E-government in Northern Africa countries: Ranking and performance evaluation through the last three sessions 2016, 2018, 2020

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Abstract:

The purpose of this study is to demonstrate the Northern Africa countries performance through their rankings in E-government adoption among the 193 United Nation Member States during the last three sessions 2016-2018-2020; according to UN Department of Economic and Social Affairs; and assesses their e-government readiness.The findings reveal that most Northern Africa countries are still ranked under the world average and too much far from world leaders; all of them are in the late 50 percentile of the ranking; except for Tunisia which stands on the top Northern Africa ranks with high EGDI and EPI Levels. However, this bad ranking does not mean that they have not achieved any positive progress in e-government implementation.

Keywords:E-government; ITC; Northern Africa countries, EGDI.

1. Introduction

During the second half of the 1990s, the world witnessed a massive revolution in information technology and communication. Governments as well as communities, citizens, businesses and especially in the last decades strongly increased the use of ITCs, e-government initiatives have spread all over the word, many developed and developing countries as governments have launched e-government projects trying to move from traditional management to e-management in order to improve their efficiency and effectiveness.

Information technologies can give developing countries the chance to reduce some long and painful stages of development that other countries had to go through. Northern Africa countries also tried to do so, each country apart; although at different speeds; were engaged in such programs.

The UN Division for Public Administration and Development Management (DPADM) Publishes the United Nations E-Government Survey every two years. This survey gives anoverview about a relative ranking of e-government advancement of all UN Member states. And since Northern Africa countries are all members of the united nation, what was the ranking of these countries during the last three sessions 2016/2018/2020? And what improvement did they make?

2. A theoretical framework for E-government

There isn't one, unique and generally acknowledged definition for Electronic government, based on this, we will list a set of definitions that we think most common.

The World Bank defined e-government as "government-owned or operated systems of information and communications technologies (ICTs) that transform relations with citizens, the private sector and/or other government agencies so as to promote citizen empowerment, improve service delivery, strengthen accountability, increase transparency, or improve government efficiency".(The World Bank, 2002, p2).

The Organisation for Economic Co-operation and Development (OECD) defined it as"The use of information and communication technologies, and particularly the Internet, as a tool to achieve better government".(OECD, 2003, p13).

The United Nations Organization (UN) definedE-government as "the use of information and communication technology (ICT) and its application by the government for the provision of information and basic public services to the people"(UN, 2004, p15). And

defined it on its 2014 Survey as "the use and application of information technologies in public administration to streamline and integrate workflows and processes, to effectively manage data and information, enhance public service delivery, as well as expand communication channels for engagement and empowerment of people"(UN, 2014, p2).

The Organization of American States defined E-government as "the application of Information and Communication Technologies (ICTs) to government functions and procedures with the purpose of increasing efficiency, transparency and citizen participation"(http://portal.oas.org, 2021).

E-government is about a process of reform in the way governments work, shares information and delivers services to external and internal clients. Specifically, e-government harnesses information technologies (such as wide area networks).(Subhash.B, 2004, p22).

E-government refers to the use of information technology in general, and e-commerce in particular, to improve the delivery of government services and activities in the public sector, such as: providing citizens with more convenient access to information and services, and providing effective delivery of government services to citizens and businesses as well as improving the performance of government employees.(Efraim Turban and All, 2015, p211).

This use of ICT in government operations, (Subhajit .B, 2004,p111), also facilitates speedy,transparent, accountable, efficient and effective interaction with the public, citizens, businessand other agencies.

While differing in accentuation, almost all definitions we listed include the use of information and communication technology to increase digital interaction with citizens and other stakeholders, so ICTs are the core element of that new kind of public management in which governments should improve their functions and procedures to meet stakeholders modern and new expectations.

3. Domains of e-government

Domains of e-government are: (http://www.egov4dev.org, 2021)

3.1 Improving Government Processes: E-Administration

E-Government initiatives within this domain deal particularly with improving the internal workings of the public sector. They include:

- *Cutting process costs:* improving the input/output ratio by cutting financial costs and/or time costs.

- *Managing process performance:* planning, monitoring and controlling the performance of process resources (human, financial and other).
- *Making strategic connections in government:* connecting arms, agencies, levels and data stores of government to strengthen capacity to investigate, develop and implement the strategy and policy that guides government processes.
- *Creating empowerment:* transferring power, authority and resources for processes from their existing locus to new locations.

3.2 Connecting Citizens: E-Citizens and E-Services

Such initiatives deal particularly with the relationship between government and citizens: either as voters/stakeholders from whom the public sector should derive its legitimacy, or as customers who consume public services. These initiatives may well incorporate the process improvements identified in section B1. However, they also include a broader remit:

- *Talking to citizens: providing citizens with details of public sector activities. This mainly relates to certain types of accountability: making public servants more accountable for their decisions and actions.*
- *Listening to citizens: increasing the input of citizens into public sector decisions and actions. This could be flagged as either democratization or participation.*
- *Improving public services: improving the services delivered to members of the public along dimensions such as quality, convenience and cost.*

3.3 Building External Interactions: E-Society

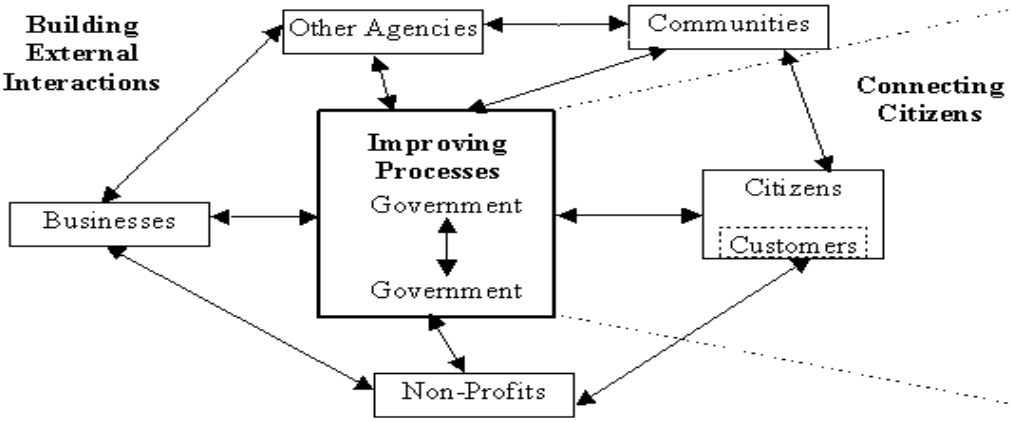
Such initiatives deal particularly with the relationship between public agencies and other institutions - other public agencies, private sector companies, non-profit and community organizations. As with citizen connections, these initiatives may well incorporate the process improvements identified in section B1. However, they also include a broader remit:

- *Working better with business: improving the interaction between government and business. This includes digitizing regulation of, procurement from, and services to, business to improve quality, convenience and cost.*

- *Developing communities: building the social and economic capacities and capital of local communities.*
- *Building partnerships: creating organizational groupings to achieve economic and social objectives. The public sector is almost always one of the partners, though occasionally it acts only as a facilitator for others.*

This three principal domains can be well shown in **Figure n°1**.

Fig.1.Domains of e-government



Source: http://www.egov4dev.org/success/definitions.shtml

4.Benefits of E-Government

E-government has a lot of benefits for all stakeholders. Some of the benefits of e-government are as follow: (Mahmoud, H.H., 2010, p185)

- A transparent government;
- Improved and streamlined services with speed and convenience;
- Expanded service capability to 24x7, at any time, at anywhere;
-Realized efficiency gains, reduced human related errors and reduced unnecessary duplication of information by integrating databases and networking web sites and other gateways;
- Increase of users' ICT skills and knowledge;
- Timesaving and more useful and useable information;
- Cost savings, improved efficiency;
- Increased satisfaction, better public decision-making, more responsive government;
- Improved life standards, happy and informed citizenship;

- Build trust between governments and citizens.

5.The United Nations E-Government Survey

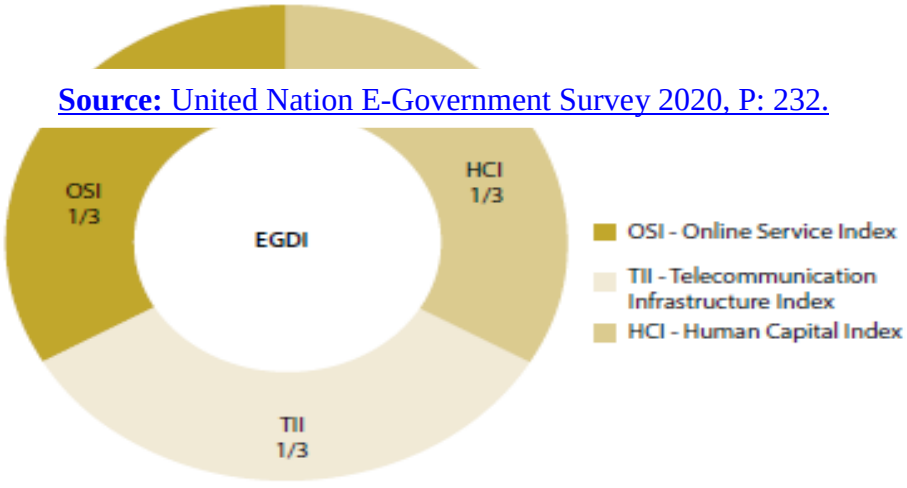
It's every two years, that the UN Division for Public Administration and Development Management (DPADM) Publishes the United Nations E-Government Survey. This survey gives anoverview about a relative ranking of e-government advancement of all UN Member states.

Since its beginning in 2003, the conceptual framework of this Survey has been laying on three important dimensions: ***the availability of online services, telecommunication infrastructure and human capacity***. Grouped together they form ***E-Government Development Index (EGDI)*** (See **Figure n°2**).

While the methodological framework for EGDI has remained consistent across the Survey editions, each edition of the Survey has been adjusted to reflect emerging trends of e-government strategies, evolving knowledge of best practices in e-government, changes in technology and other factors. In addition, data collection practices have been periodically refined (UN, 2016, p133).

Countries are classed in three groups according to their EGDI scores -Very high EGDI (>0.75), high EGDI (0.5-0.75), middle EGDI (0.25-0.5), Low EGDI (<0.25).

Fig.2.The E-Government Development Index (EGDI)



Source: United Nation E-Government Survey 2020, P: 232.

5.1 Telecommunication Infrastructure Index (TII)

Since the first edition of the survey, The Telecommunication Infrastructure Index has been an arithmetic average composite of five indicators:

- Estimated Internet users per 100 inhabitants;
- Number of main fixed telephone lines per 100 inhabitants;
- Number of mobile subscribers per 100 inhabitants;
- Number of wireless broadband subscriptions per 100 inhabitants
- Number of fixed broadband subscriptions per 100 inhabitants[1].

While in the 2020th edition Telecommunication Infrastructure Index was shorted to only four indicators (number of main fixed telephone lines per 100 inhabitants excluded). (UN, 2018, pp 199-200).

5.2 Human Capital Index (HCI)

The Human Capital Index (TII) consists of four components, namely:

- Adult literacy rate;
- The combined primary, secondary and tertiary gross enrolment ratio;
- Expected years of schooling;
- Average years of schooling.

5.3 Online Service Index (OSI)

The Online Service Index (OSI) is a composite normalized score derived on the basis on an Online Service Questionnaire. The 2018 Online Service Questionnaire (OSQ) consists of a list of 140 questions.

Each question calls for a binary response. Every positive answer generates “more in-depth question” inside and across the patterns. The outcome is an enhanced quantitative survey with a wider range of point distributions reflecting the differences in the levels of e-government development among Member States.

[1]For more details check: ***United Nation E-Government Survey 2020: digital government in the decade of action for sustainable development –with addendum on COVID-19 Response***, UNPAN, New York, 2018, PP: 232-234.

It should be noted that this list is dynamic and is updated for each edition of the Survey. The language for the areas starts with:

-"information about"something such as laws, policies, legislation or expenditures;
-"existence of"a feature such as social networking tools;
-"ability to"do something on the website i.e. run a transaction[*].

6. Methodology

To assess the reality of e-government advancement in Northern Africa countries, our study focused only on the Northern Africa countries performance data subtracted from the last three United Nations publications about e-government (2016/2018/2020), the documents downloaded from the official website of the United Nation, https://www.un.org/.

First of all, we started by collecting data from different publications for each session and gathered all data in the same tables in order to facilitate comparison between Northern Africa session countries EGDI scores and word EGDI scores by calculating the mean of each Index.

Secondly, we focused on EGDI subcomponents to make the comparison more clear and obvious. Then finally, and to further more our research we have decided to analyse The E-Participation index EPI which have direct relationship with e-government readiness.

7. Results and discussion

After the collection of data concerning the subject we want to study, we have obtained the following results shown in tables below.

[*]For more details check: UN, ***United Nation E-Government Survey 2018: gearing e-government to support transformation towards sustainable and resilient societies***, UNPAN, New York, PP:199-211

Table 1.Northern Africa countries E-Government Development Index (EGDI)

Country	International rank			E-Government Development Index (EGDI)		
	2016	2018	2020	2016	2018	2020
Algeria	150	130	120	0.2999	0.4227	0.5173
Egypt	108	114	111	0.4594	0.488	0.5527
Libya	118	140	162	0.4322	0.3833	0.3743
Morocco	85	110	106	0.5186	0.5214	0.5729
Sudan	161	180	170	0.2539	0.2394	0.3154
Tunisia	72	80	91	0.5682	0.6254	0.6526
Northern Africa average	/	/	/	0.4220	0.4467	0.4975
Number of UN member states	193	193	193	/	/	/
World average	/	/	/	0.4922	0.5491	0.5988

Source: Own study based on United Nations E-Government Surveys (2016, 2018, 2020)

As the table above shows, Northern Africa countries EGDI ranking and performance differ from one country to another through the last three sessions (2016/2018/2020), where:

1- Algeria: It is the country that has made the most improved among the North African countries, it witnessed a quantum leap in the e-government index as itstepped up 30 positions compared to its ranking in 2016, moving from a score of 0.2999 to 0.5173 in 2020.

2- Egypt: Egypt ranked 108 in 2016 with a score of 0.4594, then stepped down to the 114th place with a score of 0.488, and finally, stepped up three positions to 111, with a score of 0.5527 in 2020.

3- Libya: Libya witnessed a remarkable decline in the EGDI index during the last two sessions, after it ranked 118 in 2016 with a score of 0.4322, it fell by 22 places in 2020, ranking 162 with a score of 0.3743.

4- Morocco: Morocco is the second best-ranked country in North Africa after Tunisia, it ranked 85 in 2016 with a score of 0.5186, then fell to the 110 place in 2016 with a score of 0.5214, to step up four places in the last session with a score of 0.5729.

5- Sudan: it is the weak link Northern Africa country, as it stepped down from the 161st place in 2016 to the 180th in 2018 with a score of 0.2539 and 0.2394, respectively, occupying the last 13 ranks at the international level, then advanced 10 places in the last session with a score of 0.3154.

6- Tunisia: clearly, Tunisia always ranks the highest in North Africa and higher than even the world average, despite its slight decline at the international level, as it ranked 72, 80, and 91 with a score of 0.5682, 0.6254, and 0.6526 respectively.

The average of Northern Africa countries EGDI has been slightly increasing from 0.4220 in 2016 to 0.4975 in 2020. In the other hand, we notice that the EGDI level is still lower than the world average, as they scored 0.4220, 0.4467, and 0.4975 respectively, compared to 0.4922, 0.5491, and 0.5988 for the World average. In order to further investigate this matter, we presented the components of EGDI separately to discover the impact of each subcomponent on EGDI, as shown in Tables n°2, 3, and 4.

Table 2. Northern Africa countries Online Service Component (OSI)

Country	Online Service Component (OSI)		
	2016	2018	2020
Algeria	0.0652	0.2153	0.2765
Egypt	0.4710	0.5347	0.5706
Libya	0.1087	0.0972	0.0412
Morocco	0.7391	0.6667	0.5235
Sudan	0.2174	0.1528	0.3059
Tunisia	0.7174	0.8056	0.6235
Northern Africa average	0.3864	0.4120	0.3902
World average	0.4623	0.5691	0.562

Source: Own study based on United Nations E-Government Surveys (2016, 2018, 2020)

1- Algeria: Online Service Component (OSI) is the Algerian weakest performing component, as it ranked last in 2016 compared to Northern Africa countries with a score of 0.0652, then 0.2153 and 0.2765 for the last two sessions.

2- Egypt: Egypt has been at about the same level as the world average, it achieved a score of 0.4710, 0.5347, and 0.5706 during the last three sessions.

3- Libya: it is the weak link in this indicator, as it witnessed a noticeable decline in its performance, with a score of 0.1087, 0.0972, and 0.0412 respectively.

4- Morocco: Morocco ranked first in 2016, with a score of 0.7391, it witnessed a relative decline in 2018 and 2020, achieving a score of 0.6667, 0.5235.

5- Sudan: Sudan achieved remarkable progress during the last session with a score of 0.3059, after achieving a score of 0.2174 and 0.1528 in 2016 and 2018.

6- Tunisia: Tunisia's performance during the last three sessions has not decreased from the world average, achieving remarkable progress with a score of 0.7174, 0.8056, and 0.6235, respectively.

Northern Africa countries achieved middle Online Service level 0.3864, 0.4120, 0.3902 during the last three sessions, a level which stand lower than the world average, 0.4623, 0.5691 and 0.562 for the same sessions.We notice that we can divide countries on two different groups according to their performance, a first one including Tunisia, Morocco and Egypt with a high OSI level, and a second one, a weak group, composed from Algeria, Libya and Sudan negatively affecting Online Service level.

Table 3.Northern Africa countries Telecommunication Infrastructure Component (TII)

Country	Telecommunication InfrastructureComponent (TII)		
	2016	**2018**	**2020**
Algeria	0.1934	0.3889	0.5787
Egypt	0.3025	0.3222	0.4683
Libya	0.4291	0.3353	0.3459
Morocco	0.3429	0.3697	0.58
Sudan	0.1861	0.1780	0.2844
Tunisia	0.3476	0.4066	0.6369
Northern Africa average	0.3002	0.3334	0.4823
World average	0.3711	0.4155	0.5464

Source: Own study based on United Nations E-Government Surveys (2016, 2018, 2020)

1- Algeria: Algeria continued its achievements with regard to this component, as it jumped from a low TII level of 0.1934 in 2016 to a high TII level of 0.5787 in 2020, ranking third among Northern Africa countries.

2- Egypt: Egypt achieved a middle TII level very close to Northern Africa average during these sessions, with a score of 0.3025, 0.3222, 0.4683, compared to 0.3002, 0.3334, 0.4823.

3- Libya: Although Libya was the first ranked among Northern Africa countries in 2016 with a score of 0.4291, it could not continue its progress, as it stepped down to the fourth and fifth place in 2018 and 2020, with a score of 0.3353, 0.3459 respectively.

4- Morocco: made clear progress in Telecommunication Infrastructure, especially during the last session, surpassing the world average with a score of 0.58.

5- Sudan: it remains one of the least progressive countries in North Africa during these sessions, as it ranked sixth and last with a score of 0.1861, 0.1780, and 0.2844.

6- Tunisia: As usual, Tunisia has made big progress in its performance during the last three sessions reaching even a high level of telecommunication infrastructure in 2020 with a score of 0.6369.

The average of Northern Africa countries Telecommunication Infrastructure Component (TII) has been increasing from 0.3002 in 2016 to 0.4823 in 2020, but still seen as a middle TII level. In the other hand, we notice that the World average TII moved from middle to high during these three sessions with a high score of 0.5464 in 2020.

Table 4.Northern Africa countries Human Capital Component (HCI)

Country	Human Capital Component (HCI)		
	2016	2018	2020
Algeria	0.6412	0.6640	0.6966
Egypt	0.6048	0.6072	0.6192
Libya	0.7588	0.7173	0.7357
Morocco	0.4737	0.5278	0.6152
Sudan	0.3581	0.3873	0.3559
Tunisia	0.6397	0.6640	0.6974
Northern Africa average	0.5793	0.5946	0.62
World average	0.6433	0.4155	0.688

Source: Own study based on United Nations E-Government Surveys (2016, 2018, 2020)

1- Algeria: This is its best performing component, with high HCI level often equal or greater than the world average, estimated at 0.6412, 0.6640, and 0.6966 respectively.

2- Egypt: as well as for Algeria, Egypt achieved high HCI level, with a score of 0.6048, 0.6072, and 0.6192 during the last three cycles.

3- Libya: it is the strongest link in the HCI component, ranked 1st in North Africa, it achieved very high HCI level that exceeds the world average. With a score of 0.7588, 0.7173, and 0.7357 respectively.

4- Morocco: Morocco witnessed a remarkable improvement in its performance, as its HCI score increased from 0.4737 to 0.5278 and then to 0.6152 during the last three sessions.

5- Sudan: Sudan ranked last among Northern Africa countries, it is the only country that achieved a middle HCI level with a score of 0.3581, 0.3873, and 0.3559 respectively.

6- Tunisia: with a high HCI Level, Tunisia ranked second after Libya, with a score of 0.6397, 0.6640 and 0.6974 respectively.

Almost all Northern Africa countries have high Human Capital level Human even more than the word average except for Sudan, which stands in the bottom of ranking. Northern Africa average has increased from 0.5793 to 0.5946 and 0.62 in the last two sessions, and it stands in the same high level compared to the world average 0.6433, 0.4155 and 0.688 respectively. Sudan must catch up with the rest of the group since it achieved middle HCI.

Table 5.Northern Africa countries E-participation Index (EPI)

Country	International rank			E-participation Index (EPI)		
	2016	2018	2020	2016	2018	2020
Algeria	167	165	183	0.1186	0.2022	0.1548
Egypt	107	109	106	0.4068	0.5393	0.5119
Libya	170	183	189	0.1017	0.1236	0.0357
Morocco	17	56	106	0.8305	0.7753	0.5119
Sudan	138	176	175	0.2542	0.1404	0.2143
Tunisia	43	53	73	0.6949	0.7978	0.6905
Northern Africa average	/	/	/	0.4011	0.4297	0.3531
Number of UN member states	193	193	193	/	/	/
World average	/	/	/	0.4625	0.5654	0.5677

Source: Own study based on United Nations E-Government Surveys (2016, 2018, 2020)

1- Algeria: Algeria is lagging behind in terms of EPI, as it ranked very late at the international level, achieving its best rank 165 in 2018 with a score of 0.2022, which is nearly the half of Northern Africa EPI Level.

2- Egypt: Egypt achieved a not far score from the world average, and ranked 107, 109, and 106 with a score of 0.4068, 0.5393, and 0.5119 respectively.

3- Libya: Libya is at the bottom of the world ranking, it is the weak link in North Africa, and has witnessed a continuous decline in its ranking from 170 to 189, with a low EPI level of 0.0357 in 2020.

4- Morocco: Morocco was one of the top 20 countries in the world in 2016, ranked 17th with a very high EPI score of 0.8305, ranking first among Northern Africa countries, and then experienced a slight decline starting from 2018 with a score of 0.7753, which is also higher than the world average, to decline another one to the 106th place in 2020 with a score of 0.5119.

5- Sudan: like Libya and Algeria, Sudan ranked late, 138, 176 and 175 with a score of 0.2542, 0.1404 and 0.2143 respectively.

6- Tunisia: Despite the decline in Tunisia's performance during the last three sessions, it is still in the first half of the country's ranking, as it ranked 43, 53 and 73 with a score of 0.6949, 0.7978 and 0.6905 respectively.

Half Northern Africa countries scored low in their state of E-participation Index (EPI), and ranked late in the international ranking, but if we take the Northern Africa average we notice that it is a middle EPI level compared to the high EPI world average level. It is important to note that Morocco and Tunisia are the main countries that positively affected this progress, by achieving even very high level scores.

8. Conclusion

This paper has shown that Northern Africa countries are still in the late fiftieth percentile of the ranking according to the UN Department of Economic and Social Affairs surveys for the last three sessions (2016/2018/2020), as for Tunisia, it's the only country which is ranked within the top fiftieth percentile and which should be taken as a model of e-government in North Africa, we notice that almost all of its indicators are better than the World average. Morocco is the second top leader in E-Government Development. However, this bad ranking does not mean that they have not achieved any positive progress in e-government implementation.

Egypt and Algeria had made remarkable progress in E-Government Development, but Algeria remains the only country that have advanced in ranking by moving thirty places from middle EGDI level to high level. Both Libya and Sudan form the weak link among Northern Africa countries as they achieved middle EGDI level.

Half Northern Africa countries scored low in their E-participation Index (EPI), and ranked late compared with the world average, but the Northern Africa countries average were at a middle level due to both Tunisia and Morocco.

Finally, we can say that Northern Africa countries in general have known some improvement in E-Government Development even the late ranking they achieve.

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