CHAPTER 2

REVIEW OF LITERATURE

2.1. INTRODUCTION

In this chapter, literature survey is done about the Dynamic information access of the E-Governance application in cloud services. In the areas of rural, the biggest issue like technology awareness is more important in the application to avoid the infrastructure of non-availability. The issues are overcomes by fulfilling the needs of E-Governance services for the rural citizens by using the application in cloud environment. The e-Governance service offers the services with the generic and oriented process of government in the computing model. It’s not only for the specific area; in worldwide the application usage is providing more benefits. Relevant literature related to these works are condensed and given below:

2.2. CLOUD COMPUTING OF E-GOVERNMENT METHODS

Normally the service of E-government is flexible in on-demand high quality utility with less cost. But when ensuring the security and access control need to be improved for an efficient process. In searching mechanism the function of retrieving and finding is based on scoring and ranking of the keywords and as well as for preserving privacy. It ensures the semantic find through keyword extension. By TFIDF algorithm the searching process is extending the keyword search with ultimate support on semantic query. It makes for a flexible and fast process of searching mechanism [29].

In many enterprise storage services provides to users with less cost, scalable and trust access from anywhere at any time. The provider provides trust based on process between the cloud users. Encrypting of data is establishing the search to provide security. It explores the techniques based on CRSA and B-Tree in order to enhance the trust level [30].

By ranking score the multiple keywords search is implemented to have data retrieval from cloud storage. In this paper they propose a ranking method to avoid the undifferentiated results. The statistical measurement approach builds the index structure function to protect sensitive information. Based on the data score the keyword search is
performed without loss of privacy and leakage of information. Through the analysis encryption scheme is implemented by using the OPM function for multiple keyword search [31].

The Enhanced Multi keyword Top-k Search and Retrieval (EMTR) scheme is proposed in this paper to have high efficiency. In this scheme based on inverted indexing the document efficiency is estimated. By using ranking and scoring method the data is indexed in multi keyword search [32].

Searchable symmetric encryption (SSE) is proposed for encrypting the data for secure retrieve process. It addresses the issues of data privacy and proposed a log generating module based on the two-round searchable encryption (TRSE) scheme. It provides secure and efficient process with the leakage elimination [33].

In order to have an efficient security process without leakage trust management domain is implemented. The retrieval of cipher data is based on the ranking making, privacy and secure keyword search. The multi-keyword query scheme is proposed to address query results during the expansion of keyword dictionary. Based on matching the result set is available from the database [34].

The secure data access is utilized by the proposed secure ranked keyword search by matching the set of ordered data based on ranking. It enhances the matching criteria and deployed the data hosting services with privacy-preserving without losing privacy of keywords [35].

In E-Government application, the addressing of information flow is re-observed somewhat inadequate by the classical MAC not by the classical DAC [36]. In constructing the resource sharing is the main target in this paper with the integration and sharing of information. Integrated tactics are proposed based on the planning catalog system [37]. Also, the management mode is it reform in this application. The impact of services provided to the users or the public is pointed out and developed for efficient process and access of government information which is directly reaching the people [38].

The privacy-preserving based multi-keyword text search (MTS) scheme is implemented to have a similarity based addressing the issues. It builds the index based
similarity measure in terms of vector space and frequency model. The tree-based index structure is performed by the multi-dimensional (MD) algorithm in a linear manner with an efficient process. Secure index schemes are performed with the requirement of privacy [39]. For economic savings and flexibility, multi keyword search based on ranking is proposed to improve the information retrieval of encrypted cloud data [40].

Unique storage access is addressed to the path or location for quick access of XML files. The storage and retrieval of XML files indexed the data for utilization of query search [56]. In AHP application, the decision policy for evaluating information is performed based on the information security and its components. The process of decision making is done by analysis the methodology. As per the security and management the e-government information systems provides an availability of secure information to the users or public [41].

E-Governance system is one of the applications in cloud computing which is beneficial for all educational institutes, enterprise and industries, improving the quality of information shared and efficient learning with minimum cost. In E-Governance model, the services are available in urban and rural areas. In rural areas non-availability of infrastructure for the application is the biggest problem like technology awareness. The issues are overcomes by fulfilling the needs of E-Governance services for the rural citizens by using the application in cloud environment. The e-Governance service offers the services with the generic and oriented process of government in the computing model. It’s not only for the specific area; in worldwide the application usage is providing more benefits [42, 43].

As a long term service, secure accesses of storage are provided in cloud services [38], [44]. Through encryption and decryption process, the storage and retrieval system are secured. The proxy re-encryption scheme is analyzed to encode the data for secure process. This system suggests a parameter to provide flexibility in cloud storage service and reduces the cost of the resource requirement. Untrusted server is detected by using the data integrity checking and data correctness. In the research work [45], the data partitioning is discussed. The data will be split into many parts using the splitting technique for easy storage of data in cloud. For flexible distributed storage in E-
Governance application in cloud server, pre-computation process and integrity mechanism is discussed in [46]. To detect the data correctness and error localization in the application the integrity checking is implemented. It is used to achieve the integrity of dependable storage services, availability, flexibility and the quality of the data. The scheme shall be resilient against the threat and the attack in cloud services [47, 48].

In cloud storage, the data integrity is analyzed in the research works [49]. Data integrity is supported by dynamic data operation and public auditability to have evaluation of the quality in services and independent perspective with the third party auditor. Multiple auditing tasks are devised here to increase the efficiency of storage model. A secure storage system consists of public auditing and data integrity checking. For efficient access of multiple users simultaneously TPA is implemented for a fast performance, the work conducted on Amazon EC2 were discussed in [50]. In E-Governance application in cloud has forwarded various Hadoop components and specifies it for access by the hardware commodity or thin clients. It initiated the layer on domain for the expert system [51, 52].

Public auditing is established in the cloud data storage to help cloud economy. When needed of accessing the risk of outsourced data the trusted entity and the capabilities data owners do not group as an external audit party. For reality of cloud storage the public auditable secure cloud storage services is analyzed and evaluated in [53].

In the work [54], author discussed about the encryption and access control of outsourced data in cloud. By HASBE scheme a flexible access services and the secure data storage is handled in cloud computing. It provides the performance, security, complexity, scalability and flexible access of the outsourced data through encryption and access control with a hierarchical structure of users. Cryptography scheme is discussed in [55, 56]; this scheme is used to provide an efficient secure storage using public key. RSA algorithm is used here for the secure process of the secret documents. It provides more security that is robust against the threats and attacks over the public network. RSA algorithm is implemented for the speed transmission and for communication between
networks. It considered the key generated for the secure process and in all networks gateway the database are detected for the storage of data’s.

For speeding up of RSA decryption for retrieval of data from cloud and to improve the performance the algorithm is implemented with the load transferring and multi prime techniques are analyzed in the research works. The author outlines the security of the data storage in cloud and the privacy of the system [50]. The critical security issues are listed for the secure process and to find the solution for it. In the public cloud environment the secure access is the major issue; to overcome this some of the security algorithm is considered [57].

In paper [58], author discussed about the lossless compression technique that is used for compressing and storing the data in cloud. Huffman algorithm has been achieving the output and it consist the hybrid technique of the code components. Huffman model requires $O(\sigma \log n)$ bits as a size of text. The encoding scheme was designed for the worst case scenario, to calculate the time and the performance of the compression and decompression of the data. In this case it requires $\sigma \log \log n + O(\sigma + \log 2n)$ bits and encoding and decoding is supported in $O(\log \log n)$ time. This scheme consists of the model used to analysis the time taken for compression / decompression as discussed in [59].

The perceptions for the issues in security and solution for related issues are essential to provide ensure access in hybrid cloud computing of E-Governance application [60]. In Information and Communication Technology (ICT) world the model provides the process speed and more information by cloud computing. The main factors are on demand self-service, pay per use, rapid elasticity etc. A public cloud service provides the management and control by the vendors like Canonical / Eucalyptus, Amazon.com, Google.com, Microsoft, Oracle/Sun etc. In Private cloud services, the overall controls and loaded process of software are provided by VMware, Microsoft, Eucalyptus, Citrix etc. Governments are adapted or planning to have efficiency improvement and cost reduction of services and infrastructure. Also, several security issues are considering in the sector during the adaptation speed [61, 62].
In E-Government application, the addressing of information flow is re-observed somewhat inadequate by the classical MAC not by the classical DAC [63]. In constructing the resource sharing is the main target in this paper with the integration and sharing of information. Integrated tactics are proposed based on the planning catalog system [64]. Also, the management mode is it reform in this application. The impact of services provided to the users or the public is pointed out and developed for efficient process and access of government information which is directly reaching the people [65].

Government agencies are in various stages of development and are looking for ways to improve their service provisioning, and using e-Governance service they are in position to offer the same but at the same time they are looking for ways to reduce their costs due to severe budget cuts. It is often argued that there is a need for restructuring structures and processes to improve efficiency and effectiveness [66]. One way of restructuring the IT function is by embracing the software delivery model of cloud computing named Software as a Service (SaaS). This can be tested as a new type of sourcing model to offer e-Governance services to maximum users in less cost and minimum infrastructure requirements thus the power of cloud computing can be utilized to offer that services using SaaS model over communication networks to end users [67, 68]. However, many governments have already initiated the use of cloud models in the aspects of computerization of certain e-Governance services but the need of the time is to have an integrated approach to all types of government services under the cloud framework of more customizable, distributed and scalable system.

The use of SaaS model of cloud computing might provide the opportunity to lesser cost, but also supply the applications of software to the end-users over the web, providing a much more flexible experience in terms of time and location of access [69]. Although the current literature focuses primarily on business-oriented SaaS services [70], within the public sector there are some notable and visible examples of SaaS as well. This includes the use of office applications provided by the SaaS model and the use of services to the citizens. In the latter situation, the services provided by a SaaS provider are integrated in the website of the agencies responsible for providing the services and the data is communicated to the agency to enable the processing. In both examples, the
governmental agencies do not have to develop or maintain the services in-house and rely on the SaaS provider [71].

This paper is structured as follows. In the next section, the background of SaaS and related components such as grid computing, cloud computing are discussed. Next, the research approach and proposed frame work is presented, followed by a discussion of the findings. Finally, conclusions are drawn.

Whereas in the past software was bought and locally installed and maintained, the cloud models resemble a fundamental new way of thinking in which software is rented and remotely provided. SaaS type of cloud applications has existed almost for a decade and has been advocated for a faster implementation of software changes and focus on the demand-side [72].

In the SaaS model, no large upfront investments are needed, but the variable costs can be substantially higher. Payment might be dependent on elements such as the number of users and the expected lifetime of users [73]. SaaS providers will often not only provide one service of a certain software suite, but also might typically provide a bundle of software services, although models are possible in which SaaS services are provided by the company who has developed the software. By delivering a set of software as services, the idea is that many of the present limitations constraining its use, deployment and evolution can be overcome. The shift in offering services also has implications for the SaaS providers’ revenue models. Traditionally, the customer buys a license to use an application and installs it on their owned or controlled hardware.

Over time, new updates can be installed, including security patches and other control and update activities [74]. By buying a license, the customer gets unlimited usage of the software. Per user or preinstalled system, additional licenses might be necessary. In contrast, in the SaaS models the user does not buy a lifetime license. The user pays a certain amount for the software running on a third-party server and loses access when he ceases payment.

The Cloud provides a powerful and cost effective platform to develop new applications and new ways to deliver e-Governance services and other information to communities [75]. In Cloud based model various levels of government can take
advantage of the power of open data-placing information and services directly into the hands of citizens. Government Agencies are looking for ways to take advantage of cloud computing, while maintaining data security and protection, and new initiatives take many forms. Here are a few examples of how agencies are getting started [76].

Chandwick and May [77] in the year 2003 proposed an eGovernance framework regarding the interaction between Government and its citizens. They had focused on the managerial, consultative and participative models of eGovernance. In the year 2005, Grant and Chau’s [78] review report proposed the strong integration between IT and managerial aspect of e-Governance in a sophisticated manner in reflecting the citizen-centric perspective of e-Governance.


V. Cardellini, E. Casalicchio, and M. Colajanni [85] consider different categories of web applications, and evaluate how static, dynamic and secure web service request affects the performance and quality of service of distributed web sites. But the entire above discussed web services are either very much server centric or device centric in nature. A properly distributed cloud computing web service that fit effectively in eGovernance is merely available.

Mukherjee and Sahoo [86] proposed a new effective framework of e-Governance based on cloud computing concept, which would be intelligent as well as accessible by
all. It is observed that while some places have plenty of resources, other places suffer from the lack of it. This discrimination can be wiped out by a proper management and strategy adopted by the Governments of different countries in the form of a properly implemented and managed e-Governance. Rastogi, (2010) [87], by investigating problems with the present architecture of e-government, proposed a model based framework to implement cloud computing in e-governance. The proposed model was based on the prototyping model of the software engineering. From traditional computing to cloud computing is the continuous improvement process till attaining objectives. The model comprises four steps, learning, organizational assessment, cloud prototype, cloud assessment and cloud rollout strategy.

Chanchary and Islam, (2011) [88], by considering e-governance of Saudi Arabia as a case study, proposed a modification in the existing model of e-governance to improve its features and efficiency. Based on the current e-government system, a model was presented to efficiently distribute the workload and make the system more users friendly. This model was built on cloud computing and a rational inference agent. In this model, the existing e-government system outsources critical data and process to the public cloud, while keeping total control centrally. In the proposed system, a toolkit in the software layer of the existing e-government system is deployed so that can act like a rational inference agent to facilitate users by providing them decisions based on predefined facts, rules, and conditions on various problem areas according to their queries.

Mukherjee and Sahoo, (2012) [89] proposed a new framework of e-governance based on cloud computing paradigm, which could be intelligent as well as accessible by all. The proposed e-governance framework has three layers. Firstly, the knowledge base layer, which comprises of a series of rules and facts about the particular problem area from which the system draws its expertise. Secondly, the inference engine layer, which scans facts and rules, and provides answers to the queries given to it by the user. Finally, the user interface layer, which includes the channels by which the user communicates with the system using human understandable languages.
Khan et al., (2011) [90] analyzed the potential of cloud computing for the implementation of e-government in general and particularly, its leapfrogging potential for developing countries. They proposed cloud environment for e-government in Pakistan for supply and demand side. Researchers in this study suggested establishing a government private cloud for critical and sensitive government information. However, for general services, where government has less control over how the services are provided, the public cloud model was proposed. On the demand side, they suggested that the Universal Service Fund can be utilized to exploit the potential advantages of cloud computing for addressing the digital divide problem within the country.

Liang, (2012) [91], by pointing out insufficiencies of current e-government and key benefits of cloud computing, put forward architecture, deployment and service model selection strategies. The architecture of cloud government comprises of five layers; the infrastructure layer (Physical resources and Kernel software), the application platform layer, the application layer, the management layer and the client layer. It compared (in terms of security and cost) between four models, government private cloud, community cloud, public service cloud and hybrid cloud. Then, he identified the target departments for each model. In addition, by analysis the characteristics of the service models of cloud computing (IaaS, PaaS, and SaaS), the appropriate target businesses were identified.

Ahmad and Hasibuan, (2012) [92] proposed a cloud based e-government architecture, which consists of six layers: infrastructure, virtualization, management, user, access, service and layers. This architecture enables greater information and resource sharing, and promotes more standardization in the government’s resources. In addition, for deployment model, the hybrid cloud model was recommended based on the special characteristics of e-government in Indonesia. The initial results pointed out that implementing cloud based e-government architecture can significantly reduce costs of ICT investment. For Indonesia, it was predicted to enable the government to make an investment efficiency of 45.8%. Further, researchers compared Net Present Value (NPV) between the cloud and non-cloud and fount that the cloud is more profitable.

Das et al., (2011) [93] described how to adopt cloud computing in e-government applications to reduce cost of infrastructure, increase security and scalability as well as
accelerate implementation. Researchers in this study proposed a model for e-revenue system, which helps G2G, G2E, G2B and G2C applications to benefit from the available services on the cloud. In this model, revenue inspector, higher officers revenue collector, collectors, Revenue Divisional Commissioner (RDC) and public can access the data in different formats. The revenue inspectors enter the data using own interface in a web based system. So, it is easy for the revenue inspector to access the interface anywhere from the locations. Then, the revenue collector checks the data entered by the revenue inspectors for further computations and sends it to the district office for the collector approval. The district data centre on the cloud collects the data from different revenue collector of the district for necessary processing. The data, in form of reports, are sent to the RDC for review purposes and for governmental activities as well as for future plans and developments.

Khare, Raghav & Sharma, (2012) [94] discussed the similarities between the traditional government processes and services, and the use of cloud computing services. Then, they analyzed the main issues in implementing service oriented grids for governmental organization. They proposed a model based framework to implement cloud computing for rural area e-governance services. In this model, simple cloud architecture is built to be highly flexible and modular, and can integrate with other systems. It offers the three layers of abstraction, so e-governance services can be offered using cloud computing layers, IaaS, PaaS and Saas.

Kurdi et al., (2011) [95] developed a comprehensive framework, and related guidelines and tools to support e-government information system readiness, with a specific focus on moving to the cloud computing. The proposed framework aims at providing a method to guide the readiness assessment of e-government to move to the cloud. It covers four dimensions; technological, organizational, people and environmental. The technological block includes ICT infrastructure, which includes hardware, software, network infrastructure, security infrastructure required to exchange data and IS infrastructure, information quality, system quality, and service quality. The organizational block, which comprises organization (Structure, Culture, Size, Strategy and Vision), strategy and planning (Leadership Support, IS Strategy, Funding/Budget, BPR, Legislations, and Data Sharing), and human resources (Training, Staff Motivation).
The people/stakeholders block includes citizens, business, and government. Finally, the environment and society block, which comprises demographic characteristics, country profile, social/cultural, political, and economic. The output helps authorities to understand the key issues that affect the implementation of e-government systems as well as assessing the readiness to migrate to cloud computing.

Naser et al., (2012) [96] proposed a new model for e-government development, called ‘Before Cloud E-government Model’, which satisfies the migration to cloud computing. The model composed of five stages; assessment stage, re-construct the applications of services according to Service Oriented Architecture (SOA), classification of services, aggregation and legal contract. In the assessment stage the e-government is assessed according to specific scientific basis to determine the current state of e-government by suggesting several domains and make some indicators for every domain. In the next stage, the applications of services are reconstructed according to Service Oriented Architecture SOA. So, the application is constructed as independent units and services. Then, in the classification stage, the services are classified into a lot of main classes; static services, dynamic services, inquiry services, interactive services, procedural services, costly services, cheap services, secret (privacy) services, and less secret services. Next, by aggregating these services according to the functional purposes, and re-constructing the applications with SOA, the redundancy can be reduced. So, we can get one united functional SOA application with all optimization services, and distribute this application to local governments with little customizations according to the privacy and requirements of local governments. Finally, in the legal contract stage, the law texts should carefully be set. This law demonstrates the ownership of information, and puts specific penalty to the leak of any governmental transaction.

H. Singh, (2012) [97] proposed a technology transfer model to moving e-governance from traditional to cloud computing. The proposed model was built on prototyping model. The model explains step by step the migration process of e-governance from present traditional computing to cloud computing. It includes six steps; learning, requirement specifications, cloud prototype development, data and application migration, cloud rollout, and cloud advancement. This is a continuing process of improvement starting from an initial prototype until fulfilling requirements.
Naseem, (2012) [98] analyzed cloud computing and examined its application in the context of e-government. He suggested cloud computing as an ideal solution to e-government challenges. He proposed a framework of e-governance based on cloud computing. It forwards the different components of Hadoop and then specified the role of each component. Hadoop is at the top which is being accessed by thin clients or commodity hardware. Further, commodity hardware consists of active commodity hardware and idle commodity hardware. The idle commodity hardware plays the role of volunteer node. An intelligent layer that helps the Hadoop to behave as an expert system on a specific domain is also initiated.

Song, Shin & Kim, (2013) [99] presented a framework to efficiently deploy government service through the cloud in Korea. The framework includes three main phases; policy, technology and service introduction system. It identifies a procedure of developing an introduction system by considering policy and technology factors. These factors should be accounted when identifying the service and presenting the development guidelines for each area. The service introduction system is configured in such a way that cloud services can be classified from various viewpoints, and the procedures and guidelines needed for the implementation of each service is identified. Chandra and Bhadoria, (2012) [100] investigated the role of cloud computing in the effective implementation of National e-Governance Plan (NeGP) of government in India. They stated that the Indian population database is very huge and grows rapidly and it needs a robust, dynamic and scalable computing environment. Therefore, they suggested that the national database can be built using the cloud computing model. Then, the Mission Mode Projects (MMP) of the NeGP at different levels can connect to the database and provide services using different community clouds.

P. Wang and Hua, (2011) [101] constructed a model for government information value-added exploitation using cloud computing concepts. The model components include user group, organizer (cloud service provider and internet service provider) and participator (solution supplier, application and content supplier, software and hardware, terminal provider, advertisement agent). The user group is in the most inner ring and forms the core of this model. The user group includes individual consumer and enterprise providing customized information products and services. The organizers provide the
cloud computing services after identifying the requirements of the user group. The participators are essential to join main bodies in the model of information value-added development. The solution provider offers personalized solution for users by integrating resources. Application and content provider develops applications and contents personalized requirements from customers. Software and hardware equipment provider is an indispensable participator in the IT area. The advertising agency has a very important role, especially for the user of the free application for personal service. Cloud computing service provider in this model identifies users’ requirements and integrates resources and functions. The participator based on analyzing and studying user group, builds the platform of the integration and utilization of resources. This model fully mobilizes other participators through integrating platform and provides perfect information and value-added services to users on the basis of users’ requirements.

Nir Kshetri, (2010) [102] evaluated the attractiveness of the cloud computing with reference to developing countries' capabilities, requirements and competitive positions. He presented a framework for exploiting cloud computing benefits in line with developing world needs. The proposed framework explains contexts, mechanisms and processes associated with the development of the cloud industry in the developing world in terms of three interconnected flows; value, performances and determinants. It represents how these three components are related. Impacts of the cloud reflect the ‘value’ created by the cloud, which are the ultimate objectives that policy makers want to accomplish. Cloud related performances are actions of various economic factors that are instrumental in delivering the impacts of the cloud. Determinants are key factors that affect cloud related performances.

Hana, (2013) [103] presented a model to enable a national governmental cloud computing provision in Egypt. She proposed a hybrid cloud computing model to be used nationwide. The proposed model aims to decrease cloud computing risks without ignoring any of its current practices. The hybrid model consists of three types of cloud computing, which are Intra Cloud computing, Extra-Cloud computing and Inter-Cloud computing. IntraCloud computing is a private cloud which is dedicated to a single national entity cluster. Members of that cluster are the only legitimate users. It provides IaaS, PaaS and SaaS services to a specific cluster with a vast focus on back-office
functionality and services. Intra Cloud computing model enclose all efforts towards a unified automated system available by national agencies in different geographic areas.

Mohammed, F., & Ibrahim, O., (2013) [104] investigated the impact of cloud computing on e-government readiness indexes. By analysing the benefits and challenges of cloud computing and thier impact on each indicator, they proposed a framework that refines e-government index indicators according to the cloud computing characteristics. The framework reflects the effect of cloud computing on e-government readiness indices. It shows that by cloud computing indicators like, ICT infrastructure and human capital will get less weight, while indicators such as, connectivity and regulations will acquire more weight.

Li, Zhang, Wang, and Feng, (2013) [105], by analyzing the current situation of China’s e-government and existing cloud computing technologies, discussed the importance of cloud computing to e-government. Further, by combining with the practical issues of implementing cloud e-government, they analyzed existing factors of e-government and proposed an influence factor model of implementing e-government cloud in China. Based on Gil-Garcia model, which identifies 5 classes of critical factors for e-government implementation, it divided influence factors of implementing e-government into five classes and 22 indicators.

Decman and Vintar, (2013) [106], by reviewing the literature in the area of digital preservation and analysing the current state of this subject, investigated a three-level digital preservation framework with more focus on the public sector. They linked this framework with the cloud computing concept. They aimed to suggest a solution for long-term digital preservation for the public administration sector, in the form of a centralized intermediate repository based on the concept of cloud computing. It mapped the factors of digital preservation to the three levels of digital preservation. They showed that using the appropriate steps, supported by suitable strategies and policies, enable the public administration sector to take advantage of cloud computing to solve the demanding and critical problem of digital preservation. They suggested a new solution for short- and long-term digital preservation for the public sector with the idea of a centralized digital preservation repository in the form of a community cloud which is available to all public
administration organizations. It links the ideas of cloud computing with the concept of digital preservation levels (defined by Thibodeau (2002) [107]) presenting new potential for efficient digital preservation. The centralized repository would be built and managed by the government or an appointed public organization within the government cloud. Each institution could therefore connect its own Electronic Document and Records Management System (EDRMS) to this centralized repository in order to transfer documents in both directions and use the services provided by the cloud or even use the central solution as a primary EDRMS.

Shin, (2013) [108] examined the adoption of cloud computing services in government agencies by focusing on the key characteristics that affect behavioral intent. He explored the factors influencing user perception of cloud computing to theorize its acceptance model. Shin, (2013) applied the theory of reasoned action (TRA) and modifies the technology acceptance model (TAM) to propose a new model that can be used to examine the acceptance of cloud computing. The model is built upon the existing TAM by integrating specific influencing factors such as availability, access, security, and reliability. These factors are driven by underlying some perceived beliefs such as benefits, availability, access, and security as enhancing constructs to predict user acceptance of cloud computing technologies. The research model was empirically verified by investigating the perception of users working in public institutions. Results showed that user intention and behavior were influenced by the perceived features of cloud services.

Trivedi, (2013) [109] proposed a model for cloud computing adoption in governments and large enterprises. The proposed cloud computing adoption model helps organizations understand what capabilities they need to develop, when they want to adopt cloud computing and how much time it take to go to the cloud. It applied TOE framework to identify technological, organizational and environmental factors for cloud computing adoption by governments and large enterprises. The factors were identified from analyzing of case studies and reviewing the literature on TOE framework. The case studies highlight salient aspects of cloud adoption. They point to key elements of readiness, discernible patterns, characteristics of organizations at different stages of adoption and also indicative timelines for a full scale move to the cloud.
Taher, Haque, Nquyen and Van den Heuvel, (2011) [110] developed a cloud based platform that allows non IT experts to customize reusable public services by parameterizing them. They called the platform T-Shaped platform. The T-Shaped is grounded on the concept of reusability, which is a methodology for customizing reusable processes, based on the cloud computing paradigm. The T-Shaped platform consists of two different views; horizontal and vertical. The horizontal view proposes that public service administrators can reduce the transparent cost by exploiting a number of generic reusable services in the public service domain along with a reference guideline for customizing these services. The connector of T-Shaped platform connects a provider to a public service repository where providers can query and find reusable services. For the vertical view, the users can customize the generic public services as they want by using the reference guideline. The reference guideline serves as the guiding principle for public administrators or service providers, accommodating the customization of generic services without the need of having intense knowledge on processes as well as its related technologies. This cloud based solution facilitates migrating the excessive complexity in in-house service development infrastructure. This encourages much wider adoption of IT within public service domain, promotes the development of innovative public services, and reduces the time to deliver services to customer (e.g., citizen). In addition, the proposed platform includes guideline that will enable the public service organizations to develop and deliver services without requiring experts. This implies that public service organizations can reduce the service development cost significantly since they will be able to lower their budget on experts.

V. J. Singh and Chandel, (2014) [111] investigated the benefits of using latest technologies, such as reduce the operating costs, provide greater reliability, transparency and sustainability. They proposed a cloud framework for the Indian National eGovernance Plan (NeGP) to ensure interoperability functionality among different states. Mainly, the proposed cloud framework integrates the various departments’ operations among the different states under the Indian National e-Governance Plan. The state data centers in the various states can be integrated together logically over the cloud so that the concerned authorities may be provided with instant access to the desired information without any delays and barriers to communication across the states. This provides fast
and efficient resolution to the governance related matters without causing inconvenience to the consumer. By using cloud based technology, the state Wide Area Networks (WAN) for all the states can be integrated together at a national level so that the consumers can get uninterrupted access to the information they seek instantly.

2.3. SUMMARY

This chapter discusses the E-Governance services in the cloud environment. Integrity checking and computation process are ensuring dynamic data operation and services. The limitation with existing mechanism has performed the dynamic processing with more time and cost in cloud services for secure storage of data. The proposed work overcomes such limitations with high performance, reduced cost and limited data storage space in cloud. It also ensures resilience against threats, attacks and misbehaving server. It also helps in reducing the time and cost consumed making an efficient and secure service in E-Governance environment. The proposed work discussed in chapter 5.