

# A PROPOSED MODEL FOR ENHANCING E-GOVERNMENT SERVICES TO ACHIEVE THE SUSTAINABLE DEVELOPMENT GOALS IN EGYPT " CASE STUDY"

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## ABSTRACT

In light of the increasing interest of governments in e-government and achieving the sustainable development goals 2030, the governments seek to provide new e-government services and develop strategic plans to achieve the SDGs. This study clarifies the contribution of E-government services in achieving SDGs and the relationship between them and describes how can Enhance e-Government services to achieve SDGs in Egypt.

The primary goal of this paper is to present a model for Enhancing E-government services in order to contribute to achieving some sustainable development goals. and also to enhance the researchers and anyone who wants to improve, add a new service to E-government services, or to achieve the SDGs and their domains with data and methods that help them ease of choice and decision making.

This study proved that there is a relationship between E-government services and sustainable development goals, and there is an effect of Enhancing E-government services on achieving the sustainable development goals. in this study, the Blockchain technology was being integrated into the E-voting system to submit the prototype of the Egyptian E-Voting System, and that is the significant improvement point against the traditional voting system as the users can cast the vote and check the results after completing all processes by using the web application. the improvement of This service will contribute to the achievement of 18 targets from SDGs.

**Keywords:** *Sdgs; E-Government; UN; Egypt; E-Government Services; Sustainable Development Goals; Means Of Implementation [Moi]; Blockchain; E-Voting*

## 1 INTRODUCTION

On September 2015, on a historic UN Summit and in the presence of 193 countries. The 2030 agenda for Sustainable Development Goals [SDGs] was adopted, which included 17 SDGs that aim at reaching 169 targets, which will be monitored and evaluated through 232 indicators. These indicators are measured by percentages, prevalence rates, participation rates, assistance amounts, averages and other methods that need continuous and accurate data collection. These social indicators and data should be of high-quality, timely and easily accessible, reliable, and sufficiently disaggregate to achieving the Sustainable Development Goals. [1] .

The technology plays an important role in monitoring SDG indicators and achieving its goals through highlighting and supporting the articulation

of technology as an explicit Means of Implementation [MoI] under SDG17.

E-government [electronic government] is increasingly a global phenomenon that is consuming the attention of politicians, policymakers, and even ordinary citizens. Governments around the world continue to make massive financial and political commitments to establish e-government and that form a significant part of the government investment portfolio in almost around the world. Now, there is a strong interest in developing Internet applications and working towards technological transformation as they are a powerful tool that can change the relationship between government, citizens, and the business sector, in general. [2] [3] [4]

E-voting is the most adopted electronic system worldwide that represents the democracy of the

election. Therefore, most countries continue to improve the E-voting process.

Blockchain technology provides a decentralized architecture that distributes digital information synchronously among the P2P network without a central database. Hence, this study proposes a Blockchain-based E-Voting System to enhance the integrity, optimize the voting process, produce consistent voting results, and strengthen the transparency of the voting system.

## 2 RESEARCH BACKGROUND.

### 2.1. The Sustainable Development Goals [SDGs]:

On September 2015, on a historic UN Summit and in the presence of 193 countries. The 2030 agenda for Sustainable Development Goals [SDGs] was adopted, which included 17 Goals that aim at reaching 169 targets, which will be monitored and evaluated through 232 indicators. [As shown in

Figure 1 United Nations – SDGs ] [5] [6] [7] . These indicators are measured by percentages, prevalence rates, participation rates, assistance amounts, averages and other methods that need continuous and accurate data collection [8]. The SDGs are built on the Millennium Development Goals [MDGs]; a set of eight time-bound and quantified goals that led the worldwide efforts to meet the needs of the world's poorest between the years 2000 and 2015. [9] [10].

The United Nations Statistical Commission [11] is the body within the UN system which responsible for the development of a global indicator framework for monitoring the progress towards the achievement of the SDGs that comprise a new broad range of economic, social and environmental objectives. And over the next years, the countries will mobilize efforts to end all forms of poverty, fight inequalities and tackle climate change ensuring that no one is left behind.



Figure 1 United Nations – SDGs

One of the challenges in implementing Sustainable Development Goals [SDGs] is a measurement of indicators that represent progress towards such goals. As Measuring such progress enables data-driven decision making and helps the management of SDG-relevant projects and strategies. [9] Another challenge is that the efforts were mostly focused on the goals but, not enough for achieving them [12].

Acknowledging this shortcoming, the SDGs point out that the Means of Implementation [MoI] are the key to the realization of the SDGs and that they are equally important as the rest of the goals and targets. So, the agenda dedicates one full goal [SDG-17] to the articulation of such means. [9] [As shown in Figure 2 - The Means of Implementation [MoI] ]

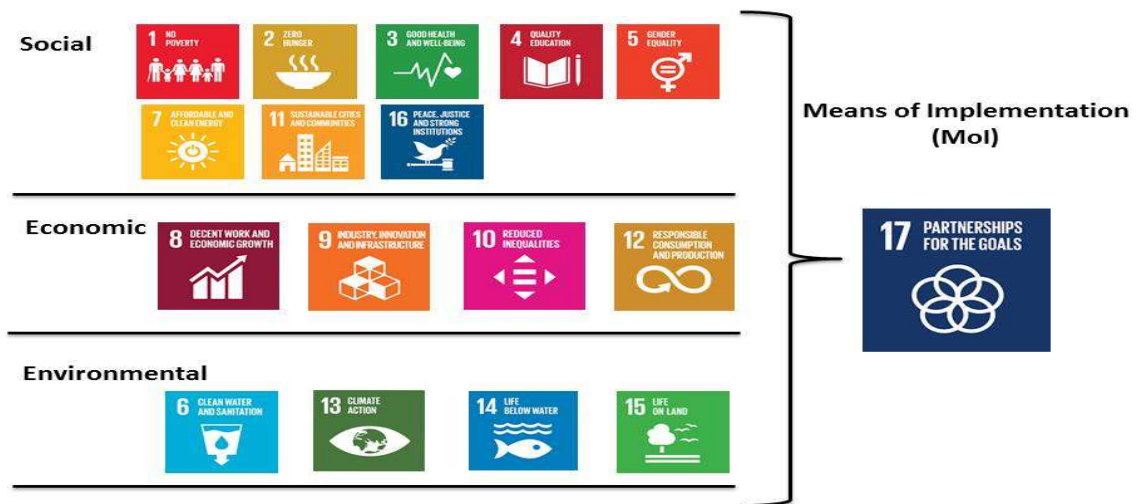


Figure 2 - The Means of Implementation [MoI]

### The Means of Implementation [MoI]: [9]

The concept of [MoI] is broader than gathering resources but, it also encompasses the institutional frameworks, the formal and informal arrangements that determine how public decisions are made and how public actions are carried out and also governance issues required for achieving the SDGs which considered crucial for implementing the 2030 Agenda because it underlies all of the SDGs [13] [14].

The MoI are a mix of financial resources, technology development and transfer, capacity-building, inclusive and equitable globalization and trade, regional integration, as well as the SDG-enabling environment on the national level, particularly in developing countries [15].

The Means of Implementation [MoI] that are relevant to this research are those ones related to technology more specifically to digital technologies as well as data and statistics for monitoring, accountability, innovation and technological

advancements which are needed to meet the aspirations of the SDGs and necessary to monitor progress, conduct integrated policy analysis, and effectively implement the 2030 Agenda.

### 2.2. E-Government: -

The United Nations Department of Economic and Social Affairs [UN-DESA] defined the E-government as the use of ICTs to deliver more effective and efficient government services to citizens, businesses and governments by achieving public ends using digital means to improve the internal workings of the public sector by reducing the financial costs and transaction times, better integrate workflows and processes and to enable effective resource utilization across the various public sector agencies aiming for sustainable solutions [16].

The primary models of E-government are divided into: Government-to-government [G2G], Government-to-Business [G2B], Government-to-Citizen [G2C] and Government-to-Employees [G2E]. [17]

E-government aims to make all necessary services equally available, secure safe, privacy and more efficiently delivered and also it improves communication and citizen participation and accomplishes organizational missions and goals, as well as increasing the economic competitiveness, managerial effectiveness and citizen satisfaction. [18] [19]

#### **E-Government services in Egypt: -**

Great efforts are made by the Egyptian government to develop an appropriate framework for the digital transformation in all ministries and government agencies. Most of Egypt Ministries have websites, provide E-Government services and has a lot of citizen data that is not collected in one database. So, important steps are being taken in developing E-government services and E- payment methods.

Currently, Egypt has a lot of service providers that are available to citizens. Egyptian governmental websites became more sophisticated and contain much more information on Laws, Regulations, and policies. It has initiated enact many laws and policies that contribute in the process of digital transformation and enabling e-government services such as, law No.15 of 2004 regards to Organize the E- signature [20] and Law No. 175 of 2018 regards to combating information technology crimes [21] .

### **2.3. The National Elections Authority**

The National Elections Authority [NEA] [22] was established in the Arab Republic of Egypt in 2014 as an independent body, exclusively concerned with administering referendums, presidential, parliamentary and local elections, starting with preparing and updating the voter database, proposing to divide districts, determining the controls of advertising and financing, electoral spending, advertising it, and monitoring. It also facilitates voting procedures for Egyptians living abroad, and other procedures until the results are announced. And it is all regulated by law.

The most prominent provisions of the law that regulate the National Election Authority [NEA] are the commission's guarantee of the right to vote for every voter, the commission's commitment to equality between all voters and candidates during referendums and elections.

#### **The available E-Service in [NEA]: -**

The Find out Constituency Service [FOCS] is one of the services that are provided by the National Election Authority [NEA] [22] that available on the Egyptian e-government portal [23].The [FOCS] background could be divided into two stages. The

first stage is before initiating the service, and the second stage is after initiating it:

**First:** The situation before initiating the [FOCS]: Prior to the establishment of the National Election Authority [NEA], Egypt had multiple election management bodies. Up to 2010, the Ministry of Interior managed all elections except for the 2005 presidential elections which were administered by the Presidential Elections Commission, a body established as a result of the amendment of Article 76 of the 1971 constitution, the amended article called for direct elections for the president rather than a referendum to renew the term of the incumbent president. From 2011 to 2016, elections have been administered by different election commissions, all comprising full judicial representation. Presidential elections were administered by A Presidential Elections Committee, while a High Elections Committee administered referenda and parliamentary elections, and both committees were supported by civil servants seconded from different state institutions. The 2014 Egyptian constitution mandated the creation of an independent NEA, the competent authority for the administration of all electoral events in Egypt [elections for the president, the parliament, local councils, and referenda]

**Second:** The situation and benefits after initiating the [FOCS]. Egypt's National Elections Authority has launched an online service to help voters to find their constituency and their polling stations, using their national identity card number. Instead of the paper statements.

### **2.4. Electronic Voting**

E-voting is the most adopted electronic system worldwide that represents the democracy of the election. [24] Therefore, most countries continue to improve the E-voting process.—[25] Electronic Voting [E-voting] is simply an electronic system, in which voters use electronic devices to cast their votes during an election process. [26] While I-voting is nothing but remote E-voting [internet accessible].

In 2005, the first digital voting had been conducted in Estonia. [27] In this e-voting system, Estonian citizens used their national identification [ID] cards as the credential that is required. Besides, a voter may use their mobile to identify themselves for e-voting, through using mobile phones with SIM cards to authenticate their identity and sign in through a system called Mobile-ID. [28]

## 2.5. Blockchain

Blockchain was invented in 2008 by pseudonymous Satoshi Nakamoto [29] to manage Bitcoin, a cryptocurrency network. Blockchain is an algorithm designed free of any agencies, mainly to manage electronic information without any central administrator. [30]

Blockchain technology is a database of records of transactions that are distributed, validated, and maintained by a network of computers around the world. Instead of a single central authority such as a bank, these records are supervised by a large community and no person can control them and no one can go back and change or erase a transaction history [31]. The implementation of blockchain is transparent and cannot be tampered with due to blockchain's built-in distributed nature of structure and confirmed guarantees by the peers, [32] as compared to a conventional centralized database. Blockchain architecture can be mainly divided into three layers: the first is Applications which are the top layer of the network followed by the Decentralized Ledger and the bottom layer is the Peer-to-Peer Network. [33]

## 2.6. Blockchain based E-Voting System

Introducing blockchain technology in the E-voting protocol strengthens the security of the e-voting process and protects the privacy of each voter. The blockchain-based e-voting protocol is

decentralized and does not need to rely on human trust and preserves its security and its privacy on a high-level scale. [34] [35]

In Blockchain-based e-voting, the registered voter has the right to vote using their electronic devices connected to the Internet. All the vote records will be publicly distributed and can be verified by any intended personnel, records could not be manipulated and no one is able to corrupt the E-voting process and also illegitimate votes could not be added. As other voters would be able to see the record if ballot tampering occurred [36] [37], and all the votes can be recorded, managed, counted, checked, verified by the voters themselves. [38]

## 3 A PROPOSED MODEL FOR ENHANCING E- GOVERNMENT SERVICES TO ACHIEVE SDGS.

As the scope of this research is E-government services and the sustainable development goals in Egypt, we will display a proposed model for Enhancing E-government services to achieve SDGs.

The study describes how can enhance E-Government services to achieve SDGs in Egypt. The enhancing process will take place in four stages [Ensure the basic research idea, find an E-Gov. service that can improve, Stakeholder participation, and improvement process]. [As shown in Figure 3- A Proposed Model To Enhance E-Gov Services To Achieve SDGs]

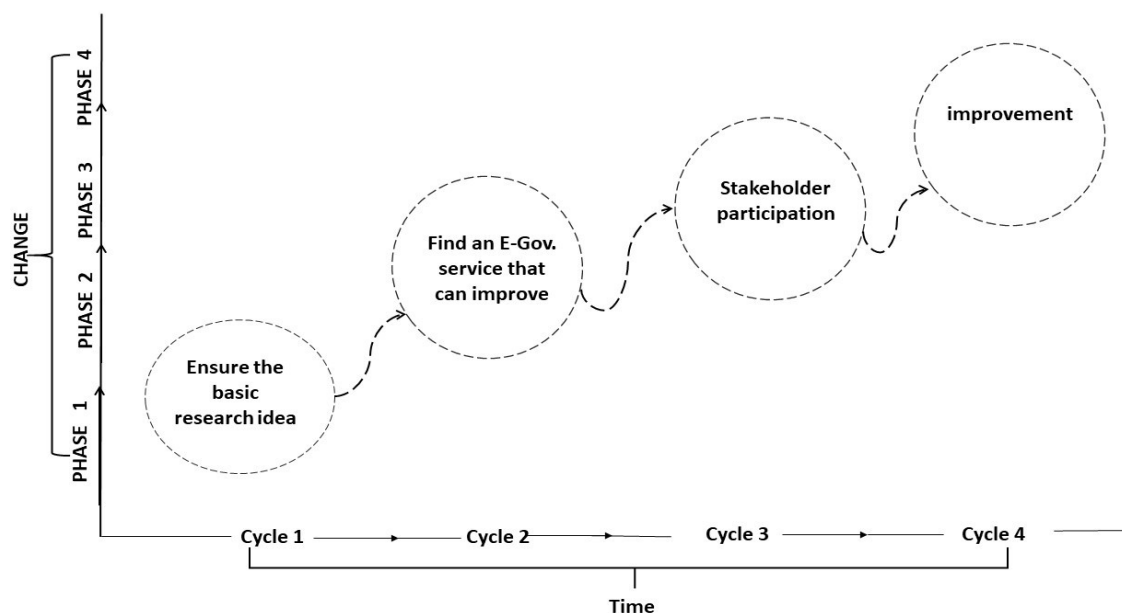


Figure 3- A Proposed Model To Enhance E-Gov Services To Achieve SDGs

**Phase 1: Ensure the basic research idea:**

The goal of this stage is to prove the basic idea of the research to confirm the existence of the relationship between available e-government services that will be enhanced and the goals of sustainable development.

**Phase 2: finding the E-government service that can improve:** this Phase is to find the E-government service that will be improved and then classify this service according to SDGs.

**Phase 3: Stakeholder participation:** in this phase, the target group of the improved service is shared to learn and visualize their opinions, whether by using personal interviews, questionnaires, or other methods. to benefit from their feedback on our selection of the previously identified service in the second phase.

**Phase 4: improvement process:** In this Phase, work is being done to improve the service after completion and achievement of the previous Phases.

**4 APPLICATION.****Phase 1: Ensure the basic research idea.**

The aim of this Phase is to prove the basic idea of the research and to confirm that there is a relationship between E-government services and sustainable development goals. E-services in Egypt were collected, sorted, and tested, then classified according to SDGs. And E-services were being linked to SDGs to derive an assessment matrix of Egyptian E-government Service Parameters towards achieving SDGs and targets. E-services were displayed, sorted according to the research limits, which identified 67 Government Websites. 34 for Ministries, 25 for Governorates and 8 for Governmental Organizations other than the E-Government Portal Verifying whether services are available or not.

During this stage, E-services were classified according to SDGs covering domains of: Health, Social Protection, Economic Growth, Employment & Decent Work, Environmental Protection, Public Security and Education. E-services were then corresponded to SDGs to obtain the Egyptian E-government service parameters assessment matrix to achieve the available sustainable development goals as described in the first stage.

This service is The Find out Constituency Service [FOCS] is one of the services that are provided by the National Election Authority [NEA] through that available on the Egyptian e-government portal. Where the National Election Authority announced in the press that there are more than 59

towards achieving SDGs and targets. These data include:

- Tables which contain the list of E-government services available in Egypt, and List of Egyptian Ministries, Governorates, and other Egyptian Governmental Organizations.
- Clarification mapping which Classifies E-government Services According to SDGs Domains.
- Assessment parameters matrix used in Egyptian E-government Services to achieve SDGs and targets.

At the end of this study and upon sorting and testing e-services, it was found that there are 16 E-government service providers. Upon classification of SDGs only 8 services providers match SDG domains, and despite the low number of Egyptian e-services and their domains, it contributes towards the achievement of 11 goals [about 65%] and 33 SDG targets [about 20 %].

This study has found that almost all Egypt Ministries and other governmental organizations have websites, mostly used for providing structural information functions, activities, news, and services helping in achieving SDGs, and also Our study provides to the researchers and anyone wants to improve, add a new service to E-government services or achieve the SDGs and its domains with data that help them ease of choice and decision making.

This phase has been published in research under the title "Evaluating the Contribution of E-Government Services Achieving Sustainable Development Goals [SDGs] A Case Study of Egypt " [39]

**Phase 2 –Finding the E-Gov. service that will be improved.**

The aim of this Phase is to Finding the E-government service that will be improved. This service was chosen from one of the available e-government services that help

million voters [40] registered for the presidential election. Voters do not have to specifically register to vote but, the voter register is compiled using citizen information stored in a national identity card database. The personal information of all Egyptian citizens possessing a national identity card who are above 18 years of age and are eligible to vote is automatically transferred from the national identity

card database to the voter registration database and Persons who are not eligible to vote are removed before the final voter lists for each polling station are prepared. As described in the Research Background.

This work proposes the Conversion of Egyptian election schemes from the paper election form and manual counting system to the E-voting system. The reason for choosing the services of the National Electoral Authority is due to the following:

**First:** The National Election Authority [NEA] services target more than 59 million voters. [40]

**Second:** The E-service of [NEA] was classified according to SDGs. that covering 5 goals and 18 targets from SDGs [6 Social targets, 6 Economic targets and 6 Means of Implementation [MoI] targets. [ As shown in Table 1] - [As shown in Figure 1 and Figure 2 ]

Table 1 - E-service of [NEA] classified according to SDGs

S	Domain	SDGs NO.	Targets NO.	Total Targets
1	Social	1	4	6
		6	5,6,7,10,B	
2	Economic	9	5,A,C	6
		10	2,3,6	
3	[MoI]	17	6,7,8,14,16,17	6
Total		5	-----	18

### Phase 3: Stakeholder participation

This Phase aims to Stakeholder participation through a statistical study to confirm that there is a statistically significant relationship between E-government services and sustainable development goals "Confirmation of the Phase 1", and proving the impact of Enhancing E-government services on achieving sustainable development goals when applied in the Arab Republic of Egypt "Confirmation of the Phase 2 ". The descriptive methodology was followed, which relies on studying the real phenomenon and describe it accurately. Quantitative methodology was used to study and analyze the data. rates, percentages, statistical tests were used as analysis tools to come up with conclusions upon which the study proposals are based. To process the collected and statistically analyzed data, the Statistical Package for Social Sciences [SPSS] [41] version 25 was used for all these research aspects.

#### i. The hypothesis: -

**H1** - There is a statistical relation between E-government services and sustainable development goals.

**H2** - There is a statistically significant impact on Enhancing E-government services to achieve sustainable development goals.

#### ii. Limitations: -

- **Objective limits:** this study is limited to proving the relationship between E-government Services and sustainable development goals and proving the impact of Enhancing E-government services on achieving sustainable development goals.
- **Human limits:** Citizens of Arab Republic of Egypt.
- **Time limits:** 1/2021 – 4/2021.
- **Place limits:** Arab Republic of Egypt.

#### iii. The study sample: -

The study community in this study is the Egyptian citizens who represent more than 100 million [42] and The National Election Authority [NEA] services target more than 59 million voters [40] , so the researcher chose a sample of "385" according to Stephen Thompson's [43] equation[ As shown in Equation 1] as it represents the best for the study community.

$$n = \frac{N \times p(1-p)}{\left[ N-1 \times \left( d^2 \div z^2 \right) \right] + p(1-p)}$$

Equation 1 - Stephen Thompson's equation

#### iv. Study instruments: -

- Building the study instrument

The researcher designed a questionnaire and used primary sources for valuable information and data in the questionnaire sections, determining an appropriate scale as the researcher used five-point Likert scale, according to the following form: - [5] Strongly agree, [4] agree, [3] neutral, [2] disagree, [1] strongly disagree

- Questionnaire description

To measure the study variables" Independent variable is E-government services and Dependent variable is Sustainable

development goals”, a questionnaire was designed [Closed Questionnaire] and a letter was attached with the questionnaire to explain it briefly to the targeted people, and includes an introduction to the researcher also explains the study importance and how to fill out the questionnaire. With a statement that the information will be used for scientific research purposes only. The questionnaire consists of [43] paragraphs and it is divided into two parts as follows:

- **First section:** Consists of [7] paragraphs covering the respondents' personal data. They include the following: [gender - age - academic qualification - profession - e-government services use - satisfaction with services - the preferred method of payment].

- **Second section:** Consists of [36] paragraphs. They include the main variables [E-government services and the sustainable development goals] "According to the aforementioned classification in Phase 2 " and this section consists of two subjects as follows:

**First subject:** E-government services, includes [18] paragraphs covering the following points:

- 1- E-government services characteristics and it is divided on [6] paragraphs.

- 2- Familiarity with the National Elections Authority services and it is divided on [5] paragraphs.
- 3- Developing National Elections Authority services and it is divided on [7] paragraphs.

**Second subject:** sustainable development goals, includes [18] paragraphs covering the following points:

- 1- The effect of enhancing the National Elections Authority electronic services on achieving some sustainable development social goals proposed in [6] paragraphs.[ As shown in Table 1]
- 2- The effect of enhancing the National Elections Authority electronic services on achieving some sustainable development economic goals proposed in [6] paragraphs.[ As shown in Table 1]
- 3- The effect of enhancing the National Elections Authority electronic services on achieving means of implementation for sustainable development goals proposed in [6] paragraphs. [As shown in Table 1].

**Sample Description: -**

From the target group's personal data description, the repetitions and percentages were identified, and targeted group data results were summarized in the following Table 2 - Discription Of The Study's Sample

Table 2 - Discription Of The Study's Sample

S	Statement		Number	Percentage
1	Gender	Male	194	50.4
		Female	191	49.6
Total			385	100.00
2	Age	From 18: 29 Year	31	8.05
		From 30: 39 Year	129	33.5
		From 40: 49 Year	106	27.5
		From 50: 59 Year	83	21.6
		From 60 years and over	36	9.35
Total			385	100.00
3	Qualification	postgraduate studies	33	8.6
		University degree	212	55.1
		Above average qualification	61	15.8
		Average qualification	42	10.9
		Other	37	9.6
Total			385	100.00

4	Employment	Freelance	25	6.5
		Public sector	108	28.1
		Private sector	166	43.1
		Other	86	22.3
Total			385	100.00
5	Using E-government services	Yes	345	89.6
		No	40	10.4
Total			385	100.00
6	Satisfaction Level	Satisfied	309	80.26
		To some extent	68	17.66
		not satisfied	8	2.08
Total			385	100.00
7	Preferred Payment method	Cash - upon receipt	222	57.7
		Prepaid card	69	17.9
		Credit card	30	7.8
		Other	64	16.6
Total			385	100.00

**The previous table shows that: -**

1. The largest percentages of targeted group are males, whose percentage was 50.4%, while a female was 49.6% of the total number.
2. As for the average age groups, the largest percentage goes to who are between 30 years old to 39 years old, and their percentage is 33.5%. Followed by the age group from 40 to 49 years old and their percentage is 27.5%. Followed by the age group from 50 to 59 years old and their percentage is 21.6%. Followed by the age group from 60 years' old and above their percentage is 9.35%. Followed by the age group from 18 to 29 and their percentage is 8.05% of the total number.
3. The following percentages of qualifications were: University degree and their percentage was 55.1%. Followed by above average qualification and their percentage was 15.8%. Followed by other and their percentage was 9.6%. Followed by postgraduate studies and their percentage was 8.6%. This explains that the highest percentage is for those who have a university degree.
4. As for Employment, the highest percentage was for those who work in private sector companies and their percentage was 43.1% out of the total number of targeted people. Followed by public sector companies' employees and their percentage was 28.1%. Then by others and their percentage was 22.3%. Finally, freelancers and their percentage was 6.5%.
5. The percentage of E-government services users was the highest percentage of the sample, and it was 89.6%. While the non-users' percentage was 10.4% out the total number of the sample.
6. E-government services satisfaction percentage is 80.26% satisfied. Followed by neutral and their percentage was 17.66%. Followed by not satisfied and their percentage was 2.08%.
7. As for the payment method, the highest percentage of the percentage preferred cash-upon receipt, and their percentage was 57.7%. Then prepaid card and their percentage was 17.9%. Followed by others and their percentage was 16.6%, and finally credit card and their percentage was 7.8%.
  - Study Instrument Reliability:  
Questionnaire reliability means that the answer should be the same in case of distributing it on the same people. To measure the questionnaire validity, the researcher used the Reliability equation Cronbach's Alpha and the results are as follows.

Table 3 - Reliability coefficients of the study instrument and its different dimensions

S	Study subjects	Dimensions	Number of paragraphs	Reliability coefficient
1	E-government services	E-government services characteristics	6	.989
		Familiarity with the National Elections Authority services	5	.986
		Developing National Elections Authority services	7	.989
First subject reliability - E-government services			18	.994
2	Sustainable Development Goals	Achieving some social goals	6	.988
		Achieving some economic goals	6	.987
		Achieving of some means of implementation	6	.978
Second subject reliability - Sustainable Development Goals			18	.995
The questionnaire reliability of all paragraphs			36	.996

#### vi. Study questions analysis:

The data in Table 3 indicate that the questionnaire reliability of all paragraphs is very high as it reached [.996] for the total number of paragraphs [36]. Study variables reliability ranged between [.978 - .989] which are statistically acceptable reliability in general according to Nanli scale [2] which indicated that the minimum reliability is [0.70]. Consequently, the questionnaire final form in the study field application was approved.

The following includes a complete and detailed study results presentation, analysis and statistical interpretation. The means, standard deviation, and the study sample response homogeneity degree regarding their questionnaire answers means are as follows:

Table 4- Arithmetic means, Standard Deviation and study sample response homogeneity degree

S	Study subjects	Dimensions	Mean	Std. Deviation	Homogeneity degree
1	E-government services	The reality of E-government services	4.67	0.659	Very high
		Knowledge of National Elections Authority services	4.6	0.694	Very high
		Developing National Elections Authority services	4.61	0.700	Very high
Total paragraphs in the first subject- E-government services			4.62	0.67	Very high
2	Sustainable Development Goals	Achieving some social goals	4.65	0.671	Very high
		Achieving some industrial goals	4.64	0.688	Very high
		Achieving of some means of implementation	4.60	0.674	Very high
Total paragraphs in the second subject-Sustainable Development Goals			4.63	0.674	Very high

Table 4 presents all means, standard deviation and study aspects homogeneity degree. They are analyzed as follows:

- Familiarity with E-government services: Targeted people satisfaction mean is [4.67], the standard deviation is [0.659], and the degree of homogeneity is very high.
- Familiarity with National Elections Authority services: Targeted people satisfaction mean is [4.60], the standard deviation is [0.694], and the degree of homogeneity is very high.
- Developing National Elections Authority services: Targeted people satisfaction mean is [4.61], the standard deviation is [0.700], and the degree of homogeneity is very high.

**Regarding the e-services total paragraphs, targeted people satisfaction mean is [4.62], the standard deviation is [0.673], and the degree of homogeneity is very high.**

- Contribution in achieving some social goals: Targeted people satisfaction mean is [4.65], the standard deviation is [0.671], and the degree of homogeneity is very high.

- Contribution in achieving some economic goals: Targeted people satisfaction mean is [4.64], the standard deviation is [0.688], and the degree of homogeneity is very high.
- Contribution in realizing some means of implementation: Targeted people satisfaction mean is [4.60], the standard deviation is [0.674], and the degree of homogeneity is very high.

**Regarding the sustainable development goals total paragraphs, targeted people satisfaction mean is [4.63], the standard deviation is [0.674], and the degree of homogeneity is very high.**

#### vii. Examining the Study Hypotheses: -

##### - The First Hypothesis: -

In order to validate the First Hypothesis, the Pearson Correlation coefficient is applied to illustrate the relation between E-government services and sustainable development goals as shown in the following table:

Table 5- correlation between the two main variables

Correlations			
		E-government services	sustainable development goals
E-government services	Pearson Correlation	1	.956**
	Sig. [2-tailed]		.000
	N	385	385
sustainable development goals	Pearson Correlation	.956**	1
	Sig. [2-tailed]	.000	
	N	385	385
**. Correlation is significant at the 0.01 level [2-tailed].			

Table 5 illustrates the correlation between the two main variables, namely the E-government services and achieving sustainable development goals. Pearson Correlation coefficient equals [.956] at the calculated significance level [.000] which is less than the afore determined level [ $0.05 \geq \alpha$ ].

“This indicated that there is a positive statistical correlation between the two variables”

- **The second hypothesis:** - This hypothesis was confirmed by four steps, as shown below:

##### **The first step [Determine the method used]:**

The least-squares method was applied in the linear regression analysis, where the independent variable is the E-government services and the dependent variable is the sustainable development goals. As shown in Table 6

Table 6 - The linear regression analysis method

Variables Entered/Removed <sup>a</sup>			
Model	Variables Entered	Variables Removed	Method
1	E-government services		Enter
a. Dependent Variable: sustainable development goals			

b. All requested variables entered.

#### The second step [linear correlation]:

This step shows the result of calculating the linear correlation coefficient R and the coefficient of determination, R square, where the linear correlation coefficient between the variables is .956 and the accuracy of estimating the dependent variable [sustainable development goals] is .914. As shown in Table 7.

**“This is an evidence of a correlation with a statistical significance between E-government services and sustainable development goals”**

Table 7 – The linear correlation between the variables

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.956 <sup>a</sup>	.914	.913	.19842	.914	4055.456	1	383	.000
a. Predictors: [Constant], E-government services									

#### The Third step [Analysis of variance “ANOVA”]:

- This step shows the degree of the data linear regression “ANOVAa” to show of variance and know statistically significant relationship and effect between the variant’s. [As shown in Table 8]

- 1- The sum of regression squares equal [159.668]. The sum of residual squares [15.079] and the total sum are [174.747].
- 2- Regression degree of freedom df equals 1, and the residual degree of freedom equals 383, and the total df equals 384 degrees provided that [df= n – 1].

3- Regression squares mean is [159.668] and the residual squares mean is .39.

4- The analysis of variance for the regression line equals 4055.456.

5- The significance level, .000, is less than the null hypothesis significance level, 0.005, thus it is rejected and the regression line matches the data.

**“This is an evidence of the effect between the study’s variants because the significance level of 0.000 is less than the significant level of 0.005, and therefore there is a statistically significant relationship”**

Table 8 - Analysis of variance “ANOVAa”

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	159.668	1	159.668	4055.456	.000 <sup>b</sup>
	Residual	15.079	383	.039		
	Total	174.747	384			
a. Dependent Variable: sustainable development goals						
b. Predictors: [Constant], E-government services						

#### The fourth step [The Coefficients for proves the hypothesis of the study]: -

It illustrates some results. Firstly, the slope value and B, as well as the applied hypotheses with certain slope and B, where B equals [.179]. For

the independent variable [E-government services], B equals [.962] As shown in Table 9

- The results of T testing of regression line slope hypotheses for the independent variable equals [63.682] and B equals [2.535].

– Upon Examining Sig. values, it is noticed that the value is acceptable as it proves the hypothesis of study where the significance level

is less than the significance level of the null hypothesis, 0.05.

Table 9 - The Coefficients for proves the hypothesis of the study

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	[Constant]	.179	.071		2.535	.012
	E-government services	.962	.015	.956	63.682	.000
a. Dependent Variable: sustainable development goals						

“This is an evidence of values are acceptable because it achieves the study’s hypothesis, as the significant level of the test is less than the significant level 0.05”

#### viii. The Results: -

According to the result that was covered, we accepted the following research hypothesis [There is a significant statistical relationship between E-government services and sustainable development goals. and There is a significant statistical effect on Enhancing E-government services to achieve sustainable development goals]. **“Therefore, we move on to the fourth phase”**

#### Phase 4: improvement.

The Egyptian election system is traditionally handled by the National Election Authority [NEA] as Egyptian election schemes are based on the paper election form and manual counting system. The use of information technology effectively prevents human errors, which are habitual mistakes in any system across the world.

The Internet platform has been chosen by a number of countries to be used as the basic voting system. “Internet voting system” or “I-voting system”. For instance, the Republic of Estonia since 2005 [44]. A major advantage of this system is convenience reduced cost, and increased security [45] [46].

Blockchain technology is a promising decentralized technology that can be applied in order to improve security [47]. It is a chain of blocks in which each block stores all information of network activities after the block was added to the chain [48] [49]. In other words, blockchain is a traceable database. It allows every user to add data as a transaction [50]. Moreover, every user can review all data in it but, no one is able to change it [51].

This Phase proposes a promising solution to enhance the Egyptian election system in which blockchain technology has been integrated into the E-voting system. As shown in Figure 4

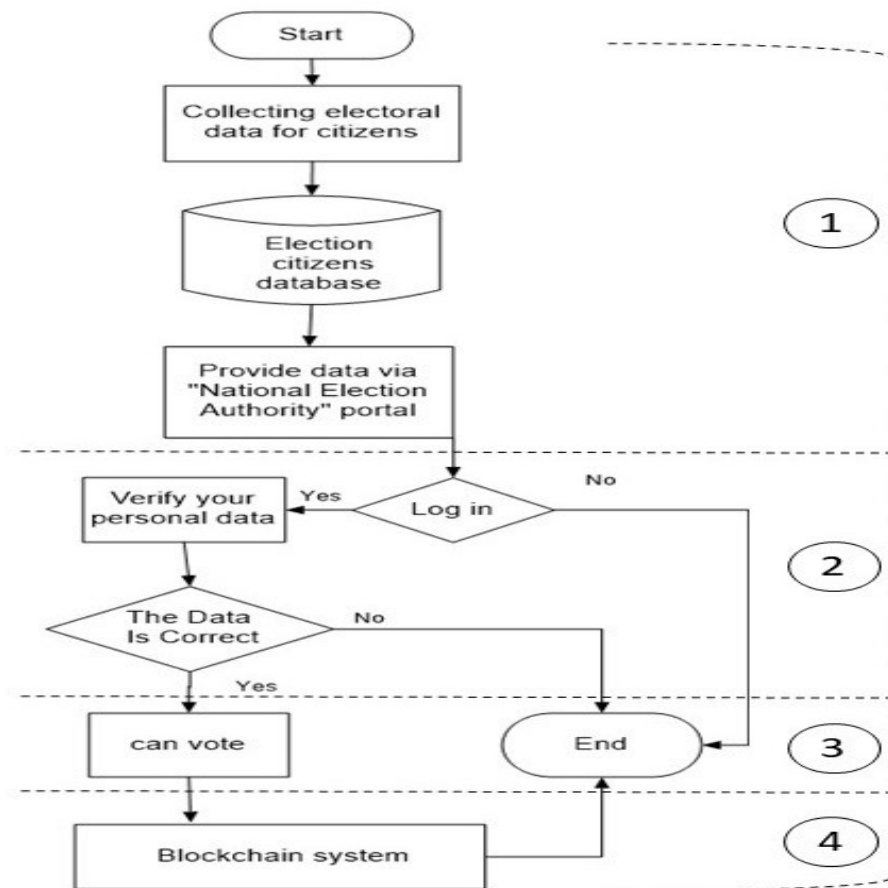


Figure 4 - A proposed framework for E-Voting System

The enhance process will take place in four stages [collecting the data electoral citizen's - login process - E-voting process - Using blockchain technology].

#### 1- The stage of collecting the data electoral citizen's:

Electoral citizen's data is collected in one database "election citizen's database" from each of the following: The National Electoral Authority [NEA], The Ministry of Communications, the National Telecommunications Regulatory Authority and Telecom companies] the data will be available on the website of the National Electoral Authority [NEA].

#### 2- The stage of verifying and log in:

- Entering the national number and specifying the mobile number.
- Verifying the citizen's data [the mobile number is registered with the national number].
- Sending a message with a secret number to complete the login process.

#### 3- Choosing between the candidates and completing the voting process.

At this stage, after completing the process of verifying the data and logging in. citizens can choose between the candidates and complete the e-voting process.

#### 4- The stage of using Blockchain technology.

At this stage, everything that was done in the second and third stages will be recorded as Citizen Data, login, and choice between candidates, and any other data within one block. Then sending the block data to all sides of the Blockchain system:

- Sending a message to the citizen explaining the result of the voting process [showing the process number only].
- Sending the block data to the National Electoral Authority [NEA], The Ministry of Communications "The National Telecommunications Regulatory Authority" and any other party participating in the system.

Then, ensuring that the block is sent to all parties of the system and recorded in their database. The system block will be added to the blockchain.

After ending the Voting process, the results will announce: The voting process will be stopped after the end of the period specified for it. inventorying and the aggregating process started, then announcing the results. If the election result was being challenged by the voters based on the block data sent to them the block data will be revised and the differences will be clarified.

## 5 DISCUSSION.

This study presented a model for Enhancing E-government services in order to contribute to achieving some sustainable development goals through four Phases, by applying this model in Egypt there were many conclusions in each phase. And this study has found that there is a relationship between E-government services and sustainable development goals. That has been proven in two methods:

**The first method:** E-services in Egypt were collected, sorted, and tested, then they were classified according to SDGs covering domains of Health, Social Protection, Economic Growth, Employment & Decent Work, Environmental Protection, Public Security, and Education. E-services were then corresponded to SDGs to obtain the Egyptian E-government service parameters assessment matrix towards achieving SDGs and targets and despite the low number of Egyptian e-services and their domains, it contributes towards the achievement of 11 goals [about 65%] and 33 SDG targets [about 20 %].

**The second method:** was the statistical method, which found that there is a significant statistical relationship between E-government services and sustainable development goals.

Regarding the effect of Enhancing E-government services on achieving sustainable development goals, this work has suggested Enhancing the E-service Submitted by the National Election Authority [NEA] for Conversion of the Egyptian election system from the paper election form and manual counting system to the E-voting system, and based upon this, The E-service of [NEA] was classified according to SDGs which found that it covers 18 targets from SDGs [6 Social targets, 6 Economic targets, and 6 Means of Implementation [MoI] targets]. This effect has been proven in a statistical method, it found there is a significant statistical effect between enhancing E-government

services and achieving sustainable development goals. This service improvement contributes to the achievement of 18 targets from SDGs.

Blockchain technology has been integrated into the E-voting system to submit the prototype of the Egyptian E-Voting System, and that is the significant improvement point against the traditional voting system as the users can cast the vote and check the results after completing all processes by using the web application.

## 6 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK.

Egypt is a very ambitious country to achieve SDGs and improve E-Government services, it provides a lot of E-Government services in order to seek digital transformation.

This study presented a model for Enhancing E-government services in order to contribute to achieving some sustainable development goals. by applying this model in Egypt there were many conclusions in each phase. And this study has found that there is a relationship between E-government services and sustainable development goals. this work has suggested Enhancing the E-service Submitted by the National Election Authority [NEA] for Conversion of the Egyptian election system from the paper election form and manual counting system to the E-voting system, Blockchain technology has been integrated into the E-voting system to submit the prototype of the Egyptian E-Voting System, and that is the significant improvement point against the traditional voting system as the users can cast the vote and check the results after completing all processes by using the web application. The E-service of [NEA] was classified according to SDGs which found that it covers 18 targets from SDGs [6 Social targets, 6 Economic targets, and 6 Means of Implementation [MoI] targets]. This effect has been proven in a statistical method, it found there is a significant statistical effect between enhancing E-government services and achieving sustainable development goals. This service improvement contributes to the achievement of 18 targets from SDGs.

In future work, we recommend applying this model for enhancing many e-government services to contribute to achieving the goals of sustainable

development and to provide many e-services that contribute to it.

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