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A New Secured E-Government Efficiency Model for Sustainable Services Provision

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Abstract

E-government projects in some developing countries face many challenges to provide sustainable services for e-efficiency. Literature shows that most governments suffer from lack of technology and restrictions associated with budgets and human resources. These factors constitute the main obstacles impeding the effective implementation of sustainable and secured e-government services. In addition to these obstacles, the e-government efficiency models adopted by some developing countries do not deliver an appropriate strategic plan for disseminating all sustainable and secured e-government services. Therefore, this paper proposes a new secured model for e-government efficiency to provide sustainable and e-efficiency services. This goal can be achieved using five determinants: detailed process, streamlined services, quick accessibility, use of latest techniques, and trust and awareness, which are discussed in this study. The proposed model has been validated by using a pilot study conducted through case study and method of application and implementation. The findings indicate that both service providers such as governments and users of e-government services took advantage of the proposed model. Accordingly, sustainable e-government services may increase.

I. Introduction

Approving and using sustainable and secured e-government services in some developing countries is considered an important issue. The digital gap between people, weakness of e-government infrastructure, and non-availability of technology and ways for obtaining such technology are critical challenges for e-government projects [1]. Although facing these challenges are an inevitable problem in developing countries, the governments will be able, by taking the appropriate procedures when designing e-government projects, to achieve higher participation in e-government activities by users. Therefore, the motive behind designing e-government projects are e-government efficiency models which help governments improve the quality of services provided, which are called the stage models [2].

The efficiency model considered as a conceptual framework that determines how e-government projects can be accommodated at specific stages. Given the enormity and complexity of the sustainable and secured e-government projects, they are often accommodated in stages. Numerous efforts have been made to standardize the stages of e-government assimilation and measure the level of efficiency achieved by the e-government project, and which leads to the development of efficiency models of e-government. While the efficiency models of the e-government under study were approved to develop the strategic plans to disseminate e-government projects, the

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studies show that there are increasing numbers of sustainable and secured e-government projects in developing countries. Such projects are not compatible to efficiency model patterns of e-government. Accordingly, the sustainable e-government services will be inefficient [3, 4]. The term "sustainability" is loosely used to identify the efficiency that can be achieved by the government in reference to cost, time, and effort required for offering the e-services. This is associated with the ability to include all interests of users (government and citizens). Making more evaluations for the efficiency models of e-government lead to many restrictions on knowledge. This process of removal, resulted from non-dependence on technology, using linear pattern for all stages, lack of detailed processes, and lack of latest techniques. The design of sustainable e-government services is impeded by such restrictions and thus it is important to design alternative models for maturity and empowerment. There are two research questions for achieving the study objectives:

- Why are the current efficiency models used for e-government not compatible with the processes performed by the projects in some developing countries?
- How can restrictions imposed by these models for implementing the sustainable e-government services be resolved?

To answer these questions, the current efficiency models of e-government are prepared and compared. The models depending on the number of stages and the efficiency nature proposed for each stage have been analyzed. Based on the findings obtained from the efficiency models analyses for the e-government, a new secured model of maturity and empowerment for the e-government has been proposed and approved. It will support developing countries governments for implementing the sustainable and secured e-government services.

Unlike the current efficiency models, the proposed sustainable and secured e-government services model distinguishes itself through certification stages as well as implementation stages. We have set certain standards for sustainable and secured e-government services, such as cost-parity, time efficiency and the effort required to provide services, and the level of services provided. The proposed efficiency secured model was evaluated by using case studies and surveys in a real e-government project. The results indicated that this approach brought efficiency to government operations in terms of cost, time and effort needed to implement e-government services, while the results of the survey showed that the activities identified in the certification stages (a set of delivery channels, awareness and trust, the kind and quality of services) encouraged more users to use the sustainable and secured e-government service.

The rest of the paper is organized into five sections. Section II presents the theoretical framework and literature review. Section III presents the proposed efficiency model for sustainable and secured e-government services. Section IV shows the evaluation and results. Section V outlines the observations and recommendations. Finally, the conclusions are outlined in section VI.

II. Theoretical Framework and Previous Studies

Previous studies showed several research papers through which many e-government competency models were developed in addition to sustainable e-government efficiency models. These models will be discussed in the next two subsections.

A. E-Government Competency Model

Many variables have been proposed by some researchers for efficiency models. Mostly all these models have agreed that development of an e-government occurred in a linear and progressive way. The government achieves its maturity at different stages. The efficiency models of current e-government consist of two to nine stages. Most models that are discussed among the current models consist of six stages, besides the technological developments [1-3], [5-8].

The researchers in [2] suggest the efficiency model through two stages. The efficiency model identifies efficiency stages to be a catalog. The governments arrange information inside such a catalog that it can be accessed by citizens, corporations, and transactions where governments provide full services of e-government. Researchers in [5] prepared a model consisting of three stages, in addition to stages bearing the publishing name, interaction, and transactions. At first, the governments publish information on the internet, then interact with users via internet. Finally, they permit users to make online transactions.

The researchers in [1], [6-8] have approved a more balanced approach for the governmental efficiency models. They emphasized that e-governments can reach the efficiency stage by implementing four stages. Among these models, the efficiency model prepared by research-

ers in [6] has been somewhat different from other models. They indicated that e-government processes can make transaction in the third stage. However, some researchers categorize the transaction phase in the second stage.

Some researchers designed models including five stages. These models were particularly prepared for developing countries where e-government is gradually applied. The models that are relatively old; Asia, Pacific, and Deloitte models, have contributed to collapse of application process. They proposed efficiency models that include six stages. Such models make the e-government application slower as the government has started from the most basic form , i.e. usage of email. Accordingly, they make small progress toward maturity and empowerment. Researchers in [5] and the world bank prepared efficiency models that are nearly identical. These models share the same number of stages. Moreover, criteria used are the same for every stage. The models argue that an e-government application is made through three stages. Governments start the first stage by electronic provision though publishing on website. The second stage is related to two-way communications, while the third stage is for transactions.

The efficiency level of e-governments was represented as only e-commerce. The governmental goal was to electronically deal with users. The researchers in [6], [7] identified four stages for efficiency models that have very identical phases. In addition, the researchers in [9], [10] have indicated identical phases for such phases of e-government efficiency models in [6]. The only difference between the proposed model in [6] and other models is the number of stages as other models include only five stages and proposed e-democracy or digital democracy to be an efficiency level for e-government. Such models have shed light on e-governments from a perspective that is more comprehensive than previous models. They include a stage witnessing citizens' participation in governmental activities.

Despite their uses, e-government efficiency models have been criticized by many researchers, such as researchers in [3], [4]. They have noticed many restrictions in the current efficiency models. The researchers in [11] analyzed the efficiency models developed by some researchers in [12]. Such models were conflicting and lacked the statistical data for supporting efficiency models suability. Moreover, they noticed that patterns of e-government development at the local level have not been supported by these models. The researchers in [13] described models as technology-based models. The models also focused on stages nomination and ignored the security requirements in each stage. Similarly, the researchers in [14] have examined more than ten models of e-government efficiency. They found that efficiency models were somewhat similar, unlike criteria used for each model. They also indicate that efficiency models should be redesigned to include modern technology available at the time of e-government application. The researchers in [3] found that e-government efficiency models were descriptive, predictive, and not precise or well-planned. They also demonstrated that models have no practical solutions for achieving stage efficiency.

Some researchers explained that efficiency models have offered a limited definition for e-government. These models identified e-government as tools for providing web-based e-management services. The researchers in [4] concluded that current efficiency models were very simple and were developed upon assumptions. They also added that there were no available facts for evaluating the degree of success for stages of models used for dealing with e-government application. They found that models were directed for presentation but ignored the verification aspect. Therefore, all abovementioned researchers developed their versions of efficiency models as there were no international models.

In conclusion for this part, all the above-mentioned works that were previously developed by a few researchers are considered important and influential and have contributed to the implementation of the e-government process. However, there are several weaknesses and limitations of these models. Furthermore, all current studies mentioned are important and effective. They already contributed to the implementation of e-government process. However, many restrictions were identified by many researchers. These restrictions are as follow:

- **The First Restriction: Processing Occurrence by E-Government Through Linear Pattern**

Almost all e-government efficiency models have agreed that e-government processing is made through linear patterns. Where the e-government project progress has transformed from simple technology to complicated technology. The models offered by researchers in [1], [6] have been exposed to United Nation (UN) scrutiny. The UN indicated that a phase should be added before starting the next. Which may be partially correct, but no other phases can be added. However, modern technology

can enable governments to start two or more at the same time. (for example, the governments can originate the e-government and integrate it into the governmental administration. This depends on the government's decision identifying its resources required for starting two stages, i.e. insertion and integration, at the same time).

- **The Second Restriction: Transaction Occurrence before Integration**

All efficiency models of current e-government have agreed that transactions stage should be implemented before integration stage related to e-government efficiency. However, transactions cannot be fully implemented without integrating services and establishing e-provision systems on all levels. The provision of governmental services already requires different processes for authentication and verification, and frequently necessitates participation of two governmental departments working together for achieving service requests presented by users. In this case, if such governmental departments have different systems, they will not offer electronic services in an efficient and easy manner.

Many countries have reached the scope of network establishment / integration with governmental departments before transactions stage. A study conducted by the researchers in [15] on the efficiency level of Indian e-government indicated that India government has approved an efficiency model including four stages for applying e-government. The study found that 58% of e-government services have achieved integration at that time, while only 29% of e-government services implemented the transactions stage.

- **The Third Restriction: Lack of the Latest Techniques**

The current models of efficiency have failed in employing the modern technology in the developmental stages of e-government [16]. Technology has been rapidly changed in the last decade. Social media has been used on wide scale and more people are communicating through internet. There are no obstacles impeding communication or information dissemination between world community members. Currently, many techniques have become outdated. For example, dial-up internet access and static web pages are infrequently used. Therefore, efficiency models should be prepared on regular periods to include modern technology. Moreover, efficiency models should be developed to deal with the current problems.

- **The Fourth Restriction: Absence of Detailed Process**

Some current models for e-government maturity and empowerment have been prepared for classifying the efficiency levels of e-government. However, these models have not provided a strategic solution for achieving e-government stages. They also have not indicated an information about processes and activities necessary for monitoring progress from one stage to the other. Such models are descriptive and predictive, but they have no realistic or technical plan for starting or completing stages. The stages models proposed by such organizations , (Asia-Pacific and UN), requested that models will work in the best way in developing countries. Like other previous models, UN has proposed an emerging existence. It created its static website as an initial stage for e-government processing. However, UN has not presented any processes identifying how governments started to use its web.

- **The Fifth Restriction: Lack of Reliability Perspectives**

Some current efficiency models of e-government are categorized based on the available technology. Mostly all efficiency models agree that governments using developed and advanced technology have reached high levels of e-government efficiency. However, the researchers in [3] affirms that technology development may not provide right prediction for the efficiency level of e-government. The e-government success should not be measured by only advancement of technology employed by the government, but services provided should also be taken into consideration to indicate whether or not they are used by users. In addition, e-services users ratio should be compared to the services offered for evaluating the e-government success. These realities seem to be omitted by e-government efficiency models.

These restrictions can be considered determinants for sustainable and secured e-government services. They affect the whole project of e-government. When reviewing the abovementioned restrictions, we can say that e-government efficiency models should deal with such restrictions for providing governments with the support necessary for designing sustainable and secured services for electronic efficiency.

B. The Efficiency Model of Sustainable and Secured E-Government

The e-government efficiency models play an essential role in designing sustainable and secured services for electronic efficiency. They evaluate the implementation sequence of electronic provision projects and offer suitable strategic plans for project implementation. Preparing a good plan for design and evaluation assists in realizing a better understanding for strength points and restrictions facing governments. Accordingly, the best approach can be selected for processing e-government projects to achieve sustainability. The sustainable and secured e-government services should be able to support governments for achieving their objectives and provide operational simplicity and prove its value to investments regarding: quality of services, accepting and using services provided on larger scale, cost of e-government application, and the process efficiency. Moreover, longevity of e-government services and flexibility for implementing changes necessary for technology are considered some main characteristics for sustainable e-government. More specifically, we define sustainable e-government services as the ability of reliable e-government services that focus on citizen and approve the latest techniques to offer service that is cost-saving, flexible, and effective and to support active participation and satisfaction by all user levels.

By identifying the sustainable and secured e-government services, two different dimensions are considered: implementation and reliability. The implementation dimension is related to technology, budget, and human resources necessary for implementing e-government, while reliability is associated with the design and approach of e-government services provision for realizing high participation by users.

In conclusion of this section, there are several weaknesses and limitations of this model. The determinants are identified based on implementation and reliability perspectives. Every determinant has tried to deal with one or more restrictions impeding governments support for achieving efficiency and citizens' active participation as shown in Fig. 1.

1) Determinants of Implementation

The determinants for implementing e-government efficiency models comply to provision of best possible approach for implementing e-government through clear stages and identifying the activities required for achieving such stages. The determinants of e-government implementation have particularly focused on how governments can be empowered to offer streamlined services related to e-government fields in developing countries. The following determinants have been proposed for the efficiency model that is applicable by the e-government. Accordingly, sustainable and secured e-government services can be offered [17].

- **The First Determinant: Detailed Operation Process for Applicable Efficiency Model of E-Government**

The e-government efficiency models should have the ability to provide a detailed brief for the processes required for implementing the stages of e-government processing. Absence of detailed processes often leads to confusion when starting a stage. This confusion occurs because there is no interpretation describing how every stage is implemented. The current efficiency models have not provided the activities necessary for implementing specific stages for e-government comprehension. Therefore, the inclusion of processing detailed activities can contribute to creation of an applicable efficiency model for e-government.

- **The Second Determinant: The E-Government Efficiency Models Have Provision to Governments for Designing Streamlined Services**

The sustainable and secured e-government requires rationalization of governmental services that highly focus on citizens. The separated systems of electronic provision and individual databases prevent users from approving the offered services. They lead to non-completion of approval and may require secondary procedures, such as visiting the governmental offices for completing the service requests. Moreover, when considering the financial issues, we have noticed that electronic governmental systems, individual or otherwise, have become less sustainable for the developing countries. The maintenance of these systems requires huge budgets and governmental process frequency. In case such systems are not central or connected, the governmental officials should manually handle the request services. This manual handling leads to inefficiency and low productivity. Hence, the sustainable efficiency model has to be able to help government for providing streamlined services via an integrated governmental system [17].

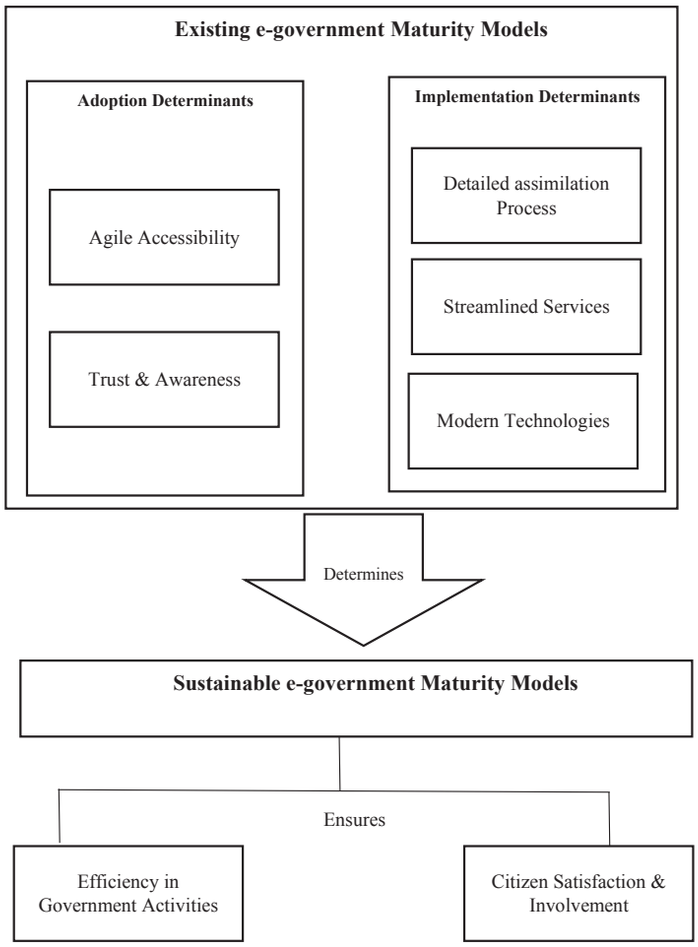

Fig. 1. Determinants of E-Government Efficiency Model for Electronic Sustainable Feedback

- **The Third Determinant: The E-Government Efficiency Models Should Focus on the Employment of Latest Techniques**

The models and technological frameworks should be frequently updated to include the latest technological changes. The latest techniques should be employed to make e-government technological projects continuous and competitive. Most efficiency models have been prepared for a few years. Accordingly, they have no strategy for making e-government projects more efficient by employing modern technology, such as the usage of cybersecurity techniques and cloud computing platforms for e-government services. The maintenance and operation of traditional techniques have become less costly but more complicated, and thus the governments should employ more developed and modern technology when widening the scope of e-government services in the developing countries.

2) Factors Identifying Reliability

The e-government reliability is as important for the e-government success. The e-government reliability denotes to the active participation of citizens in the e-government activities. Hence, the e-government efficiency models have to offer a strategy for realizing efficiency from the reliability perspective. The employment of the sustainable and secured e-government services and users' participation are based on some factors, such as the ability to access services, trust, awareness, and easy usage. Accordingly, these factors should be handled by applying a suitable manner when designing the secured e-government efficiency models.

- **The Fourth Determinant: The E-Government Efficiency Models Should Support Government for Identifying the Easy Access of Service**

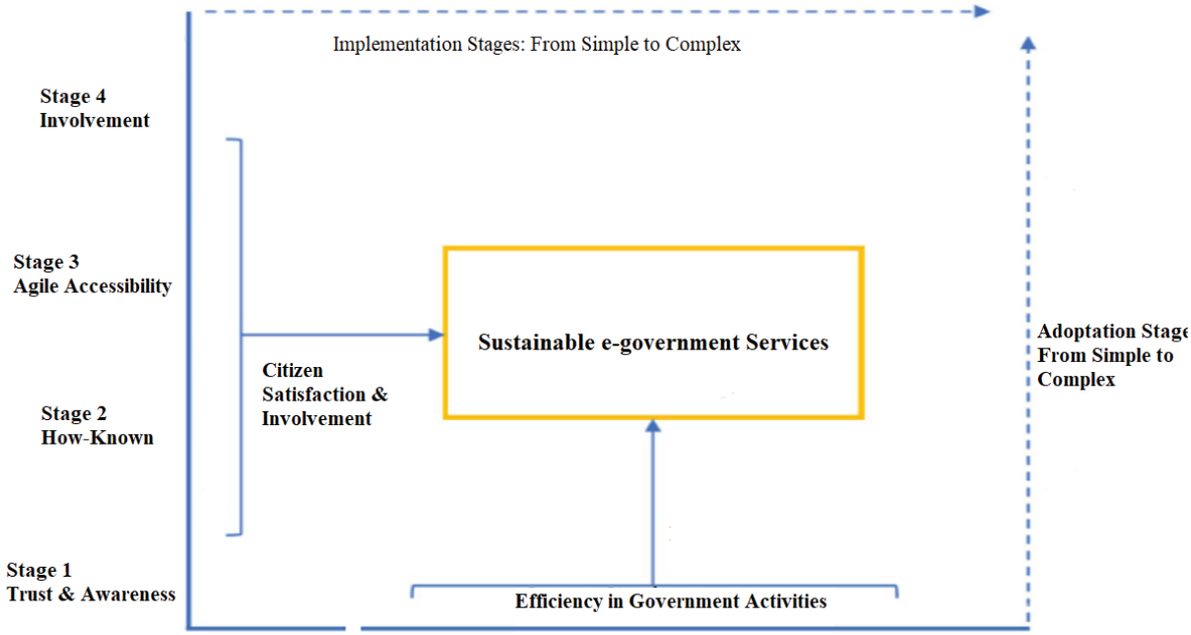

Fig. 2. The Efficiency Model of Sustainable E-Government Services

The ability to benefit from e-government services is highly associated with their success. The success of e-government services is represented by quick accessibility and offering such services for the largest group of people according to their capabilities. The developing countries are facing big challenges arising from the digital gap between citizens, and thus governments should ensure that all citizens can benefit from electronic awareness services. The studies have shown that there are specific categories of people deprived of the benefits of Information and Communications Technology (ICT) in the developing countries. Those categories include:

1. Low-income persons.
2. People who have lower educational qualifications.
3. The unemployed, aged, and people in separated or remote regions.
4. Persons with handicaps [18].

The non-accessibility to computers and internet increases restrictions on employment of e-governments services. Accordingly, the sustainable and secured efficiency models of e-governments should be supported for identifying all channels of the sustainable and secured e-government services.

- **The Fifth Determinant: The E-Government Efficiency Models Must Support Governments for Increasing Awareness and Built Trust Among Citizens**

The proposed efficiency model has highly focused on awareness and trust-building among citizens for offering sustainable and secured e-government services. Lack of awareness of electronic aid benefits is considered a critical factor for adopting users in the developing countries. Many factors: including education, race, and culture, have contributed to the low level of users' awareness. We have realized that some social groups have had much lower level of awareness regarding e-government. Meanwhile, the trust-building among citizens for trusting e-government services is the most important requirement for e-government success [19]. Therefore, users need to verify the legality and authentication of e-government services and to be sure security and confidentiality are maintained when handling their personal details online. Accordingly, governments should seek to disseminate awareness and build capacities for increasing users' participation and providing groups separated from society with e-government services.

III. The New Proposed Efficiency Model for Sustainable and Secured E-Government Services

The proposed model is depended on the abovementioned determinants for providing e-government sustainable and secured services in developing countries. The first determinant; detailed operation process, has been

indicated by offering detailed activities for each stage and identifying how such activities contribute to individual maturity. The determinants, streamlined services, and employment of most recent techniques have been indicated. The integration should be prepared before the transactions stage as described in Fig. 2. The integration stage discussed how up-to-date techniques could be employed for integrating the separated e-government systems for offering streamlined services. The reliability determinants, such as accessibility, trust, and awareness are included in the reliability phases. The phases of proposed model employment have identified different channels for providing e-government services by using different ways to support accessibility. In addition, the activities of reliability stages have presented detailed interpretations for increasing trust and awareness and realizing wider participation by users. One of the main differences between the proposed model and current models is the inclusion of reliability stages for increasing the users' participation. The proposed model shows the importance of including the reliability stages in efficiency models and provides governments with a roadmap to realize more users' satisfaction.

A. The Implementation Phases

This model focuses on four stages for implementation. The most important activities of such stages have been highlighted. These stages and their activities for offering a detailed plan for e-government implementation will be discussed in the following subsections.

1) The First Stage: The Main Services

The initial stage proposed by the efficiency model is the inclusion of e-government main services. Unlike the current efficiency models of e-government, the proposed model focuses on social media usage and an entity creation online for communicating with users. Social media (Facebook, Twitter, YouTube, LinkedIn, etc.) is a great tool for reaching users. This stage demonstrates how governments can gain citizens' trust by responding to inquiries through internet. Moreover, the stage has assisted in increasing users' awareness of e-government services. The activities that must be implemented for offering main services through maturity and empowerment model are described as follow:

- **The First Activity: Governmental Departments Computing**

The first step of the initial stage of the sustainable and secured e-government implementation is governmental departments computing. Governments should offer suitable training for their employees to operate computers and use basic computer applications at government offices. In addition to computers, other hardware, i.e. printers, scanners, storage, and internet connection devices, will be installed.

- **The Second Activity: Information Indexing**

As soon as governments achieve their departments computing, they will start indexing data documented on paper. Therefore, governments should make a digital backup of data existing in the governmental offices.

- **The Third Activity: Websites Development and Social Media Usage**

Governments should start website development and social media usage. Social media (Facebook, Twitter, YouTube, LinkedIn, etc.) is considered an effective approach for interacting with increasing number of users and indexing information.

- **The Fourth Activity: Raising Awareness**

Governments should focus to prepare an awareness raising program. They should be responsible for developing skills and experiences of government employees and raising users' awareness of e-government initiatives.

2) The Second Stage: The Streamlined Services

The efficiency model seeks to streamline e-government services for realizing their sustainability. The streamlined services can be defined as specific and complete services. The users can benefit from specific governmental services without visiting the competent governmental offices. This procedure requires integration of e-government systems in all governmental departments. This integration should be accompanied with establishment of e-government infrastructure for providing governmental resources and avoiding data duplication by utilizing databases systems as indicated.

Without implementing the vertical integration, governments can only prepare some divided electronic feeding applications and data deposits. The vertical integration can be considered a connecting link between governmental departments that have similar interests. Accordingly, data duplication can be avoided, and services can be easily offered. Moreover, streamline governmental services will substitute the layers of data manually prepared by all governmental departments. Great

effects on developing countries will arise because of citizens limited availability toaccess to ICT tools , integrated databases, and documentation systems that can enable local governments employees to use such tools in a better way. Therefore, the proposed model highlights the importance of integrating databases with variable and individual applications before transforming to the transactions stage. The duties required for realizing the e-government streamline services according to the efficiency model can be identified as follow:

- **The First Activity: Strengthening Communication and Connection**

The government's main duty is to make trusted connection between governmental departments for designing effective networks. It is supposed that governments create wired connection (fiber optic or cables) and wireless connection for achieving this interconnection.

- **The Second Activity: Establishing A Framework for Interoperability**

It is supposed to establish a framework for interoperation. This framework enables all governmental departments to make effective connections.

- **The Third Activity: Integration System Identification**

It is difficult for developing countries to achieve the desired network connection as it requires excellent and trusted infrastructure. However, the developing countries can consider cloud-based integration as a possible solution for achieving the governmental integration on all levels without preparing physical network infrastructure.

3) The Third Stage: Transactions Services

The efficiency models proposed transactions services in the third stage. All current efficiency models of e-government examined the transactions services in the second stage. Contrary, transaction services stage is arranged after integration. We can argue that transactions services cannot be efficiently offered without integration. The governmental departments integration facilitates real time communication between all departments and prevents payment delays. In this stage, governments will create payment portals that enable users to benefit from online services. Moreover, they will establish an effective connection mechanism to be more interactive. The most important duties for this stage are as follow:

- **The First Activity: The Governmental Legislations of Data Electronic Preparation**

Governments should enact legislations and regulations for data electronic preparation and electronic transactions validity. Subsequently, electronic transactions can be legalized, and trust may be promoted among users.

- **The Second Activity: Creating Mechanism for Verification Processes**

To offer e-government real time services, the governments should have mechanisms for verifying data and users' identities. The verification may be completely automatic, or manual/automatic in case of complicated information. Therefore, user's identity cards, election cards, driving license, and passport, can be used for verifying identities cards.

- **The Third Activity: Payment Portal Creation**

This activity will be the most important one that is necessary for governments to provide e-government services operating at full capacity. Governments in the developing countries can make special business partnerships for preparing payments. Moreover, they can integrate bank services through internet or mobile phones used at governmental services to enable users to perform all financial transactions.

- **The Fourth Activity: Online Deployment of Services**

As soon as governments prepare all electronic documents and services for verifying transactions and payment portals, they will offer such services through internet.

4) The Fourth Stage: Automated Services

The automated processing or automation already represent a mature case for e-government where users proactively participate in the governmental activities. Accordingly, all governmental services are transformed from payment to withdrawal upon request. E-government services will become smarter and synchronized with users' accounts. E-government provides automated services including text notifications for unpaid invoices and licenses and identities renewal, etc. The most important duties for implementing this stage are as follow:

- **The First Activity: High-Level Integration**

For establishing high-level integration, some departments on all levels will be vertical, while other departments on all levels will be horizontal. These departments should share all data and avoid any intermediate layers. Subsequently, the system will be smarter.

- **The Second Activity: Hypermarkets and Stations**

Governments should design the unified e-government portals as they enable users to benefit from all available governmental services from one place. It is supposed that governments will provide unique information about the registered beneficiaries to be employed for accessing all sustainable and secured e-government services.

- **The Third Activity: Synchronization**

Governments seek to synchronize users' data with governmental systems to deliver services specifically designed for users. The users' accounts should be synchronized with calendars to highlight dates that are important for users (permit renewal, taxes payments, social insurance payments, etc.)

B. Reliability Works

The proposed model has four stages for reliability. It is supposed that all users have examined all e-government services and proactively participated in all e-government activities during such four stages. The reliability aspect has focused on human and regulatory issues. The reliability stages have concentrated on creating value to users at every stage of e-government implementation. The efficiency model proposed for reliability stages has been integrated into implementation stages to provide governments with better direction for setting common strategies to realize citizen satisfaction and achieve efficiency when implementing e-government services. The reliability stages have been discussed and the most important activities have been indicated as follow:

1) The First Stage: Awareness and Trust

The awareness and trust stage complies with the e-government application stage. The users should be prepared for changes made when offering governmental services and specific interaction channels, in addition to awareness and training. Governments should also make efforts to make users fully prepared for change.

2) The Second Stage: Know-How

The know-how denotes to the applied knowledge of how e-government services are approved. To start offering of streamlined services by governments, the users' knowledge should be enhanced to participate in the e-government activities. Moreover, the users should receive suitable training through workshops, seminars, TV programs, and other communication tools. Accordingly, the users' knowledge on benefits of e-government services can be enhanced, and users can be aware of how to implement such services.

3) The Third Stage: The Quick Accessibility

The quick accessibility complies with integration and transactions stages for implementation. It is affected by many factors including how to access technology, personal circumstances, social impact, service availability, service reliability, security, and trust in users' decisions related to using or ignoring the e-services. Obtaining technology is considered one of the most important factors for the developing countries. Therefore, the proposed model shows the importance of quick accessibility to the sustainable and secured e-government services. This can be realized by developing variable channels for providing services (such as communications centers, kiosks, private commercial partnerships, municipal councils, and public libraries). In developing countries suffering from digital gap between their peoples, quick accessibility seeks to enable users from different levels to access e-government services.

4) The Fourth Stage: Participation

The users' participation in making governmental decisions describes the efficiency stage related to approval of e-government by users. During this stage, users will have the chance to express their opinions on governmental activities and effectively participate in the governmental legislations. On the other side, governments can receive users' opinions through many channels including online dialogue, direct conversations, public opinion surveys, etc.

IV. Evaluation and Results

The experimental investigations has taken into considerations to evaluate how the proposed efficiency model is compatible according to Fig. 3. A case study and a survey have been employed for such experimental investigations. The evaluation criteria has identified from the perspective of sustainable and secured e-government services. These criteria are associated with cost, time, effort, and the approval level of provided services. The case study and survey findings have been evaluated in the light of parameters set for evaluating the proposed

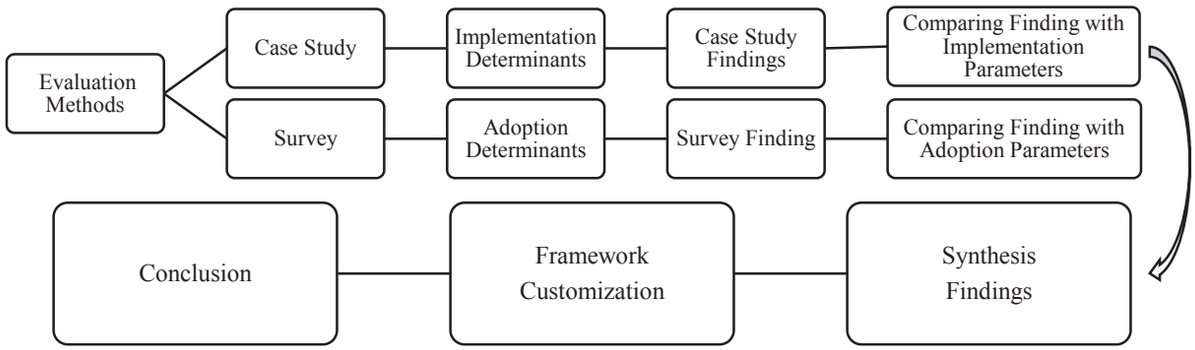

Fig. 3. The Evaluation Methodology

model's ability to satisfy the required criteria. The logical base for using two different ways for evaluation is the required parameters nature. The rationale behind using two different valuation methods is the nature of the parameters required. The cost, time, and effort made for implementing the sustainable and secured e-government services have been evaluated by the case study as it requires the real implementation of models through a real project. The customer satisfaction and the sustainable and secured e-government services approval have also been evaluated by applying the reliability method.

A. The Case Study

We also have approved a case study approach for validating the determinants implementing the efficiency model that is applicable to e-government. Case studies are considered the best method when the data acquired from the research needs are presented through descriptive and explanatory method [20]. We seek to present justifications for using the proposed efficiency model for sustainable and secured e-government services. Therefore, the case study method has been approved as we noticed and recorded the participants' opinions when implanting the model into a real scheme.

The case study's objective is to evaluate the determinants identified according to their effects on sustainable and secured e-government services. We supposed that inclusion of determinants into the e-government efficiency model will provide governments with an effective approach for implanting the sustainable and secured e-government services.

The context of this study is the National Status Administration of one of the gulf countries, whereby all citizens over the age of 15 are issued a national identity card that is used to obtain various government services. The department of national civil affairs seeks to rationalize its data to achieve efficiency, and thus the logical base of its selection is the proposed model evaluation to be applied for implementing the sustainable and secured e-government services. This evaluation includes the evaluation of costs, time, and governmental services efficiency.

1) The Study Assumptions:

The assumptions are identified as follow

- The First Assumption: The detailed operation process offered by the proposed model positively supports governments for designing the sustainable and secured e-government services.
- The Second Assumption: The proposed efficiency model seeks to support governments for offering streamlined services leading to the sustainable e-government.

2) The Study Plan

Firstly, the efficiency model that has been approved for processing e-government projects has identified. An official discussion with the participants has been made and evaluated the available governmental plan through its portals. We found that government has approved a model consisting of four stages that resembled what is indicated in [1] to process its e-government. Subsequently, the efficiency stage of e-government has been determined for the government covered by the study. Moreover, many governmental portals and their services have been evaluated to identify the efficiency level of e-government services. After the evaluation process, the results indicate that feeding has already attained the first

stage of basic services according to the proposed efficiency model. Therefore, we decided to initiate the activities required for the second stage in the light of the efficiency model. A work team has been formed to conduct the case study. Communication with governmental officials working at such a department has been initiated to assist officials at the department organizing their duties through the proposed model experimentation.

A team including governmental officials and information technology employees for the e-government has been formed. The team members have worked together to implement the efficiency model and noticed the findings during the activity implementation. The roles of team members have been assigned in the case study. Moreover, the governmental employees have been supported by providing the suitable information necessary for evaluating the current situation of e-government; such as the system employed, the model used, and other governmental data required for conducting the case study. The governmental employees working at information technology have performed the technical duties including system integration, customization, network interconnection, etc.

3) The Implementation Process

After preparing the study plan and collecting the required information, the activities indicated by the proposed model have started. The model for a current project of e-government service has been implemented. Therefore, the preparedness of the region for e-government has to be evaluated. The e-government preparedness refers to regulatory and technological capabilities for implementing the e-government projects. The regulatory preparedness for e-government approval is associated with the legal framework of e-government activities, human resources availability, and enough budget. On the other side, the technological preparedness is related to the technology available to implement the e-government project and to the people's ability to approve the offered e-services and their reliable connection.

The evaluation process has included discussions with the governmental officials, evaluation of data provided by internet service providers, and analysis of previous studies prepared by some organizations. After the evaluation process, we found that the government under study has applied many laws related to e-government and ICT during the last decade. Moreover, many suitable measures have been taken for reforming service provision process by the government. Most governmental offices have been organized and computed. After obtaining the study findings, the participants have agreed that the government under study has achieved the basic level of e-government preparedness and has continuously worked for improving its progress capability. In addition, the participants have agreed that citizens have not been able to use technology, benefit from educational services, nor increase their awareness because of the absence of approval. Therefore, the proposed efficiency model has become more suitable as it included the approval stages that show how user can approve the offered services.

The evaluation findings have shown that the government under study has achieved the first stage of e-government services implementation. Accordingly, the second stage of the proposed efficiency model was started. The e-government services provided by the government has failed in attracting the users. Therefore, immediately the approval stages is started. The case study has been restricted to implementation of second stage of maturity and empowerment. It has not been useful form the practical viewpoint to implement all stages. Moreover, sustainability as the efficiency of governmental services provision and approval of such services have been defined, and thus these goals can be achieved in the second stage in most cases. Other stages can be implemented by developing the government performance by using more advanced technology and achieving gradual progress.

4) The Second Stage of Implementation: The Streamlined Services

As decided by participants, the second stage of maturity and empowerment model started. Unlike other efficiency models associated with transactions in the second stage, the second stage of the proposed model is the streamline of services which can be achieved though governmental departments integration. The governmental systems integration is a complicated duty. Regarding the government under study, all servers of governmental departments on the site have participated. However, there is a need for integration. The sections of governmental departments have not been completely integrated. Accordingly, problems of data isolation have originated. The same problems have occurred for national identity data. Data has been individually saved in many offices and they have requested manual connection for all departments. This procedure has taken a long time and negatively affected service efficiency and customer satisfaction. According to what was identified in the proposed

model, many activities for offering streamlined services are performed.

- **The First Activity: Communication and Connection Enhancement**

The first duty for offering streamlined services is to improve network connection and to link between governmental departments and offices located in different geographical locations. Governmental departments have acknowledged that they need internet connection enhancement and to easily communicate with each other. For achieving this objective, the government under study has succeeded in establishing fiber optic networks in some important regions and wireless and 5G networks in other regions. However, these efforts have not been enough to implement the sustainable and secured e-government services. Therefore, the government should speed-up the process and identify the priorities of communication connection.

- **The Second Activity: Establishing A Framework for Interoperability**

The interoperability is considered a problem for the developing countries. All governmental departments develop their private systems to digitalize their duties, and thus such systems integration has become difficult. Therefore, the initiative of the government under study is evaluated to verify that the government has established a framework for interoperability to realize consistency between the governmental systems. We have also found that the government under study has realized the necessity of this requirement and established an interoperability framework. The final draft of interoperability framework of e-government has been submitted. The government has identified the interoperability through three dimensions:

- The commercial processes and regulatory interoperability
- Information or indicative interoperability
- The technique of shared working

In addition, the government has presented variable criteria and guidelines for applications, networks, databases, security walls, document types, firewalls, and all other technological aspects related to all governmental departments and agencies. The governmental departments should adhere to such criteria and guidelines when developing their systems. The government under study has also developed the institution infrastructure framework that identified different components of feeding and indicated how subsidiary structures and governmental systems should be designed for realizing interoperability.

- **The Third Activity: Integration System Identification**

The integration system identification is considered a critical factor regarding cost and technology for implementing the integration stage for offering the streamlined services of e-government. The physical integration of e-government systems has become complicated because many governmental offices in remote locations cannot access internet-based communication network. Therefore, a cloud-based solution is identified for integration and new applications hosting.

Firstly, an analysis for costs and benefits is made to compare the costs of e-government current implementation and integration methods with the implementation and integration that are based on the new applications. We have tried to analyze what can be available when approving a cloud-based portal for its computer needs and e-government services provision. The model of costs and benefits analysis is employed and is shown in Fig. 4.

The governmental accounts is examined to identify the costs of purchase, management, and operation of e-government systems. We found that administration has allocated a budget for strengthening infrastructure and enhancing ICT. The budget has included procurements of hardware and software, technicians' salaries, training costs, equipment maintenance costs, internet rent, and service shared on the site. A summary for the amount paid by the administration for ICT for one year is given. Subsequently, these costs with the costs that would be endured by administration when approving computing portals for the new applications by third party to implement and integrate e-government system services are compared. The government will be able to highly decrease costs when approving the cloud computing portal.

Secondly, time with the human resources needed by the administration to integrated various sources of data by the traditional integration technology and could-based integration are compared. The results indicated that there are many governmental departments in terminal locations who faced connection problems. The physical networks have been increasingly complicated and need more time. Although the government have made efforts for linking the terminal governmental departments, it seems that the government needs more time to resolve these problems. On the other side, transferring databases at various departments to integrate to a cloud will require less time.

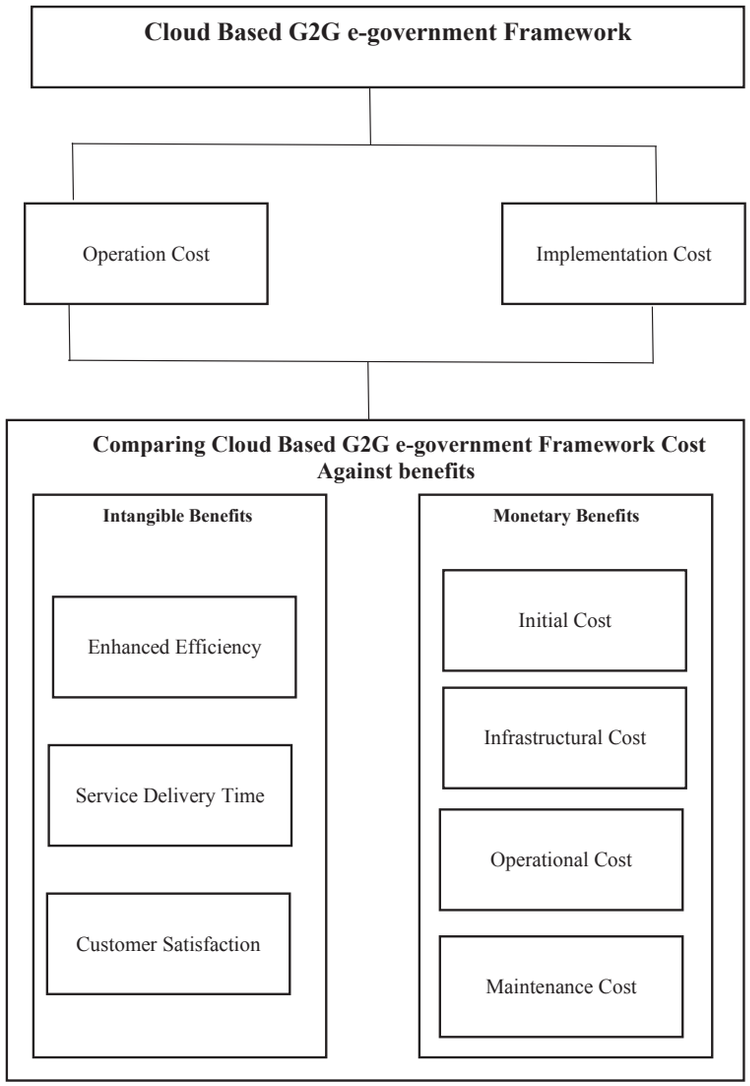

Fig. 4. Cost & Benefit Analysis for Approving New Applications-based Framework

5) The Authentication Stages: The Enhancement of Technical Skill and Trust

The technical skill of users is considered one of the most required conditions for citizens participation. Three technical workshops on how governmental services used and three seminars on the advantages of e-government services are hold . The workshops and seminars have been organized by information technology employees accountable for e-government services. The participants were government employees from all governmental local departments and inhabitants invited by e-invitations. They have received a detailed training on using these services.

The governmental officials have organized such seminars for inhabitants to demonstrate the e-government initiatives taken by the government, the available e-government services, and their benefits, and the future. The seminars have offered a great deal of information and a dialogue has been established by the end of seminar to answer all participants' questions. The workshops and seminars have proved that they constituted an identification mark for enhancing skills of participants. On the other side, the participants' opinions and concerns have assisted officials to reconsider organization of serviced offered to satisfy the citizens' needs. The governmental officials found that workshops and seminars have been an effective way for enhancing the technical skill of people.

6) The Third Stage Approval: Delivery Channel Creation

The last duty assigned for offering e-government streamlined services has been delivery channel creation. The probability of using different delivery channels identified by the proposed model is analyzed. The delivery channel approval has been based on the availability and benefit of channels. The channels approved for this government may not be suitable for other governments. The delivery channels, including communications centers and governmental offices, successfully approved by other developing countries, may be different. After a brainstorming meeting with the participants, we found that these delivery channels have not been suitable for the government understudy. Therefore, we have agreed after discussions with the government officials that the most useful choice is to use the local departments offices for providing e-government services. The approval decision for such offices has been taken based on the feedback we received from the participants during a previous seminar.

7) Observations

Many observations and documents of the participants' opinions are recorded through the case study shown by using analysis content approach employed by qualitative research for identifying, classifying, and summarizing the qualitative data [21]. The results indicate that the streamlined services can be offered by applying the proposed model. Furthermore, the transaction stages cannot be completely implemented without governmental departments integration. The observations find can be indicated as follow:

a) Reduction of Detailed Processing Processes of E-Government Implementation to the Least Limit

By applying the case study, many official and non-official discussions on the processes and activities identified by the maturity and empowerment model have been done. Moreover, the discussions on the four-stage model approved by the government under study are held at the beginning for developing its e-government projects. Although the government has achieved different activities and the proposed model's objective, it has not realized its goal because of the absence of a detailed processing plan. The participants have expressed their satisfaction to the activities and detailed processes identified by the proposed maturity model. They indicated that detailed activities have been very useful for understanding the requirements of maturity and empowerment levels and for planning for the next level.

The first participant working as an employee at e-government has demonstrated his observation. He said, "The activities identified by the model support suitable strategies establishment for implementing the e-government services and they will save time and effort". The case study team members at governmental information technology department believe that the activities systematically arranged at the proposed model stages will provide the government with more clarifications. The second participant working as information technology expert added "The activities identified by the model are beneficial and support government for prior planning for the second stage and thus the activities set in advance save more time when designing the implementation strategies".

One of the government employees has shown that the name of the stage expressed the meaning of service efficiency, not the technological efficiency. This supports the government when comparing the project findings with the e-government objective. Although the service maturity has resulted from the applied technology, the employees found that it has been easy to understand in context of service provision. The abovementioned results have advocated the first assumption stipulating that efficiency models should have comprehensive processes for supporting the government when designing the sustainable and secured e-government services.

b) The Services Unification through Integration and Efficiency Enhancement

All governmental departments have approved an approach from government to citizenship when dealing with the e-government. Specific services (such as downloading applications, reviewing application status, checking examinations results, etc.) have been provided through departments' specific services. However, there have been no effective services as they required users to visit the governmental departments for completing transactions. The case study indicated that the proposed model has supported the government for offering governmental streamlined services inside the department. All e-government systems in all geographical locations have been integrated for establishing a unified system permitting the terminal offices to offer all governmental services in shorter time and less effort. The case study participants

have agreed that the efficiency of governmental processes has been achieved by streamlining the sustainable and secured e-government services. The manual processing of information has been cancelled, and thus the governmental employees working at terminal offices have had the ability to take simultaneous decisions and handle the users' requests in the real time. Accordingly, the work efficiency has increased.

Moreover, depending on the integration portal service has achieved good performance as the government will save costs and less effort will be made when integrating and implementing the sustainable and secured e-government services by using cloud computing portal. However, the availability and reliability of cloud computing resources for the government under study is still an issue. Therefore, the government requirements are to adopt an inventiveness to launch a cloud infrastructure or enact laws and set suitable policies for private or public cloud usage to offer the sustainable and secured e-government services. Subsequently, the cost and benefit analysis has indicted that the cost of cloud establishment is very high, so that it may be less useful for the developing countries. However, once a good infrastructure is established, the total cost of operation will be very low when comparing with the traditional projects of e-government. Regardless of issues related to governmental systems integration, the integration should be implemented before the transactions stage to streamline the sustainable and secured e-government services. Efficiency has been considered as an aspect of the sustainable and secured e-government services. An efficiency in the light of cost, time, and effort that were effective in the proposed model are examined. The second assumption, indicated that the proposed model should support governments for offering sustainable streamlined services, has been verified.

c) Using the Latest Techniques is a Basic Requirement for Offering the Sustainable and Secured E-Government Services in the Developing Countries

The observation results indicate that using latest techniques for implementing and offering the sustainable and secured e-government services has increased the government productivity and permitted access to more beneficiaries of e-government. The proposed efficiency models have suggested different activities at different stages that focused on employment of latest techniques including usage of social media in the initial stage and employment of computer resources shared between the governmental departments through the cloud computing portals and etc. Such latest techniques also include cloud-based integration to streamline services and electronic wallets usage for handling transactions. Moreover, employment of latest techniques for performing the e-government activities has been effective when comparing the cost of latest techniques with old ones. Accordingly, the e-government services may be supported to be sustainable and secured. The government officials have seen that designing approaches to be directed to citizens for offering services will be very beneficent. It will make communication between government officials and citizens easier and more transparent.

B. The Survey

The survey seeks to analyze the reliability determinants in the light of sustainability. The survey has been made in the same geographical location of the case study.

1) The Study Assumptions

Two assumptions for the survey have been proposed. They have been identified by considering the reliability determinants identified by the sustainable and secured e-government services.

- **The Third Assumption**

The quick accessibility to the e-government services will gain the users' approval on a larger scale.

- **The Fourth Assumption**

Increasing awareness and trust in the sustainable and secured e-government services will have a positive effect on the users' decisions related to such services approval.

2) Data Collection and Analysis

A questionnaire for collecting data has been conducted. This questionnaire included specific questions that required nearly one hour for completion. The questionnaire structure has depended on the reliability determinants. Four general questions and fourteen objective questions have been asked for knowing the participants' opinions and ideas. The psychometrics ranging from 1 to 7 have been employed for verifying and validating the participants' opinions related to all aspects. Subsequently, the designed questionnaire has been tested by four researchers in this field. The questionnaire format has been changed as appropriate depending on observations and

TABLE I
PARTICIPANTS WHO USE TOOLS OF INFORMATION AND COMMUNICATION TECHNOLOGY AND AWARENESS

Description	Number
Participants who had computers	20
Participants who had smart phones	100
Participants who were able to access the internet	90
Participants who were acquainted with the e-government services	40

TABLE II
THE DIFFERENCE IN THE E-GOVERNMENT SERVICES APPROVAL

Implementation Time	E-Government Approval	
	Yes	No
Before the Efficiency Model Implementation	40	80
After the Efficiency Model Implementation	100	20

feedback from the pilot test.

Questionnaires have been distributed to selected participants and a final period not exceeding 3 weeks has been specified for participation. However, some participants have not completed the questionnaires. Therefore, the researcher has collected the responses by interviewing the concerned participants. The data collected by the qualitative and quantitative methods have been analyzed. The analyses have examined the participants' viewpoints regarding the public e-government services for following a sustainable and secured approach for the e-government. Moreover, other data analyses, such as the quantitative data regression analysis and qualitative data deductive approach are made. The regression analysis has been made to identify how the sample individuals have been dependent on the sustainable and secured e-government services reliance on the proposed assumption related to accessibility, trust, and awareness.

3) The Survey Context

The government under study started the e-government project in 2015 to reduce the corruption level to the minimum degree and enhance the governmental services compatibility to satisfy the users' needs. Although the time specified at the plan declaration has expired, few projects have been achieved. The reasons behind this delay have been related to:

- Difficulty to access technology
- Services nature
- Awareness and Trust
- Poor participation of citizens in the e-government activities

The survey has been conducted on 100 university students and 50 local inhabitants in the city. Both samples have a relative level of knowledge of technology. The age of participants, who have basic skills in information technology and passed the secondary education, has been at least 18 years old. Stratified random samples have been used for identifying the sample size. Such stratified samples are used when there are many subsidiary groups or groups inside a group. Accordingly, the sample sizes can represent inhabitants in a proportional manner. 125 responses, including 120 right responses, have been received. Five questionnaires have been ignored. Therefore, 120 questionnaires have been used for final analysis.

4) The Survey Results

The survey results have been indicated in two separated parts. There are two separated approaches used for analyzing data.

- **The Participants' Feelings on the Sustainable and Secured E-Government Services**

The self-questionnaire has provided a valuable insight on the users' opinions concerning the sustainable and secured e-government services. The frequency analysis has demonstrated some attractive results on the usage of the sustainable and secured e-government services and accessibility to ICT tools before implementing the proposed model.

Among many factors affecting the users' behavior and intentions towards the e-government approval, accessibility to the sustainable and secured e-government service has appeared as the most important factor as indicated in Table I. Only 20 participants had computers, while 100 participants had smart phones. In addition, only 90 participants were able to access the internet, and only 40 participants were acquainted with the sustainable

TABLE III
INITIAL REGRESSION ANALYSIS

Quadrature Adjustment	0.966
Standard Deviation	0.34

and secured e-government services. Because there have been only few participants who used technological services, it has not been possible to believe that this factor was the main reason for the non-success of the sustainable and secured e-government services approval in the developing countries. After implementing the proposed model, the participants' opinions have greatly changed. Table II has clarified the difference in the e-government approval before and after the model implementation.

The results obtained from the answers is organized in three different aspects: accessibility, awareness and trust, and quality of services. Some keywords that were frequently mentioned in the response, such as mistrust, inaccessibility to technology, lack of awareness, and poor information are identified. The users' opinions have been classified based on such keywords to be analyzed.

- **The Effect of Quick Accessibility on the Sustainable and Secured E-Government Services Approval**

The first determinant for the viable efficiency model of e-government according to the citizen's viewpoint is the accessibility to the sustainable and secured e-government services. We have supposed in the proposed model that accessibility to services may encourage more citizens to use the sustainable and secured e-government services and can motivate such services approval in the developing countries. The survey has approved this assumption and indicated that inaccessibility to technological services; including unavailability of internet, smart phones, computers, etc., has negatively affected the users' intentions to approve the sustainable and secured e-government services. The participants have agreed that they would prefer using the sustainable and secured e-government services as they have been easier. Moreover, most participants shared the same opinion that the process for obtaining and verifying a national identity card has taken less time. The different locations prepared by local government departments for offering the e-government services have enabled the participants who had no access to computer or internet to access the e-government service. The participants have demonstrated that increasing the delivery channels represented by the portable service stations of e-government will be effective for the local community.

- **The Effect of Awareness and Trust on the Citizens Participation in the E-Government Activities**

The second determinant has produced a critical role in designing the practical e-government efficiency model related to the sustainable and secured e-government services. Increasing the awareness of citizens and promoting trust in the sustainable and secured e-government services constituted the base for this determinant. The trust in the electronic transactions system has a great effect on the citizens' intention toward the e-government usage. Before implementing the efficiency model, the participants have found that the electronic transactions repeated were incorrect in most cases. This means that reoperating the process was very essential. The participants have frequently completed the service by visiting the governmental departments. Moreover, some participants, especially those whose ages ranged from 45 to 55, have established strong personal relationship with the governmental official over years. Therefore, they have become more confident when completing their services.

The participants have discovered that the governmental initiatives for building trust by launching various campaigns and enacting many laws concerning security and privacy of online transactions have been important initiatives. Moreover, the workshops organized by government in the local community on ICT have assisted in building trust among people to use the sustainable and secured e-government services. The online communication though social media has widely disseminated among users. The participants have seen that government's web and social media pages included extensive information on the governmental activities. However, they expressed their concerns about content and its type on the governmental portal. Some participants found that poor quality of the sustainable and secured e-government services have not encouraged them to use such services. They also stressed that trust would originate from the service type offered by government.

TABLE IV
REGRESSION ANALYSIS RESULTS

	R2	Standard Deviation	Statistic T	P Value
Intervention Information	0.8011	0.36799	2.19879	0.027
Accessibility	0.172	0.057986	2.79988	0.006

- **Quality of Service**

Quality has been defined as the type and importance of information, the response time, and availability of assistance and support. This definition is not compatible with the developing countries. The participants have found that governmental websites were not compatible to smart phones and specialized devices. The websites have been designed to work on specific devices, and browsers have been prevented from accessing services by non-users of computers. The participants have agreed that smart phone-friendly designs that are independent from devices, encourages users to access online services. Some participants have found that unavailability of language choices on the government website has made it difficult to be used. They also indicated that the applications are complicated as the used abbreviations have not been correctly described, and their contents have been badly maintained. In addition, the interface of such website has not been easy-to-use. Therefore, some participants have ceased usage of the e-government online application after using it multiple times. There is not any assistance or technical support for customers when needed. The participants' participation in using the sustainable and secured e-government services would increase if such issues were resolved.

5) Assumption Validation

The responses are documented and classified using SPSS programs for analyzing the statistical data. The multiple regression analysis has been made for examining the independent variables effect (accessibility, trust, and awareness) on the dependent variable (the users' intentions towards the sustainable and secured e-government services approval). Table III indicates the regression analysis results.

There are 120 correct answers that have been submitted by participants of survey analyzed. The analyzed cases have offered important results supporting this assumption. As indicated in Table IV, the quadratic equation value R represents the variance level for the dependent variable when altering the independent variable. The regression analysis shows that the quadratic equation value R was nearly 96.6%. That proves that the decision of the sustainable and secured e-government approval greatly relied on accessibility, trust, and awareness. On the other hand, the remaining decisions ratio (nearly 3.4%) has been affected by other factors.

The regression analysis indicated in Table IV displays that all three independent variables: Accessibility ($p > 006$), Trust ($p < 0.009$), and Awareness ($p > 0.008$) have important values. The variables have been considered important as they affect the dependent variable when p less than 0.05. The values that have been restored from p less than 0.05 proved the assumption that accessibility, trust, and awareness affected the users' decision for approving the sustainable and secured e-government services. The analysis also demonstrated that accessibility has the greatest effect ($R2 = 0.172$) on the users' decision, followed by awareness ($R2 = 0.137$) and trust ($R2 = 0.079$).

C. Validity

There is always a danger of bias that is expected for the results of surveys and cases studies, and thus we have tried to reduce it. Accordingly, some students are trained and employed for reliability as they are not directly associated with research and studies. We have affirmed before launching the investigation that availability of resources and participants is necessary for any experimental investigation. The participants have been selected based on specific criteria to be able to understand questions. This has reduced the possibility of wrong questions and promoted data validity. Data from multiple resources is collected for the survey and case studies to minimize the effects resulting from interpretation of one data resource. We also compared these studies findings with other studies to reduce bias.

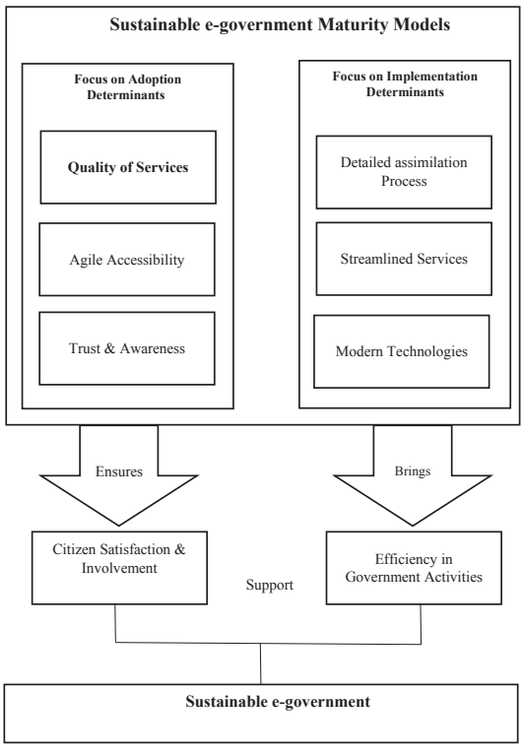

Fig. 5. The Determinants of Applicable Efficiency Model of E-Government.

V. Observations and Recommendations

We discuss here how our findings, obtained by evaluating validity of the proposed model contributing to the design of the sustainable and secured e-government services, are supported. For validating the new efficiency model, four assumptions have been supposed; two assumptions associated with the implementation of e-government services, and two assumptions related to such services approval. These assumptions have been designed to test how the identified determinants have contributed to the design of the sustainable and secured e-government services. The tested determinants including accessibility, detailed processing, streamlined services, trust, and awareness have been integrated into the new efficiency model.

For the first assumption, we have indicated that the detailed processing provided by the proposed efficiency model will contribute to the development of the sustainable and secured e-government services. The case study results have demonstrated that the stages of the sustainable and secured e-government services implementation and their processes identified by the new efficiency model are simple. Such results have presented a list including all detailed activities required for every stage. The governmental officials discovered that the detailed processes have saved more time which was required when evaluating and implementing some services. Moreover, the predetermined activities contributed to better preparation of governments to set strategies for implementing the e-government services and saving time. The governmental officials have realized that predetermined group has saved more cost and effort. That has proved that inclusion of detailed processing process in the efficiency model would support the design of the sustainable and secured e-government services.

Moreover, we made discussions on the second assumption indicating that streamlined systems of e-governments would support the provision of the sustainable and secured e-government services. The arrangement of stages has been one of the most critical problems existed in the efficiency models of e-government. The integration of e-government systems should be achieved before the transactions stage. Accordingly, streamlined services could be offered for the users in the developing countries. The findings also highlighted that local departments integration in regions has contributed to streamlined services

provisions for users. This has saved the time consumed in services provision and achieved more satisfaction. Particularly, the governmental systems integration has cancelled the processes of manual paper verification occurred in the governmental departments. Therefore, the new procedure of implementation stages has verified that government may offer streamlined services by approving the new model.

For the third assumption, we expressed that accessibility to the sustainable and secured e-government services can be ensured to achieve more satisfaction among users. We have examined this assumption by employing the regression analysis. After explaining that approval of e-government services has been associated with human behavior, approving a determinant for quick accessibility to be an independent variable would be affected by the users' intentions toward the e-government services approval. The regression analysis has restored a predictive value for accessibility less than 0.15 which is an important issue. The variance in e-government usage patterns has also shown that more users have approved the e-government services after implementing the new model. This has been a proof that accessibility to e-government services has gained more approval by users.

For the fourth assumption, we expounded that trust and awareness have been an important determinant affecting the user's decision regarding e-government services approval. The regression analysis has demonstrated that trust and awareness have greatly contributed to the users' decision regarding the approval of e-government services. The p values for trust and awareness have been less than 0.15. The questions have highlighted the users' opinions expressing that government efforts for building trust and increasing awareness have promoted them to use the e-government services. Therefore, trust and awareness have been proved to be positive contributions to the users' decisions regarding the e-government services approval.

The case study and survey findings have proved that inclusion of determinants into the new proposed mode would contribute to the design of the sustainable and secured e-government service.

Another new determinant has appeared. This determinant presented the offered services as an important contributor to decision making regarding the e-government services approval. Most participants have declared their opinions on the screen types and contents that made the e-government less attractive. They also expressed their feelings to the government on the enhancement of the sustainable and secured e-government services quality. Accordingly, the services quality must be included as the sixth determinant for designing the sustainable and secured e-government services as shown in Fig. 5.

VI. Conclusion

This research paper proposed maturity and empowerment model for the sustainable and secured e-government services. Many restrictions on the current efficiency models of e-government have been noticed. One of the main issues explored by the study has been the linear patterns of e-government development stages. The technology-based nature, and lack of detailed processes and latest technology have been also highlighted. We have found that incompliance processing of e-government projects and efficiency model stages of e-government has resulted from such restrictions. Accordingly, non-sustainable governmental services have originated.

Therefore, based on restrictions imposed on the current models, some determinants for achieving the efficiency model applicable to the e-government have been identified. This model has been required for developing the sustainable and secured e-government services. Based on determinants, a new model in the light of sustainability and security of e-government services is proposed. The main feature of the proposed model has been integration of implementation and application stages for realizing the governmental services efficiency to satisfy the citizens' needs. The case study's results have proved that detailed processing processes and streamlined approaches for offering services have been the most desired factors for the sustainable and secured e-government services from the perspective of implementation. The proposed model has supported the governmental departments to efficiently offer the e-government streamlined services. The survey results advocated the assumption that proposed adoption determinants have been essential for the sustainable e-government services. The regression analysis has been employed for analyzing the effect of proposed determinants on the users' decision regarding the e-government services approval. The study also indicated that determinants have played an essential role in the users' likelihood to approve e-government services.

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