employees have agreed that due to the implementation of e-governance they can efficiently and effectively deliver services to the citizens by reducing the time in handling, accessing and searching for data and it helps them to finish their work faster.

- Implementation of e-governance services helps employees to satisfy more citizens, that there is an increase in service quality, increase in clarity of process and increase in transparency

- Operational cost of traditional system is very high as compared to e-governance system. Whereas revenues are collected in very high proportion in e-governance system as compared to traditional system.

- Due to implementation of e-governance services more transparency is maintained in tendering the process and the saving is approximately ₹ 250 crore per year. Thereby PMC can divert these funds which are saved for the benefit of PMC.

- Implementation of e-governance services helps PMC to detect the frauds in ‘Birth and Death Certificates’ module.

- e-governance has the potential to be dominant alternative delivery channel of all civic services in near future, which cannot be easily challenged by the traditional method.

### 6.4 Designed and Suggested Framework of e-governance

Success of the e-governance applications depends on four important pillars which are technology, service providers, users and their satisfaction. The term e-governance represents the implementation of various government services to citizens by giving them the convenience to avail services ‘Anytime, Anywhere’. The central dimensions of e-governance application and citizens are user friendliness of delivery channels, presentations, content, interactions, satisfaction about services and security about data and technology.

In the course of the study, it occurred to the researcher to devise a layered framework for the successful implementation of e-governance applications. A conscious attempt was therefore made to construct such a model. The researcher therefore presents a “Layered Framework for Implementation of e-governance services” by considering all the positive aspects of Information Technology. It is therefore presented in the
following Fig. 6.2. The researcher has combined all the functionalities and operations of the successful implementation of e-governance services and has developed a new framework to serve the need of today’s environment. For designing framework, researcher has refereed several significant initiatives have been taken at the Centre, the State level and District level in this direction. Namely few are Ahmadabad Municipal Corporation (AMC), Kalyan Dombivali Municipal Corporation (KDMC), Pimpri Chinchwad Municipal Corporation (PCMC) at municipal corporation level. Andhra Pradesh, Maharashtra, Madhya Pradesh, Karnataka, Punjab etc at a State level. Pakistan, Jordan, Qatar etc at the international level.

The approach is primarily heuristic through technical and other details. This is because the researcher wanted to construct a framework which is at work at various levels by using the unique identity of Indian citizens through UID /Aadhar Card. The current framework followed by the government is not adequate to the unique identity of the Indian citizen. To my knowledge such a layered framework catering to the needs of the implementation of e-governance applications has not been devised so far.

**i) The Framework: Operations and Functions**

Any framework consists of various layers, components and a few other factors. Considering all these components, Figure No. 6.2 gives the detailed mode of operation and functions of the Conceptual Layered Framework for the Implementation of e-governance services. This framework is created and presented based on earlier studies, the researcher’s experience and the conclusions arrived at from Chapter 3 and Chapter 5. The researcher has presented this conceptual framework knowing full well that it can’t immediately replace the current framework. It requires some extra time as well as basic preparation before implementation. **This framework is so designed based mainly on the unique identity of citizens through UID/Aadhar card.** This framework is the best combination of the unique identity of citizens with its high security of data. As we studied in chapter 3 and chapter 5 e-governance status according to citizens and employees point of view, this framework is the best combination of all the studied frameworks implemented by various local, municipal, state and central governments.

The detailed design of this framework is based on the UID/Aadhar card for unique identification of the user and his/her data security. The user may be an external user or internal user of the system. External users are citizens, business users and vendors.
whereas internal users are administrators, CFC operators, PMC employees or government bodies. The user can avail e-governance services through various delivery channels like mobiles, kiosks, CFCs, web ports, personal computers, digital TVs as well as through video conferencing. But before availing any e-governance services, the user has to first validate his/her UID card. The UID card can be validated by using the PMC Registrar system, in which the user can send a request through a mobile device/Pos device/biometric scanner for validation purposes. Once the PMC registrar system receives the user’s request, the request is passed/forwarded to the UID authentication server. Requested details will be matched with the UID database and validations will take place. After validation, by using gateways, the user can avail any services related to e-governance applications. Implementation of e-governance includes many services and a few of them are birth and death certificate registration, grievance redressal, assessment and payment of property tax, e-procurement, and health department services including food licenses etc., building approval and water bill. It also includes maintenance of the personal information of all PMC employees and their payroll systems with all the account details. During the interaction, proper authentication and access management will take place for security purposes and after completion of the transaction the details will be stored in the particular database.

ii) Layered Architecture
The e-governance platform will consist of mainly three layers namely back office layer, infrastructure layer and operations layer. The back office layer will consist of administrative modules such as analytics and monitoring, fraud detection, billing and CRM and customer and tech support. The infrastructure layer will consist of system components such as distributed computing platform, application server, distributed caching service, event management, audit and logging system, process management, application monitoring and management, alert and task management and business workflow processor and rule engine. The operations layer would comprise of components that help administer the data centre and services of the UID system and will include data centre operations and management modules, network management, data backup and archival and disaster recovery system. Incidentally, the UID application will comprise of twin layers of interface and application. The interface layer, says the authority, will be the only way in which the UID system can be accessed by the outside world. It supports the key enrollment and
authentication services as well as makes available portals and other analytics and monitoring reports to both end users — the residents as well as the eco-system of UID partners. The application layer will comprise of two components — enrollment server and authentication server. On its part, the enrollment server takes in a request for UID authentication. On the other hand, the authentication server will provide several ways in which a resident can authenticate himself/herself using the UID online system. After the verification of the uniqueness of the resident/ UID number it will allow the user to avail various services.

The architecture will be classified in three ways: centralized, separate database server and replication architecture. Centralized architecture consists of web server, an application server, database server and user interface. The application server, database server and the web server run on the server side while user interface is displayed in the web browser on the end user’s machine. The application server performs all the e-governance applications with the help of the database server. The user interacts with the HTML web browser, and the information or request sent to the web server, which passes the user’s requests to the application server. There are several mechanisms for communication between the server and the interfaces. One mechanism can be that the entire e-governance applications are written in the form Java Servlets and executed on the server side. Any servlet can be involved from the user side. An information technology consists of lots of data to be handled. The database server can be separated from the central entity and can make a proper communication between the central server and the web server. When the user requests for the HTML page, the request goes to the web server that runs the application and takes the required data from the database server. All the e-governance applications reside in Java Apple, which needs to be executed through any one of the delivery channels. The user can avail the entire services through any delivery channels, while the server is only used as a repository.

iii) Presentation & Implementation of the Proposed Architecture

Considering the advantages service-oriented approaches can offer to e-government applications, we chose them for the PMC. Moreover, in view of our requirements, we need to separate the presentation from the application in an e-government application, and to use a data layer. So, the researcher chose a multi-tier architecture. Such architecture subdivides a system or an application in immeasurable tiers thus making it possible for the various existing e-government applications to be integrated with the new ones. Moreover, these applications can be extensible. The framework that we
propose for the PMC e-government applications is a five layered framework namely: the client layer, the presentation layer, the application layer, security layer and the data layer. Figure 6.2 shows the Conceptual Layered Framework for the Implementation of e-governance services. Each layer of architecture is represented by number and hence client layer has a 1 number followed by presentation layer has a 2 number and application layer has 3 number. Further Security layer has 4 numbers and data layer has a 5 number. Following Fig. 6.1 shows the importance of each layer in layered framework. In this work, the researcher is primarily interested in e-government web applications, given that, they agree more with the PMC technological infrastructure.

Researcher has set the priority for each layer according to their importance in the implementation strategy. Presentation layer has a highest priority as compared to other layers. Hence in Fig. 6.1 the middle finger shows the highest priority with number 1 of the Presentation layer followed by second priority to the Security layer with number 4 and third priority to the Data Layer with number 5. The fourth priority is for the Client layer with number 1 and fifth priority is for the Application layer with number 3.

![Figure 6.1 Importance of each Layer in Layered Framework](image)

1) **Client layer**

The client layer represents the various e-government application delivery channels. This layer supports the different types of users: external users and internal users via a PDA or a cellular phone. For external users, PMC services can be reached through a web browser, when the application is in the form of a website, or through a self developed
application invoking them. The communication with the presentation layer will be done using the HTTP protocol made safe by SSL. The choice of the HTTPS protocol (HTTP over SSL) comes from the increasing need for security on the internet. In fact, a citizen who sends personal information on the web will feel more trustful when he/she knows that it is secured. Moreover, the HTTPS makes it possible for the user to check the identity of the website to which he is connected.

When a user invokes governmental services through an application, it will not interact directly with the application layer without having to pass by the presentation layer. The communication with the application layer will be done by using SOAP over HTTP. The choice of HTTP comes from the fact that it can pass through software firewalls which constitute an obstacle for the distributed applications. To preserve the confidentiality and the integrity of the exchanged messages with the application layer, we quantify and digitally sign SOAP messages according to the WS-Security specifications.

i) Operating Agents – External and Internal Users: The layered framework includes a number of internal as well as external users as follows:-


   b) Internal users: Administrator, CFC Operator, PMC Employees and Government Bodies

ii) Delivery Channels: Mobiles, Kiosks, PCs, CFCs, Web Portal, Video Conference and Digital TV.

2) Presentation layer
The presentation layer manages the interface proposed for the users interacting with the e-governance application. This level processes the data entered and received by the users and manages their interactions with the application layer. Separating this layer from the application layer makes the application accessible via various channels such as web browsers, self developed applications and even cellular phones, without having to change the application's implementation. In the case of an application accessible through a Web browser, this level contains a web server which organizes the presentation and the interactions with the application layer. The communications with
the application layer will be done using the SOAP protocol over HTTP. In the case of a web application, the web server imbricates a servlets container. The administration layer is only accessible to the chief administrative employees of the government. It ensures a follow-up of the services requested by the citizens or the other administrations. In addition, it contains a digital signature checking module which is used to check the validity of the certificates delivered to the citizens if necessary. The console also integrates the switches of the web services used to activate or deactivate the services.

The full form of abbreviations which are used in fig 6.2 layered framework for the implementation of e-governance services are as follows

- PC: Personal Computer
- CFC: Citizen Facilitation Center
- UID: Unique Identification Number
- UTM : Unified Threat Management
- XML: Extensible Markup Language
- SMS: Short Messages Service
- SMTP: Simple Mail Transfer Protocol
- GIS: Geographical Information system
- VPN: Virtual Private Network
- ULB: Urban Local Body
Fig. 6.2 Layered Framework for the Implementation of e-governance Services
i) Gateways
A gateway is a node on a network that serves as an entrance to another network. The gateway is the computer that routes the traffic from a workstation to the outside network that is serving the web pages. In homes, the gateway is the ISP that connects the user to the internet. In enterprises, the gateway node often acts as a proxy server and a firewall. The gateway is also associated with both a router, which use headers and forwarding tables to determine where packets are sent, and a switch, which provides the actual path for the packet in and out of the gateway. A computer system located on earth switches data signals and voice signals between satellites and terrestrial networks.

- **Web Gateway:** The Web Services Gateway is a run-time component that provides configurable mapping based on WSDL documents. It maps any WSDL-defined service to another service on any available transport channel. It is usually deployed at the firewall and has access to internal services. The Web Services Gateway provides the various features: namely Service Mapping, Transformation, UDDI publication & lookup and Security and Management.

- **XML Gateway:** XML Gateway is an integrated suite of components and offers an easy-to-use, single point of entry to all business enterprise information. It enables users to make informed business decisions, quickly and easily.

- **SMS Gateway:** An SMS gateway is placed between two SMSCs, acting as a relay between the two SMSCs. It is able to translate one SMSC protocol to another, and can be used by two different wireless carriers to interconnect their SMSCs.

- **Payment Gateway:** It is the service that automates the payment transaction between the citizen and government. It is usually a third-party service that is actually a system of computer processes that process, verify, and accept or decline credit cards transactions on behalf of the merchant through secure Internet connections. The payment gateway is the infrastructure that allows a merchant to accept credit card and other forms of electronic payment. When referring to payment gateways used for Internet transactions, it may also be called an IP payment gateway.

- **SMTP (Simple Mail Transfer Protocol) Gateway:** a protocol for sending e-mail messages between servers. Most e-mail systems that send mail over the internet use SMTP to send messages from one server to another, the messages
can then be retrieved with an e-mail client using either POP or IMAP. In addition, SMTP is generally used to send messages from a mail client to a mail server. For that, it is needed to specify both the POP or IMAP server and the SMTP server when you configure your e-mail application.

- **GIS Gateway:** GIS gateway is used to create urban planning proposals, arrange public services, and devise targeted revenue models. The Municipal Corporation applies GIS to assess property transaction information scientifically and accurately evaluate all taxes related to a property which helps them to increase their revenues. Property tax is a major source of revenue for a municipal corporation. GIS can help to gather information in real-time on infrastructure issues to pin-point which areas need attention. Geo-referenced data can generate maps that reveal spatial relationships, patterns and trends that governments can use to manage and plan urban infrastructure by using the participation of their citizens. It also provides an online database to search for property tax records by using an interactive map, or by putting in property information such as a property ID number, owner’s name, address, or the legal description.

- **VPN Gateway:** A VPN is a network that primarily uses public telecommunication infrastructure, such as the Internet, to provide remote offices or traveling user’s access to a central organizational network. VPNs typically require remote users of the network to be authenticated, and often secure data with encryption technologies to prevent disclosure of private information to unauthorized parties. VPN Gateway is a secure access solution that extends enterprise applications to remote employees, contractors, partners, and customers. It supports both SSL and Internet Protocol Security (IPSec) capabilities to ensure that users gain access to only the data applications they require, protecting against loss or theft of confidential information. It can also leverage browser-based software already available on a user's PC to provide secure access without the need to distribute or manage client software.

**ii) Specific Personalization**

Personalization involves using technology to accommodate the differences between individuals. The administration layer is only accessible to the chief administrative employees of a government. It ensures a follow-up of the services requested by the citizens or other administrations. This will be done thanks to a follow-up console inter-
connected to the data base containing the historical of the carried out treatments. In addition, this console contains a digital signature checking module which is used to check the validity of the certificates delivered to the citizens if necessary. The console also integrates the switches of the web services used to activate or deactivate the services.

**iii) Content Management**

Content management is the process of organizing, distributing and tracking information/data through a website over the internet. It helps to make users more knowledgeable or informed by offering instant access to correct information online. It deals with providing the right information, to the right people at the right time. The contents of a website can be divided as follows: Text, Graphics, Audio, Video, Diagrams, Links, etc. Managing these various types of content is important. It is necessary to decide where to provide text and where to have images and graphics. Content management further involves web based publishing, format management, revision, indexing and providing a search facility to users.

**3) Application Layer**

The application layer is the core of the e-government application. It contains two fundamental components: the application server, and the orchestration engine. It lodges the web services of a governmental administration. Among these services, we identified two which will have to be generic with any application following our architecture: the signature service and the authentication service. With regard to the signature service, its role is to digitally sign the certificates delivered by the governmental administrations. These services fulfill the citizen's acquittal requirement. In addition, the government services generally require a database access; hence an authentication mechanism for the service consumer is necessary. These consumers are of two types: citizens or other governmental administration. In the case of a citizen, the pair «username/password» to be used is already given in the client layer. Thus, it will be transmitted to the application layer by the Forwarder. It is on this level that the authentication service checks the identity of the service requester and decides to launch or not launch the requested service.

The administration authentication arises if an administration (administration1) wishes to use a service which belongs to another (administration2). In this case, the authentication
is also done by the pair «username/password» exchanged between the two administrations earlier. The authentication data will be transmitted within the inputs of the service. In our architecture, all the offered services are composed of the authentication service and the service in question. Thus, we are sure that no non-authenticated user will be able to use a service. Moreover, the same identifier will be used for data base connection if necessary. Consequently, different access rights are allotted to each identifier.

4) Security Layer
The functions achieved by servlets are generally to connect or to process data to the data layer. In this framework, we identified two functionalities pertaining to the presentation layer which are generic for all e-government applications: the specific personalization and content management - the authenticator and the forwarder. These two functionalities are ensured by servlets. Authenticator authenticates the citizens so that it can access the services offered by the administration. The Forwarder manages the transmission of the information seized by the user to the application layer.

i) Authentication
Authentication is the process of verifying the digital identity of the sender of a communication, such as a request to log in. The sender may be a person using a computer/mobile, a computer/mobile itself or a computer/mobile program. In a web of trust, authentication is a way to ensure users are who they say they are — that the user who attempts to perform functions in a system is in fact the user who is authorized to do so. An effective access management system incorporates one or more methods of authentication to verify the user, including passwords, digital certificates or hardware or software tokens. Authorization is the process of verifying that a known person has the authority to perform a certain operation on a given resource. Authentication, therefore, must precede authorization. Authorization governs what a user can access or do within an application. It lets the right users manage the content they have access to and the actions they can perform.

ii) Identity and Access Management
Identity management is a significant component to provide trusted and reliable online delivery of government services. Authentication and authorization should be considered within the context of identity management.
Identity management is an integrated system of business processes, policies and technologies that can enable the government to facilitate and control the citizens’ access to critical online applications and resources - while protecting confidential, personal and business information from unauthorized access. This includes the creation of the user entity (functionality typically found in a human resource application), authorization and permissions (single sign-on and password management functionality), and a single point of administration for accounts hosted over one or multiple user stores. Identity management is a set of processes and infrastructure for the creation, maintenance and use of digital identities for the purpose of access to e-governance portals and the information on those portals. A well established identity management system helps to setup an access management system. The object of identity management is to create a scalable, extensible and secure standards based framework for identity data acquisition and storage.

Access management involves authentication of the identity of the user and giving access the government and public information available online. Access management is necessary to give a secure access to information to the public. Securing of public information available online is very important due to the recent online piracy and attacks on websites through hacking. e-governance would involve a huge amount of sensitive public information up for grabs for the hackers of other countries. Further, there are certain things which require to be accessed only by government officials. So, online security of information is very necessary which can be done through access management. Access management is only possible if an identity management system is already online and running successfully. The process of access management involves authentication and authorization, access control and audit & reporting.

5) Data layer
The data layer ensures the governmental administration data storage and persistence. This is carried out by using one or more databases. For each access requester to this level corresponds a single identifier. In this way, different access rights can be allotted to many governmental administrations. The management of the access rights to the data is ensured by the DBMS. In addition, this layer lodges the web services event journals which make it possible to preserve a trace on the invoked services. This layer must also be protected from possible external intrusions by using a firewall. The latter,
will filter the exchanged data and will block all the communication except those with the presentation, application and administration layers pertaining to the governmental administration.

**iv) Cost of the Framework**

The basic cost of this framework depends on the number of e-governance services implemented by PMC. The cost of the framework is mainly dependent on Server Infrastructure costs, MIS cost, GIS Components cost and other costs.

- One time Server Infrastructure cost includes Cost of civil works and Electrical cost, IT Infrastructure costs include Racks, Firewalls, Intrusion protection system (IPS), Center Core Switch, Database Server, Web Server, and Domain Server, SAN, NAS and UPS.
- Software licenses’ cost includes Production & Backup Server cost, Application Server and Network Management System cost.
- MIS cost includes License cost of the basic software, Hospital Management System, Fleet Management System and Bespoke Development & Implementation cost.
- GIS Component costs includes Enterprise GIS software cost for web based implementations, customized GIS software cost, Base Map & Image preparation cost and cost of Physical Survey & Creation of various layers of Geospatial Information.
- Other costs include e-governance Consultancy cost & Project Management cost, Training cost for MIS & GIS, Data entry cost, Implementation cost and IT audit cost.

One of the essential factors important for the success of the proposed e-governance project at PMC is to have a professional approach in implementation. All the activities need to be planned in a holistic manner with due provision for operation and maintenance. Operational and maintenance cost includes license cost of post implementation support for MIS & GIS and ATS for database and application server cost. It also includes capital cost of maintenance of IT infrastructure and connectivity cost for DR (Disaster Recovery) sites.
For implementation of e-governance applications, PMC receives a 50 percent grant from the central Government, 20 percent grant from the state government and PMC has to contribute only 30 percent of total cost. Based on our observation, the cost of the implementation of the layered framework of PMC including a one-time infrastructure cost is approximately 80 Lakhs for the first year and approximately 50 Lakhs for the following years. In addition to this, suppose we increase DR sites, the cost of the implementation of the layered framework will increase proportionally by 10 percent of the existing cost.

v) Post Implementation of Layered Framework for Implementation of e-governance Services with Cloud computing

In India most of the states are willing to adopt the e-governance model to offer government services online up to the last level. They can use the power of all the models of cloud computing to offer some urgently required e-governance services within a short time. Some major barriers are unavailability of required infrastructure, unavailability of e-governance application, unavailability of trained workforce in IT and unavailability of required funds.

Cloud computing is Internet-based computing, whereby shared resources, software and information are provided to computers and other devices on-demand. Cloud computing infrastructure allows enterprises to achieve a more efficient use of IT hardware and software investments by pooling resources into large clouds. Pooling of resources would serve to bring down costs and increase utilization. Cloud computing also allows individuals, teams, and organizations to streamline procurement processes and eliminate the need to duplicate certain computer administrative skills related to setup, configuration and support. Cloud computing solutions can enable an optimum use of resources in vital back-bone infrastructure like the State Data Centers.

Layered Framework for Implementation of e-governance Services with Cloud computing is mainly based on the Infrastructure-as-a-Service (IaaS) software that will help PMC to provide a network backbone and a wide range of information and communication technology (ICT) services to citizens all over Pune city. IaaS provides basic storage and computing capabilities as standardized services over the network. Servers, storage systems, networking equipment, data centre space etc. are pooled and
made available to handle workloads. The PMC would deploy its own software on the infrastructure. It helps PMC to improve services at a lower cost. This high performance architecture will support the basic needs of remote districts and villages through always-on, scalable and affordable computer resources where an on-site server infrastructure cannot be deployed to tackle downtime in these areas.

vi) Cloud Computing Benefits in e-governance
Enterprises would need to align their applications, so as to exploit the architectural models that Cloud Computing offers. Some of the typical benefits are listed below:

- **Reduced Cost**: There are a number of reasons to attribute lower costs with cloud technology. The billing model is pay as per usage; the infrastructure is not purchased thus lowering maintenance. Initial expense and recurring expenses are much lower than traditional computing. Available at a fraction of the cost of traditional ICT services; with upfront capital expenditures eliminated, this technology has dramatically reduced the ICT administrative burden by hiring the infrastructure from clouds.

- **Increased Storage**: With the massive infrastructure that is offered by Cloud providers today, storage & maintenance of large volumes of data is a reality. Sudden workload spikes are also managed effectively & efficiently, since the cloud can scale dynamically.

- **Enhanced Flexibility**: This is an extremely important characteristic. With enterprises having to adapt, even more rapidly, to changing business conditions, speed to deliver is critical. Cloud computing stresses on getting applications to the market very quickly, by using the most appropriate building blocks necessary for deployment.

- **Access anywhere**: Instead of offering government services from a single computer or network, we may use different computers in a shared network environment or we can use portable devices like laptops, notepads and mobile phones, to run applications and documents everywhere. Applications and documents accessible from anywhere in the world, will help in facilitating group collaboration on documents and projects.

- **Measured Service**: In a measured service, different parts of the cloud service are controlled and monitored by the cloud provider. We can add and subtract the
services and infrastructure support as we need it. This is crucial for billing, access control, resource optimization, capacity planning, and other tasks.

- **On-Demand Self-Service**: The on-demand and self-service aspects of cloud computing mean that a consumer can use cloud services i.e., network storage and server time as needed without any human interaction with the cloud provider.
- **Easy to Implement**: No need to purchase hardware, software licenses or implementation services. You can just start within a short time.
- **Service Quality**: Reliable services, large storage and computing capacity and the user will get 24*7*365 services and up-time.
- **Delegate Non-Critical Applications**: We can outsource non-critical applications to service providers and we may focus on the more business-critical applications.
- **Always the Latest Software**: As updates are automatic we will get the latest software without paying new purchase costs to the vendor.
- **Resource Pooling**: Resource pooling allows a cloud provider to serve its consumers via a multi-tenant model. Physical and virtual resources are assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction e.g. country, state, or data center.
- **Data Recovery**: Natural disasters like floods, earthquakes, wars and internal disturbances could cause the e-governance applications not only to lose data, but also make services unavailable. Multiple installations in geographically separated locations with complete backup and recovery solutions is required as without this we may have huge problems. Applications and data must be redundant and should be available on a short notice to switch from one data center to another. Cloud virtualization technologies allow backups and restoring. It offers application migration seamlessly compared to a traditional data center.
- **Distributed Data Centers**: An ICT based e-governance model may have many risks, like attack of viruses, hackers, fire and terrorists at some time. Such disasters possess mass destructibility and even intentioned activities after disasters. Distributed data centers provide fault tolerance against such disasters.
These centers facilitate robust communication support, self-supervision capability and real visible platforms, which will help in e-governance applications to use and manage.

vii) Summary

The conceptual Layered Framework for Implementation of e-governance Services consists of various layers, components and a few other factors which work on the unique identity of Indian citizens through UID /Aadhar Card. The framework that we propose for the PMC Municipal Corporations e-government applications is a five layered framework namely: the client layer, the presentation layer, the application layer, security layer and the data layer. The client layer represents the various e-government application delivery channels with operating agents. The presentation layer manages the interface proposed for the users interacting with the e-governance application. The application layer is the core of the e-government application. The security layer consists of authentication and Access & Identity management. Authentication is the process of verifying the digital identity of the sender of a communication, such as a request to log in. Identity management is a significant component in providing trusted and reliable online delivery of government services. The data layer ensures the governmental administration data storage and persistence. Furthermore this Conceptual Layered Framework for Implementation of e-governance Services with Cloud computing is cost effective because it saves implementation costs and maintenance costs.

This framework is prepared on the basis of my knowledge and actual experience in the light of the present research study. The researcher has also discussed it with a technical and network expert in this area. It can be improvised in the light of actual experience so that it can be widely implemented and applicable at various levels.

6.5 Suggestions

For the success of an e-governance project and superior service delivery, it is imperative that the government agency focuses on the whole citizen experience. Focusing on the citizen is essential for long term success. The government agency
needs to integrate information from all points of citizen interaction. The overall architecture for e-governance needs to ensure that the architectural components are extensible and scalable to adapt to the changing environments. The e-governance applications that are emerging as islands of successes have to be inter-operable. Following are some suggestions for the successful implementation of e-governance services.

- **Organize citizens’ awareness programs on IT and e-governance applications:**
  Marketing and publicity are integral parts of successful electronic government initiatives. Marketing efforts should focus on creating brand awareness of the online presence. Using traditional media methods and outlets to create the right image for this new delivery channel can accomplish this kind of "branding." The government can create awareness among the citizens using mass media vis. namely radio, television (documentary), newspapers, handouts on the same lines as polio awareness i.e. on a war footing. Public awareness programs should be arranged highlighting the relevance of IT in daily life. IT literacy programs should start early in schools and colleges because it is at that tender age that students are most open to new ideas and technologies. The government should also arrange, encourage and subsidize IT vocational training to create an IT-literate society with an awareness of e-governance applications. The corporate sector as well should render full cooperation for successful implementation of e-governance.

- **Create online access points at public places or increase number of CFCs:**
  Online access points should be made from public places such as post offices so that anyone can get access to the internet at a low, subsidized cost. This is a model that is popular in almost all countries. Without such facilities, G2C and G2B services may not be able to reach the target population easily. The government can increase the number of CFCs all over the city to make it easy to avail e-governance services. It would help illiterate citizens to interact with the government and avail services easily according to their convenience. Because of the timings of CFCs, many citizens are not able to avail services in their day-to-day routine life. Hence the government can also set up infrastructure like unmanned kiosks 24X7, so citizens can easily access the civic services according to their convenience anytime, anywhere. Government authorities should take serious note of this.
- **Extend connectivity outside cities:** In India, most of the people stay in rural areas. Due to the lack of infrastructure facility, they are not able to avail civic facilities according to their convenience. Steps have to be taken to allow easy internet access from outside cities. The government can set up the infrastructure in rural areas by using the advantages of IT. This will help the government to increase its revenues. Incentives will have to be given to ISPs to locate outside cities. The government can reserve an adequate budget for infrastructure in rural areas. The researcher has already suggested technology that is highly cost effective (Para 6.4.2). By using cloud computing, government can save infrastructure costs and make it affordable to avail e-governance services in rural areas.

- **Standardization in localization (for vendors):** e-governance has an impact only when the services to the citizens are made available in their respective languages. India is a country with 22 official languages and the use of computers is spreading fast not only to create employment in the IT sector but also to support the productive use of IT in daily life e.g. increase productivity and competitiveness, provide a better quality of life, enable inclusiveness and strengthen democracy. The ability of different sections of the people to use computers demands that the Basic Information Processing Kit be available in their respective languages. It also needs to be constantly upgraded for various hardware and software platforms, adding new tools and promoting work with application developers to enable/support local language use in different sectors/verticals. Software vendors should take serious note of the language diversity in the nation and translation conversion measures should be given keeping in mind the rural users who may not be computer savvy or highly literate.

- **Create literacy and commitment to e-governance at high level:** The most important requirement is a training program for policy makers in e-governance, which means politicians and IT task force members must be included. The training program needs to be adjusted according to the requirements of the policy makers at the top. In addition it should be made mandatory for all the stake holders in the implementation and maintenance of e-governance services to have general IT skills. There may be specific requirements for training in certain specific projects. Such programs can be need based and outsourced when required. A few suggested programs include e-governance training, building web interfaces for citizen
interaction, document management and workflow applications, security and PKI solutions, office automation and networking.

- **Conduct usability surveys for assessment of existing e-governance projects:** There is a varying degree of the development of e-governance among the different states. A few states have leapfrogged into a digital era whereas a few are yet to start with any initiative. There is a tremendous divergence in the extent of implementation of the concept of e-governance. It is therefore not possible to come up with a framework for implementation of e-governance which is straightaway applicable to all states and the central government. Therefore an e-readiness exercise should be carried out in all states and their government departments to understand their level of acceptability of e-governance.

- **Starting with the implementation of pilot projects and replicating the successful ones:** The pilot projects taken in various states should be assessed for their achievement levels. They should be classified as successes or failures according to the desired output written down before implementation of the projects. The study should be carried out by an independent agency for the implementation agency. The study should be carried out at each stage of implementation. Bottlenecks and causes of delays should be documented, even though they are removed later. The successful projects should be replicated all over the nation with members drawn from the implementing team. The projects, which could not achieve the desired outcome, should be documented for possible causes of failure. Various bottlenecks and causes of delay should be identified.

- **Follow the best practices in e-governance:** The study of best practices will bring forward the best practices being followed nationally and internationally. The national and international best practices study will give a great momentum to the process of e-governance. The state governments will not have to re-invent the wheel every time and they can learn from the developments already made.

- **Build a National Resource Database of e-governance projects:** This would allow any organization planning an IT project to instantly ascertain whether any such project has already been implemented anywhere in the country. Intending implementers would know who the key people in similar projects are and how to reach them. It is well known that it is much easier to replicate a solution than to evolve it the first time around. So the lead-time to implement projects can be
reduced substantially. If a project is already in operation in a similar environment somewhere in the country, acceptance by all concerned is much faster and smoother elsewhere. So change management becomes much easier and so does the time and effort involved in such implementations. Due recognition would accrue to the pioneers who created the successes. It would enable others to learn from them if they wish. For implementing agencies, be they Government owned organizations like NIC, CDAC and State PSUs or private IT companies, it offers a unique opportunity to derive the full return and reward, both domestically and internationally, from their successes and the IPRs/ products that they have created. It would help create an archive of e-governance applications in the country.

- **Manage and Update content on government websites efficiently and regularly:** Content is the 'heart' of any IT project. The government agency has to keep in mind some of the important technical guidelines, while developing the software and computerization, to facilitate the future integration. The department also needs to address the security of transactions and messages. The process of content development encompasses a whole range of activities starting with a comprehensive study of the system and identification of the objectives. It ends with the delivery of the intended benefits to the citizens or other users of the IT system. The government agencies must ensure that the data on the sites is always updated and relevant.

- **Thrust on Awareness before Training:** One of the primary reasons why government officials resist the use of IT lies in the way the training programs are structured. The typical training programs introduce government officials to the world of IT through programs such as Microsoft Word, thus throwing them into confusion about what computers are really about and how it will benefit them. Since most officials do not need to type documents themselves, they cannot relate to the computers as far as their daily office work is concerned. These IT training programs should be re-oriented so that in the first classes they are introduced to the concepts of how computers make their work more efficient. The training programs should stress on the awareness about the potential of IT in government rather than concentrate too much on teaching officials how to type. Users should be given ample training so that there is no technophobia, no resistance to technology. For that seminars and webinars should be organized and user manuals should be provided.
- **Increase number of training sessions:** There should be planned training programs to orient officers for using computers and more importantly, to develop an awareness about the potential of IT. Without adequate and timely training and awareness programs, e-government projects are likely to fail no matter how much the investment.

- **Make plans for reliable maintenance:** There should be a facility to have 24 hr immediate maintenance, without which critical e-governance projects should not be undertaken. It is also vital to maintain the confidence of the users. The maintenance work should be ideally outsourced since the current government structure does not allow for an internal IT maintenance team.

- **Updating of database:** There should also be a process for regular updating of data since almost all e-Government projects involve the storage and retrieval of huge amounts of data. An outdated database is worse or potentially more dangerous than no database at all.

- **Encourage local software companies to prepare themselves:** Local software companies should take steps to become more prepared for handling government IT projects, especially in areas of project management. The software companies may also need to cooperate among themselves to jointly handle large scale e-governement projects. The government should take steps to give public projects to software companies so that they gain the needed experience for larger projects.

- **Continuous Feedback:** Feedback is the process of gathering the inputs of others. In the e-governance scenario it is the perception of various stakeholders towards the performance of the project and achievement of various outcomes that carries weight. The feedback process actually starts at the conceptualization of the project or at the vision state itself. Initially, it will be comments / observations on documents / reports that are prepared. At a later stage it will be the actual experience on the e-governance application and at the final stage it will reflect citizen satisfaction/dissatisfaction. The feedback cycle once started has to be maintained throughout the project for success. The purpose of feedback is improvement. This whole process of improvement requires reviewing, communication, discussion, observations, brainstorming, listening, testing and more.
- From Administration’ Perspective
  - For effective implementation, the employee, who resists the change, needs psychological counseling. This counseling will clear their doubts and they may realize the importance of implementation of new technology.
  - The implementation of e-governance projects improves the interaction between government and citizens, and increases the administrative effectiveness and efficiency in the government operations.
  - Encourage local software companies for actively participation in development and implementation of e-governance application in minimal cost.
  - The interaction of researchers from the Industry and the Government sectors is also required to make constant improvement for the successful implementation of civic services through e-governance applications.
  - Conduct e-governance audit from the third party.
  - NGO’s or Clubs (Rotary, Lion’s etc.) participation in execution of the e-governance services in slum areas.

- From Employees’ Perspective
  - To make employee computer savvy, the government should make financial provision to purchase the computers and encourage them about use of it.
  - Thrust on awareness before Training and Increase number of training sessions
  - Proper training should be arranged for new employees.
  - e-governance projects are mostly developed in English language, majority of citizens do not understand English, so implementation of these projects in local languages is suggested.
  - Make employees aware of their moral responsibility towards citizens who are tax-payers and revenue generators.

- From Citizens’ Perspective
  - Government start the computer literacy program through the authorized training center by charging affordable fee as per their income group.
  - Organize citizen awareness programs on IT & e-governance applications
  - The Nagari Suvidha Kendra (Kiosks) should start the help desk to provide the information about the governance services.
Increase the number of Nagari Suvidha Kendra (Kiosks) to citizens depending upon the population.

A National ID scheme should be launched for efficient service.

The Nagari Suvidha Kendra (Kiosks) should be Unmanned and Touch screen should be provided so then citizens can avail the services on holidays and after Office hours.

Government should start the awareness programs for the citizens so that they can trust on the government services. The government can create awareness among the citizens using mass media viz. namely radio, television (documentary), newspapers, handouts on a war footing.

Government should provide accurate information and transactions under e-governance by displaying on flex, boards, charts or by using digital media.

There should be up gradation of Government website once in a week.

There should be forum or feedback system for the citizens on policies and government performance. Committees should be formed for the same who will keep a check on the feedback.

From Vendors’ Perspective

As a social activity local software companies can organize computer and internet literacy program among the citizens to create awareness about e-governance services and also actively participate in development and implementation of e-governance application in minimal cost.

During the implementation of e-governance modules, considering the level of the employees the training has to be carried out by designing user manuals accordingly.

Vendors can implement e-governance application in local language.

6.6 Future Scope

The goals and objectives of this study were decided and studied accordingly. Since in depth studies in these areas have long term socio-economic dimensions and repercussions, the scope of the investigations can be further expanded as follows:
- Due to limitation of time in obtaining data from general public the work has been restricted to geographical corners of Pune city only. A study covering all Municipal Corporations (Urban and Rural Local bodies) under each and every state of India would be more useful, informative and illuminating to the Government of India for a successful implementation of e-governance.

- Researcher has studied citizens and employees satisfaction with implementation of e-governance services; further research can be taken to study relationship between Vendors and Employees.

- Due to difficulties in getting authentic statistical data and certain confidential information from different authorities; researcher has included those e-governance services which have been successfully implemented by PMC. Further research is also possible with other services of government which they provide like election voter registration, property registration etc.

- There is a dearth of adequate published research on this subject of study. This is because of the frequent changes in IT. Due to these citizens demand more, on the latest technology used in these services. Also data is not available due to the pathetic response from employees and citizens in this regards, so hurdles in the research. As Government policies for providing the services changes time to time, to implement and incorporate them in the available e-governance system is not immediately possible. And so upgradation in the e-governance services is slow. So to achieve all these targets it requires urgent sponsored individual and institutional research which is wider and more detailed in various areas and aspects of e-governance.