



Analysis and Design of Cloud Computing for E-government in Yemen

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ABSTRACT

Recently, Governments seeking to develop the provision of services to citizens and companies associated with these its citizens. By development of technologies and means of communication, governments also tended to use e-government to improve and facilitate the provision of its services. Cloud computing has emerged recently as an influential and effective in providing and facilitating the provision of services via the Internet. where it provides how to submit everything to you as a service wherever you are at any time you need.

The aim of this research is to analysis the impact of using of cloud computing in e-government and infrastructure required for the use of cloud computing in e-government in Yemen. It also Explains cloud computing models, security, and risks which could be faced by the e-government and ways how to develop and improve cloud computing. Type of this research is descriptive and analytical approach (Quantitative Method) was adopted as a scientific approach commensurate with the nature of this research to identify the best approaches of requiring cloud computing in e-government.

Keywords: *Cloud Computing, e-government; Information Technology, Analysis and Design e-government, e-government of Yemen.*

1. INTRODUCTION

Nowadays, the emergence of modern information and communication technologies has led to major developments in public life, both in terms of individuals' expectations and their desire to obtain more convenient services, or at the level of institutions and bodies that provide them. Information technology has necessitated the development of government agencies in line with Global developments in the use of technical systems in the development of service management and the state-owned technology is synonymous with the rise or backwardness of the state.

Recently, emerged the idea of "cloud" or "cloud services", which means the total of services that are made through hardware and software connected to servers carry data in virtual cloud ensures contact with on a permanent basis

without interruption, by different devices (PC, tablet, smartphones, etc.) after putting a special code to open the lock and thus the network is accessible from anywhere and at any time.

This research aims to find out the possibility of applying cloud computing in e-government, and will focus on two main variables cloud computing and e-government.

2. THEORETICAL OF E-GOVERNMENT AND CLOUD COMPUTING

2.1 Theoretical Review of E-Government

The e-government represents a new way to provide services to citizens in order to raise the efficiency of government performance and reduce the routine procedures suffered by citizens and provide information and data easily to benefit from the enormous digital revolution, and therefore the various definitions used for e-government, The bureaucracy and the multiplicity and complexity of the procedures to an electronic manner through which it can provide the service to citizens in an easy and safe way through modern means, which saves a lot of effort and money to the citizen and the government. Thus, reducing the cost of service delivery and increasing its quality. In addition to providing all information needs of citizens about services and laws and regulations and legislation through the Internet [1, 2].

The term e-government is defined by some as the use of various technological means of communication in the execution of administrative transactions, the provision of attachment services and communication with citizens with greater democracy [3, 4]. There are seven guiding principles about the nature of e-government, and are summarized as follows: Ease of use, Availability of all, Privacy and security, Modernization and a focus on results, Cooperation and participation, Low cost and Constant change [5].

E-government goals are a means to improve government performance to become more efficient. Can clarify the most important objectives that the eGovernment seeks to achieve the following: Provide services to citizens in a safe, easy, fast and low cost, Provide information on all government laws and regulations to citizens, Increase the time available to perform the service so that the service can be obtained at any time and from anywhere throughout the day without meeting specific official hours, Provide an investment climate conducive to reducing the obstacles and procedures that prevent attracting investors and providing an attraction for companies working in the field of technology, Raise efficiency of government performance and prepare for integration into the global system to keep pace with modern information systems [6, 7]. Can summarize e-government services in the following points: E-services from business organizations to the government (B2G), E-government services to citizens (G2C), E-services between government departments (G2G) and E-government services to business organizations (G2B) [8]. For e-Government projects to achieve the desired objectives and to provide a service of high quality, many factors should be available: Availability of an appropriate infrastructure, the existence of appropriate regulations and legislation, Reviewing the way in which government transactions proceed, provide adequate privacy and information security and Capacity building and human capacity [9, 19].

2.2 Theoretical Review of Cloud Computing

Cloud computing has been defined as "a technology that relies on the transfer of processing and computer storage space to the so-called cloud, a data center accessed by the network, thus transforming information technology programs from products to services, which contributes to the removal of maintenance problems and systems development of the companies used, and therefore the focus of the efforts of beneficiaries on the use of these services only [10].

Cloud computing can also be a generic concept that includes software as a service and other modern technology trends that share the idea of relying on the Internet to meet the computing needs of users [18].

The concept of cloud computing has revolutionized the ideas and applications of IT services, especially about the infrastructure solutions on which enterprises rely on facilitating their operations. Many large and small enterprises have found their way into this new system. A recent study by IDC, Cloud computing will become the main technology in the future on which the entire world depends [15].

There are three main different styles of cloud computing could be surmise as following: - IaaS (Infrastructure as a Service): Small and medium enterprises can manage the

technical infrastructure and software through the Internet in an easy and secure way without the need to have expensive data centers. - SaaS- (Software as a Service): Applications as a service "model where applications are available to the user, but the device itself is available as a service, including the operating system and desktop, and can be accessed from anywhere. - PaaS-(Platform as a Service): The "computing platform" is presented as a service and the same programming tool is hosted on the cloud and accessible through the browser [3, 12, 22].

They can then deploy these applications without the need for systems and network management skills. In addition to these service models, four deployments have been added Applications cloud: Public cloud: It is a commercial service provided by the service provider to multiple customers and is in a place far from the client and is a means of saving costs and time and effort. Private cloud: This type of fastener is usually within the facility so that it can be accessed through the local network and from the Internet and services are provided to the beneficiaries automatically. A hosting company can also host it. In all cases, the entity can monitor and control the components of the infrastructure. Community cloud: Is the result of collective cooperation between a group of enterprises with the same interests that the infrastructure is shared among them for achieving common goals such as information security or regulatory compliance or high performance and can be managed internally or externally from a third party. Hybrid cloud: It combines the characteristics of the private cloud and the general. An enterprise can have a private cloud through which it provides some services to beneficiaries, while it uses cloud solutions to provide other services. Some companies get a private cloud environment within the general cloud of a large commercial provider such as Amazon and then sell the services to other customers, and this also falls within the concept of hybrid cloud [4, 10, 20].

There are still many challenges, which are currently being addressed by researchers and practitioners on the ground. These challenges are summarized as follow: the performance, Security and privacy, Control, Data transfer costs and Accuracy and reliability [11, 16].

The information and communication technology is an important key to e-government adoption. For example, a computer network that covers a area. As information and communication technologies and key elements in infrastructure, it is necessary to support the implementation of e-government, in the sense of providing various types of devices and providing information exchange between devices [17]. In addition, servers play an important role in e-government, which requires powerful computers, and high specifications that can be implemented and host applications that allow connection request services by sending responses. These servers work to improve communication between government and

information transfer through the provision of high-speed capabilities for access to government data and services within the organization and among themselves as services on Internet and procurement services [13].

Clouds computing are used to enhance interoperability between various government agencies and scalability, reduce redundancy, tracking monitoring the effectiveness of government schemes. And it will generate general computing between central and state government resources to reduce costs by using existing infrastructure. Using a model payment service to use, small and medium enterprises have benefited from the cloud. Since the government needs a large infrastructure, it is important that governments use cloud computing overall [21].

3. RESEARCH METHODOLOGY

3.1 Type of Research

Type of this study is mixed method, depending on surveys and interviews for collecting data. Research on the descriptive and analytical approach (Quantitative Method) was adopted as a scientific approach commensurate with the nature of this research, and was back on the results of research, literature, books, Journal and other available documentation related to the topic of the paper. In addition to qualitative method using interviews and investigation. In this research, an attempt made to broad base the research and uses a multi-pronged approach. The study derives its insights from a combination of secondary data and systems modelling.

3.2 Population and Sample

Population of this research are the employees of the public sector in Yemen government in three departments as shown in the table1 below. The total number of employees at these departments was 207 employees. Sample of this study was selected of entire population as following: Sample to be representative of the population is 136 managers and employees of technology (IT & ICT) department in public sector in Yemen. Sampling technique used in this research is random sampling of every department and strata sampling based on the selection of departments. Proportion of every department was based on the number of every department employee. One-way to determine the amount of sample that meets the matter, it was formulated by Slovin (Steph Ellen, e-How Blog, 2010; with reference Principles and Methods of Research; Ariola et al. (Eds.), 2006) as follows: Principles and Methods of Research; Ariola et al. (Eds.), 2006) as follows.

$$n = N / (1 + Ne^2) \quad \text{where: } n = \text{Number of Samples}$$

$N = \text{Total Population}$

$e = \text{Error Tolerance (tolerance error occurrence; level of significance; to social and educational typically 0.05) } \rightarrow (\wedge 2 = \text{squared}).$

$$N = 207 \quad e = .05 \quad n = 270 / (1 + 270 * .052) = 136$$

Table 1: Sample Selection of Public Sector

NO	Public Sector Department Name	Sample	Sample
1.	Ministry of Communications and Information Technology (IT Department)	94	61
2.	IT Depart. At Post Office Sana'a	41	24
3.	Public Telecommunications Corporation	72	51
Total	Three Public Sector Departments	207	136

Source: Primary data, 2017

4. FINDINGS AND DISCUSSION

4.1 Background of E-Government and Cloud Computing in Yemen

Internet started in Yemen in 1996 through the internet provider called Yemen Net and the Public Telecommunications Corporation. Information and telecommunication technology sectors in Yemen grew from 2000 to 2005 and the investment in infrastructure development of technology and communication systems. There was high demand for faster internet connection in Yemen, which prompted two ISPs (Telemen and YemenNet) to introduce ADSL and ISDNN digital subscriber line links.

Telecommunication in Yemen still suffers of many problems related to the economic and political instability for many years. Internet penetration in Yemen is among the lowest in the Arab region. The e-government project was launched in 2000 to give citizens the ability to access Web services, finalize G2C transactions and the number of Internet users increased significantly but the quality of speed is still not up to the required level.

4.2 Description of Sample

Sample of this research was 136 employees of three different department of public sector in Yemen. Demographic data of sample included gender, age, experience and qualifications of employees in the departments of public sector. Table2 shows these demographics.

Table 2: Demographic of Sample

Demographic	Number	Percent
Gender	N = 136	100 %
Female	F = 27	20 %
Male	M = 109	80 %
Age	N = 136	100 %
18 – 25	42 employees	31 %
26 – 35	57 employees	42 %
36 – 45	32 employees	23 %
46 or above	5 employees	4 %
Experience	N = 136	100 %
Less 5 years	37 employees	27 %
5 – 10	76 employees	56 %
up 10 years	23 employees	17 %
Qualifications	N = 136	100 %
Diploma	12 employees	9 %
BS	54 employees	40 %
MS	9 employees	6 %
Other degree	61 employees	45 %

Source: Primary data, 2017

Table 3: Reality of e-government in Yemen

Question	NA		FA		AM		A		SA		Total Sample	Mean
	F	%	F	%	F	%	F	%	F	%		
Q1	34	25	53	39	7	5.1	42	30.9	-	-	136	2.41
Q2	27	19.9	43	31.6	28	20.6	38	27.9	-	-	136	2.56
Q3	16	11.8	36	26.5	33	24.3	40	29.4	11	8.1	136	2.95
Q4	7	5.1	33	24.3	69	50.7	20	14.7	7	5.1	136	2.90
Q5	-	-	54	39.7	61	44.9	13	9.6	8	5.9	136	2.81
Q6	-	-	59	43.4	77	56.6	-	-	-	-	136	2.56
Q7	33	24.3	64	47.1	32	23.5	7	5.1	-	-	136	2.09
Q8	-	-	59	43.4	65	47.8	12	8.8	-	-	136	2.65
Q9	-	-	15	11	24	17.6	66	48.5	31	22	136	3.83
Q10	11	8.1	45	33.1	60	44.1	16	11.8	4	2.9	136	2.68
Total	128	9.4	461	33.9	456	33.5	254	18.7	61	4.5		2.74

Source: Primary data, 2017

(NA= not available, FA= few available, AM= Available moderately, A= available, SA= significant available)

4.3 Reality of e-government in Yemen

This part includes 10 questions described the reality of e-government in Yemen. Likert used for these questions were 1-5 where (1) not available, (2) few agree available, (3) Available moderately, (4) available and (5) significant available. Table 3 below shows the frequencies and percentage of 10 items that were used to examine the reality of e-government in Yemen.

Mean of all indicators (items) above 2 out of 5 with Total Mean 2.74 that means there is moderate perception of employees in e-government and reflecting the employee’s perspectives. Contributing of participant’s opinions was

1.1 Descriptive Statistics

Descriptive statistical analysis was aimed to describe the data briefly used for each variable. Description of the data is important because it can be used as a basic analysis before continued into inferential analysis. Descriptive statistical analysis in this research described the data for each variable and indicators of these variables that used to measure latent variables. Descriptive statistics describes the reality of e-government in Yemen, administrative development and obstacles that facing implementation of such technology

shown as: 9.4% not available, and 33.9% were few degrees available, 33.5% normal, 18.7% available and only 4.5% significant available, table 3 shows numbers of participants of sample and percentage of all categories as well. This result showed that reality of e-government in Yemen still has some problems and faces some difficulties as well.

There are ten items used to measure the reality of e-government in Yemen, these items were explained in the table 3 as following:

These results show that 76% of respondents' answers were few of the available grades, which are low degrees of providing the necessary capabilities for the application of electronic work. For the capacity to implement e-work

results showed that there is a lack of human resources for e-work.

Table 4: Contributions of e-government applications in achieving administrative development in Yemen

Question	SDA		DA		N		A		SA		Total Sample	Mean
	F	%	F	%	F	%	F	%	F	%		
Q1	-	-	-	-	18	13.2	66	48.5	52	38.2	136	4.25
Q2	-	-	-	-	19	14	69	50.7	48	35.3	136	4.21
Q3	-	-	-	-	19	14	82	60.3	35	25.7	136	4.11
Q4	-	-	10	7.4	26	19.1	65	47.8	35	25.7	136	3.91
Q5	-	-	-	-	20	14.7	54	39.7	62	45.6	136	4.30
Q6	-	-	10	7.4	44	32.4	49	36.0	33	24.3	136	3.77
Q7	-	-	26	19.1	10	7.4	39	28.7	61	44.9	136	3.99
Q8	-	-	26	19.1	21	15.4	48	35.3	41	30.1	136	3.76
Q9	-	-	26	19.1	62	45.6	48	35.3	-	-	136	3.16
Q10	-	-	7	5.1	26	19.1	72	52.9	31	22.8	136	3.93
Total	-	-	105	7.7	265	19.5	592	43.5	398	29.3		3.93

Source: Primary data, 2017

(SDA= strongly disagree, DA= disagree, N= normal, A= agree, SA= strongly agree)

Even service and maintenance still lack qualified human resources and electronic devices. It also indicates that there are few electronic applications and technical capabilities for electronic work but most of the answers were between a low degree and regular availability. Through the results of the questionnaire and the direct observations, the link between the directorates and their branches is still very weak. Results also showed that staff uses traditional methods of communication between different departments. Other results also reflect the availability of communications between different departments, which also lack the use of electronic work

There is also a lack of security system to protect the data and information of the beneficiary in all electronic transactions. Technical support for electronic work is very poor, with 90% of employees' answers unsatisfactory. Even e-mail staff is unavailable to all employees or is unimportant to work. The responses of all participants were low degree of availability and naturalness about the possibility of filing complaints, complaints and progress in electronic vacancies.

4.4 The contribution of e-government applications in achieving administrative development in Yemen

This part includes 10 questions described the contribution of e-government applications in achieving administrative development in Yemen. Likert used for these questions was 1-5 where (1) strongly disagree, (2) disagree, (3) normal, (4) agree and (5) strongly agree. Table 4 below shows the frequencies and percentage of 10 items that were used to examine the reality of administrative development in Yemen.

Mean of all indicators (items) rating between 3 and 4.5 with total mean 3.93, which means there is good contribution of e-government applications for achieving administrative development in Yemen. Contributing of participant's opinions was shown as: 0% strongly disagrees, and 7.7% were disagreed, 19.5% normal, 43.5% agreed and 29.3% strongly agreed, table 4 shows numbers of participants of sample and percentage of all categories. There are ten items (questions) were used to measure the contribution of e-government applications in achieving administrative development in Yemen. These items were explained as following: These results reflect good degree of decentralization in administrative development in Yemen. e-government application has a significant impact, where administrative procedures for e-services can be simplified and facilitated. There are some good plans for expanding participation in administrative decision-making in Yemen. More than 80% of employees agreed that there is Minimizing the impact of personal relations on the completion of administrative work. There is a high agreement of employees about enhance confidence in electronic transactions rather than paper transactions. The results show that, there is a good support and encourage electronic culture among employees. This means related departments develop the abilities and skills of employees to use e-government. Top management are holding programs and training for employees to guide and give them information about administrative developments about facilitate the process of communication between the general directorates and the administrative regions concerned. The results also showed that the implementation of e-government would have good results

in providing electronic services wherever they are in case government helps to implement new programs. The results showed that e-government applications effectively reduce the time and effort significantly. They have a significant impact in the application of e-government and this proves that there is a profitable workers and specialists in this area.

4.5 Challans of e-government in Yemen

This part includes 10 questions described the obstacles of implementing e-government in Yemen. Likert used for these questions were 1-5 where (1) strongly disagree, (2) disagree, (3) normal, (4) agree and (5) strongly agree. Table 5 below shows the frequencies and percentage of 10 items that were used to describe the obstacles and problems of implementing e-government in Yemen. Mean of all indicators with Total Mean 3.79, which means there are many challenges facing e-government implementing in Yemen, and also reflect the employee's perspectives. Contributing of participant's opinions was shown as: 1.3% strongly disagree, and 13.6% were disagreed, 15.4% normal, 42.9% agreed and 26.8% strongly agreed, table 5 shows numbers of participants of sample and percentage of all categories.

The items of the questionnaire were ten used to determine the difficulties and problems that face e-government in Yemen. This result reflected the high absence of strategic planning to transfer to e-government and also showed that, there is a lack of necessary for the application of e-government program of financial, human and technical resources. There are more than half of participants agreed if there is lack of the policy of the application for e-government. the answers of more than half of employees showed that there is awareness of the importance of e-government but there is limitation of resources. More than half of employees have believed that there is absence of policies and regulations to ensure the applications of e-government in related departments in Yemen. Almost 80% of the employee's opinions were agreed with the resistance workers to change the shift towards e-government. These results also showed that there is a good scarcity, seminars, conferences and training courses of cadres. High rate of the employee's opinion agreed with that, there is a lack of confidence in security and data protection and beneficiary information in all-electronic transactions. A high percentage of opinions think the cadres are unqualified and there is still lack of scarcity of material incentives.

Table 5: Descriptive Statistics of Obstacles of e-government in Yemen

Question	SDA		DA		N		A		SA		Total Sample	Mean
	F	%	F	%	F	%	F	%	F	%		
Q1	-	-	-	-	22	16.2	72	52.9	42	30.9	136	4.14
Q2	-	-	-	-	15	11	97	71.3	24	17.6	136	4.06
Q3	7	5.1	19	14	34	25	69	50.7	7	5.1	136	3.36
Q4	11	8.1	72	52.9	23	16.9	30	22.1	-	-	136	2.52
Q5	-	-	57	41.9	8	5.9	32	23.5	39	28.7	136	3.38
Q6	-	-	-	-	27	19.9	61	44.9	48	35.3	136	4.15
Q7	-	-	19	14	27	19.9	42	30.9	48	35.3	136	3.87
Q8	-	-	-	-	18	13.2	49	36	69	50.7	136	4.37
Q9	-	-	18	13.2	18	13.2	73	53.7	27	19.9	136	3.80
Q10	-	-	-	-	18	13.2	59	43.4	59	43.4	136	4.30
Total	18	1.3	185	13.6	210	15.4	584	42.9	363	26.8		3.79

Source: Primary data, 2017
 (SDA= strongly disagree, DA= disagree, N= normal, A= agree, SA= strongly agree)

4.6 Design of e-government by Adoption of Cloud Computing

The basic structure of e-government is proposed to support the functional framework as shown in the following diagram Figure 1: In this design, the parties will be targeted by the e-government in the initial stages. It includes citizens, companies and government among themselves and

visitors. The use of cloud computing in e-government has been introduced. So that the provision of government services is more efficient, efficient, easy and fast access by users. Based on the information gathered and the data available for model design, the researcher suggested using Microsoft as a cloud computing provider for its robust cloud infrastructure and owning sophisticated cloud systems such as the Hyper-V virtual server. The following is a summary of this system and its features as follows: This technology is one of the virtual servers that are

running Microsoft's Windows server. The technology also innate features and savings in cost. This system works on all servers in a single server with one operating system according to the required requirements. It also can switch between various operating systems easily without losing contact with one of them. The system also has many other advantages, which is the lack of electricity usage, therefore the server's temperature is low, and it can reduce the operating costs of the data center. The system can also restore its system quickly in the event of disasters or damage to one of the devices and recover data completely without any damage.

can provide services more efficiently and effortlessly and less cost, such as tax services, documentation and the use of licenses and documents, while others represent the social infrastructure and include the services provided by the state to citizens to meet their basic needs such as education, health services and the comprehensive development of society.

5. DISCUSSION

This research explained and described the cloud computing and e-government in Yemen in addition to using of ICT and way of improvement technology. E-government in Yemen could be representing in many steps by the public sector and government. There are many problems are facing the development of infrastructure of cloud computing and e-government as well.

The importance of e-government comes from the importance of ICT in the current time. Cloud computing is the best application for e-government although the high cost of security and infrastructure. This research included three objectives based on three questions which are about the required infrastructure for the adoption of e-government, needed applications to apply cloud computing in e-government and the advantages and challenges of e-government and cloud computing.

This research included both quantitative and qualitative methods to give deep explanation about e-government in Yemen and using cloud computing to support e-government. Descriptive statistics included three parts as following:

The first part of descriptive statistics of this research is Reality of e-government in Yemen. Results of this survey were represented by mean of all items. This result showed that reality of e-government in Yemen still has many problems and face some difficulties as well. These problems related to economic situation and lack of infrastructure in the country. There is no connection between ministries and governmental administrations by Internet and they still use the traditional methods. Yemen is still at the beginning of adopting technology in both public and private sectors. Government is the first responsible of this lack of technology and infrastructure.

The second part of descriptive statistics of this research is the contribution of e-government applications in achieving administrative development in Yemen. This result shows contribution of e-government applications in achieving administrative development in Yemen. The electronic government is very important in developing countries economy and keep pace with progress in telecommunications and information technology.

The last part of descriptive statistics was conducted to analyses the obstacles of e-government in Yemen. This

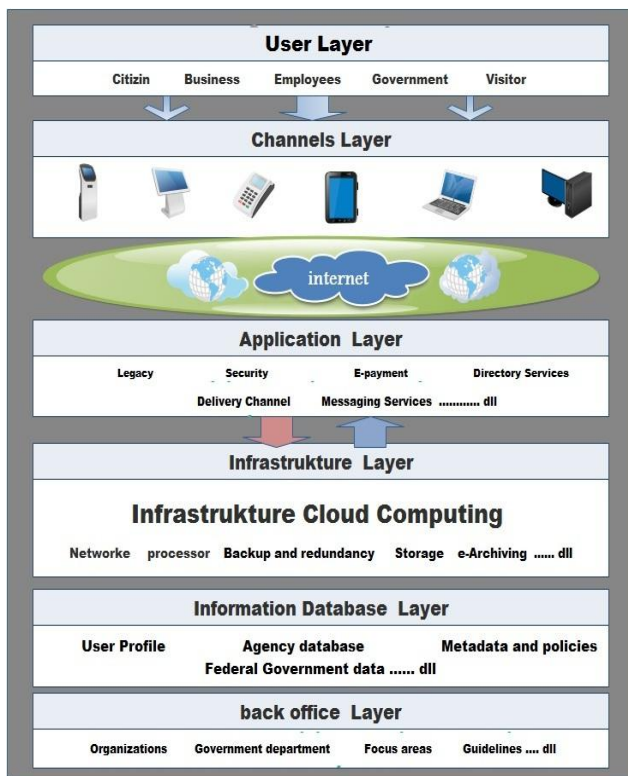


Fig 1. Design of Suggested e-government in Yemen

The proposed infrastructure consists of four layers: network, processor, storage and replication, which are briefly explained as follows: 1. The Network: Support e-Government e-services portal with an integrated network enables the leadership to provide services in full at any time and place. This technology will require fast and reliable service. 2. Processor: The most important part of the system, which is responsible for all operations within the system and therefore must choose the processors are strong and capable of high and scalable in the future. 3. Storage: This is the folder in which the data is stored and must be of high capacity to store all data easily. 4. Backup and replication: This is an important process and important part of the system to ensure that data is not lost in the event of system failure or disaster. The government

result reflects the high number of problems in the government implementation of ICT and its applications. There are many challenges face government and these challenges were determined in the answer of the question three of this research.

In addition to the descriptive statistics of this research, there were interviews conducted with three different administrations of ministry of telecommunication, post office and ICT departments. The answers of the interviewees showed and explained the problems of infrastructure in Yemen and the lack of service and awareness of government and people about the importance of cloud computing as an application for e-government.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This research analyses and illustrates the reality of e-government and its administrative development in Yemen in addition to the benefits and challenges of e-government and cloud computing in Yemen. The use of ICT and infrastructure, problems of IT, security and management of technology in Yemen have been administrated. The results of this research could be summarized in this conclusion as following: e-government in Yemen still at the beginning of development and need many investments by government to grow up. Administrative development in different departments of public sector have experienced the ICT and established good infrastructure of ICT, but e-government still use the traditional methods and there are many requirements to migrate to cloud computing. Cloud computing have been established in some public and private sectors but in very low quality and personal support. There are many challenges facing the implementations of e-government and its development in Yemen. The main problems that face development of e-government in Yemen is political stability, awareness of the importance of e-government and lately conflicts and wars. Design of e-government in Yemen by using cloud computing have been introduced. The interviews showed that, there are a huge gap between the reality of e-governments and the usual infrastructure that are required to establish e-government that depend on cloud computing as a better choice. There are many initiatives by many researchers introducing the use of technology but there is also a lack of infrastructure and support for these services.

6.2 Recommendations

This research investigated and analyzed the reality of e-government and its development in Yemen. There were many problems facing implementation of e-government. There are many suggestions by researcher during his researcher such following: Establishing a modern infrastructure of telecommunications and information and the development of high-speed Internet access and coverage for all governorates in Yemen. Without it doubt dissemination of e-culture starting from teaching of computer from the elementary stage through all ages and cultural levels in society. Restructuring organizational structures and job design is very important to meet changing and re-planning requirements for working human resources where higher administrations already have adopted the concepts of applying e-administrations. There is need to review, reformulate and prepare regulations of ICT in the country to develop the necessary strategies for the rehabilitation and training of human resources. All this could be done through establishing legal and protective legislation for electronic application and continuous provision of the necessary funds and financial resources for effective implementation. Both of government and private sector have to develop plans and held programs of awareness and education to the public dealing with government departments. They also have to develop alternative plans for electronic administrations for direct use in time of need.

Appendixes

Questionnaire No. (1): Q1: Provide the necessary capabilities for the application of electronic work. Q2: Provide qualified human resources for the application of electronic work. Q3: Provide technical capabilities for electronic work. Q4: Linking directorates and branches by Computer. Q5: Provides infrastructure for electronic work. Q6: The possibility of providing communications between different administrations. Q7: Provides a security system to protect the data and information of the beneficiary in all electronic transactions. Q8: Provide a special section on technical support for electronic services. Q9: Provides e-mail service for employees and telephone inquiry service electronically. Q10: The possibility of submitting complaints and progress on vacant posts electronically.

Questionnaire No. (2): Q1: Simplifying and facilitating administrative procedures in a way that enables the use of electronic services. Q2: Expanding participation in administrative decision-making. Q3: Minimizing the impact of personal relations on the completion of administrative work. Q4: Enhance confidence in electronic transactions rather than paper transactions. Q5: Support and encourage electronic culture among

employees. Q6: Developing the abilities and skills of employees to use e-government. Q7: Facilitate the process of communication between the general directorates and the administrative regions concerned. Q8: Providing electronic services to beneficiaries wherever they may be. Q9: Minimize time, effort and cost. Q10: Providing lucrative incentives for workers and specialists in the field of administrative development.

Questionnaire No. (3): Q1: The absence of strategic planning for the transition to electronic work. Q2: Lack of necessary for the application of e-government program of financial, human and technical resources. Q3: Lack of support from the senior management of the policy of the application of e-government. Q4: Lack of awareness of the importance of e-government and its role in the administrative development. Q5: The absence of laws and regulations to ensure the application of e-government. Q6: Resistance workers to change the shift towards e-government, because it threatens their interests. Q7: Lack of specialized in e-government cadres. Q8: Lack of confidence in security and data protection and beneficiary information in all electronic transactions. Q9: The ambiguity of the concept of e-government in some administrative leaders and employees. Q10: Scarcity of material incentives for employees to apply the e-work programs and Scarcity of seminars, conferences and training courses in the field of e-government.

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