E-Government in Arab Countries: challenges and Evaluation

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Abstract: *Almost all Arab countries seek to implement e-government in their public administration. Different perspectives exist for e-Government approaches: Reduce the operation cost, save time and effort, as well as increase effectiveness and efficiency. All countries implementing e-Government faced different and somewhat similar challenges during their endeavor. Given similar cultural and administrative foundations, Arab countries may be expected to have some similar challenges. In this work, we collect and analyze government challenges in several Arab countries and compared them with other countries worldwide. We then classify these challenges into various domains such as technical, adoption approach, cultural, strategic and organizational. We also classify e-government ranking of the Arab World countries based on income level and analyze each class success separately. We finally study the relationship between e-government challenges and indices according to United Nation report. This paper aims to identify the factors that impact on implementation of e-government and then study the relationship between these challenges and the ranking of e-government according to UN reports .The result use as an input towards proposed a general framework for e-government.*
Keywords: *E-government, Challenges, EGDI, Arab World*

I. Introduction

E-Government is always perceived as a means to improve public administration performance and services, as well as a means for better governance and access to political and social rights. The United Nation (UN) developed a measure to evaluate e-government maturity, namely E-government development index (EGDI), composed of three sub-indices: Online services (also called web measure index (WMI) in UN 2008), telecommunications infrastructure index (TCII) and human capital index (HCI). Arab countries vary on the e-government maturity ranking scale: Bahrain and UAE are in the lead among the highly ranked countries worldwide, while other are towards the lower end. This work is the first of three steps in an endeavor to formulate an e-Government implementation road-map that would be applicable to Yemen, and similar countries, once the political stability is reached. The following 2 steps would be the review of public workers priorities for e-Government in Yemen, followed by the formulation of an overall framework for e-Government implementation in similar countries. In the following, we will first present a consolidation of the literature findings related to the challenges facing e-Government implementations in Arab countries as compared to other countries. This study is evaluated of e-Government progress in the different Arab countries, classified according to EGDI, and the factors affecting e-Government progress, with a focus on Yemen. We thus conclude our paper with a review and consolidation of the main factors to account for during the formulation of the overall e-Government framework to be implemented.

II. Research Methodology

The paper follows the following track to reach the objective of these phases as shown in figure (1):
1. Review and identify challenges that faced e-government.
2. Quantify each of the challenges main categories for each country
3. Review the e-government ranking evolutions in the different countries according to UN report.
4. Study and analyze correlation between e-government ranking and e-government challenges
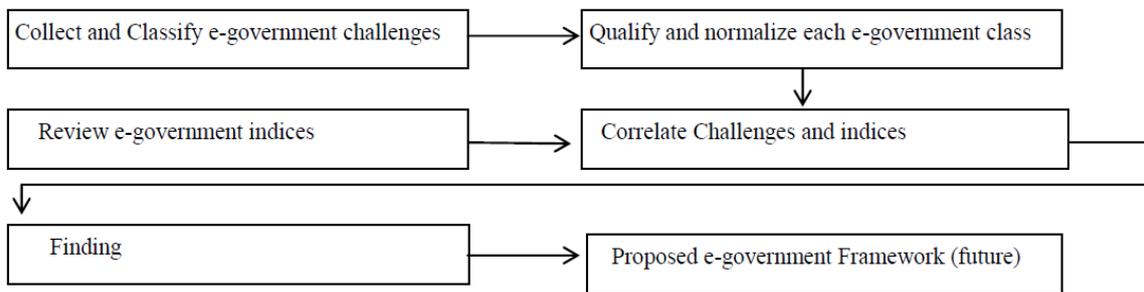
Figure1. Research Design, Methodology and Outcomes

III. E-Government Challenges

According to (Heeks, 2003)[1] only 15% of e-government implementations in developing countries are successful, 35% totally are failure and 50% partial failure. "Furuholt,2008" [2] classified e-government challenges into: Management, infrastructure and human factors. . (M. Alshehri,2010)[3] classified them into technical , organization, social and finical. According to (Hwang,2004) [4] the e-government challenges can be divided into: technical, political, cultural and legal. According to (Ebrahim, Z. and Z. Irani ,2005) [5] the e-government challenges can be divided into: IT infrastructure , security and privacy, IT skill , organization and operation cost.

Based on our analysis of the reviewed literature in the field, we could consolidate and classify these challenges into five categories: organizational, adoption approach, Technical, cultural and strategic. In the following section, we will briefly discuss the significance of each of these categories.

3.1 TECHNICAL CHALLENGES
The technical challenges relate to the availability of, and access to, information and communication technologies. This includes the provider Government, the beneficiary Citizen, as well as the intermediary mediator Internet Access Channels. Table 1 shows effect of technical challenges on e-government implementation in 13 developing countries, Arab and otherwise, in addition to Australia as an example of the moderate modern world. The main technical challenges reported in the literature are:
1. Lack IT infrastructure: i.e. National technical infrastructure.
2. Security and privacy: i.e. Type of techniques used to protect data during data exchange.
3. Lack of training: i.e. IT ,
4. Limited skill of employees: i.e. IT management.
5. Project management i.e. the existence of a clearly assigned and responsible body for the implementation and management of e-government initiatives.
6. Information Quality i.e. the availability of adequate, complete and precise data and information about citizens, properties, transactions … act.
7. System Quality i.e. the efficiency, effectiveness and conformity of information systems as well as business processes involved in the services delivery
8. Requirement: incomplete, changes i.e. change scope and objectives during implementation.
9. Data or system integration i.e. Lack of standardizations in data and system.
10. Re-engineering process: I.e. lack identifies flow in processes that need to improve.
11. Support web in different language: This is required for cases with multi-lingual society (e.g. Algeria, India) or a society with many expatriates (i.e. UAE)).

Table 1 shows the effect of technical challenges on e-government implementation in different countries. For each issue listed a (+) is awarded for positive remark and a (-) awarded for negative remark. We observe, from Table 1, that infrastructure, training, security and privacy are the most frequent challenges in the Arab world countries, respectively, compared to other countries that face challenges in infrastructure and training. Table 1clearly indicates that the most countries that face technical challenge are Egypt and Yemen, with five challenges for each, followed by Saudi Arabia and India, with three.

In general, the most technical factors that impact on successful implementation of e-government is infrastructure followed security and privacy. So these governments must build an effective infrastructure as a key founding step towards provision of online services as well as improve IT skills of employees involved in e-government programs implementation, maintenance and management. Moreover, the e-government program

leaders must, by design, ensure protection of online services to secure privacy of their citizens and businesses by choosing best techniques for data storage and transfer throughout the e-government processes.

country		Lack IT infrastructure	Security and privacy	Training	Project Management	Information Quality	System Quality	Requirement incomplete, change	Data or system integration	Re-engineering process	Limited IT skill of employees	Support web in different language	sum
Table (1):Technical Challenges													
Arab countries	Emirate[6]			++						++			+2
	Saudi Arabia[7]	--	--	--									-3
	Qatar[8]	--											-1
	Jordan[9]	--		--									-2
	Egypt[10, 11]				--	--	-	--					-5
	Yemen[12-16]	--	--	--		--	--						-5
Non-Arab countries	Australia[17]							--	++	++			+1
	Malaysian[18]	--											-1
	South Africa[19]										--		-1
	Indonesia[20]	--											-1
	Botswana[21]		--	--									-2
	India[22, 23]	--									--	--	-3
	Nigeria[24]	--	--								--		-3
	Bangladesh [25]	--			--								-2

3.2 ADOPTION CHALLENGES

For e-government projects to be implemented and used there are a number of adoption challenges to overcome. Challenges such as limited funding, ICT policy and the cost of internet subscription and access, impede the implementation and use of e-government projects. As shown in table 2, many countries face issues with e-government adoption. The literature lists a number of such challenges particularly with regards to:

1. Limited Funding i.e. lack of funding for e-government projects that cover several requirements like building infrastructure, training programming and improve society.
2. Lack of resources i.e. Lack human resource skills, technology.
3. Top management support: lack support from the leaders and top management that responsible to remove any obstacles impact to implement e-government and provide positive environments.
4. Web Content: i.e. content of web not-update probably.
5. Subscription to the interne t. i.e. Unavailable of internet or highly price.
6. Cost of telecommunication infrastructure: i.e. access to telecom is highly price relatively to income.
7. Trust and confidence in e-government: many factors missed trust in government due to corruption, inefficiency and so on.
8. Encouragement of citizens to use and participate to e-government: i.e. No incentive offered to use online services.
9. ICT policy: i.e. No blueprint poor notional policy to e-government.
10. Marketing e-government to citizens: i.e. No effort to promote citizens awareness of new services.

Country		limited Funding	lack resource	Top management support	WEB CONTENT	Subscribe of internet	cost of telecommunication infrastructure	trust and confidence in e-government	Encourage citizens to use and participation in e-government	ICT policy	Marketing e-government to citizens	Sum
												Table (2) : Adoption Challenges
Arab countries	Emirate[6]							++	++			+2
	Saudi Arabia[7]								--		--	-2
	Qatar[8]								--			-1
	Jordan[9]	--		--								-2
	Egypt[10]		--	--								-2
	Yemen[13, 15]					--	--	--	--		--	-5
Non-Arab countries	Australia[17]										--	-1
	Malaysian[18]										--	-1
	South Africa[19]						--				--	-2
	Indonesia[20]	--				--	--					-3
	Botswana[21]	--					--					-2
	India[22, 23]		--		--							-2
	Nigeria[24]						--					-1
	Bangladesh[25]	--										-1

From Table 2, it can be noted that "the top management support" and "encourage citizens to use and participate in e-government" are the challenges mostly encountered in Arab countries. On the other hand, "limited funding, subscription to the internet" and "ICT policy" are the challenges mostly encountered in Non-Arab countries. In general, the adoption factors that most impact on implementation e-government are "limited funding, subscription to the internet" followed by "ICT policy".

3.3   STRATEGIC CHALLENGES

Strategic challenges relate to the vision and strategic planning of e-Government initiatives. It is also concerned with the legislative and regulatory environment in the country. A clear understanding of the purpose and value of nation-wide e-government initiatives and services is a corner stone to success. Table 3 maps out the country level strategic challenges. For example, in the case of Jordan, the challenge pertains to "the formulation of the vision and mission", whereas in Saudi Arabia, the challenge was primarily with "the setup of the strategic information system. In the case of most other countries the challenge was mainly with "the overall strategy framework". One could conclude that lack of clarity of the national e-government vision, mission and strategy framework are key barriers to adoption. In contrast, Emirates had the best formulated strategy as shown in Table 3. Therefore, at the strategic level, it is important to ensure:

1. Overall vision and mission: i.e. limited shared vision and mission across government

2. Strategic Information Management (SIM):i.e. lack strategy to manage resources (data) to increase stakeholders' satisfaction and improve decision.

3. National ICT Strategy (Public network Strategy, Architecture and standards)

4. Objective and goal: i.e. No definition goals/objectives and miss alignments.

5. Principle: is defined as guidelines of e-government implementation .I.e. such as lack principle of collaboration, principle of data sharing and security.

6. Focus Area: too many targets sets result in lack of focus.

7. Strategy framework: is defined as comprehensive picture of government strategy that helps government to execute strategy and achieve goals. There are many challenges in strategy framework such as missing comprehensive picture of government strategy as whole.

Country		Table(3) Strategic Challenges							
		Overall vision and mission	Strategic framework	strategic I information Management	ICT Strategy	objective and goal	principle	focus Area	Sum
Arab countries	Emirate[6]		++	++	++	++			+4
	Saudi Arabia[7]			--					-1
	Qatar								
	Jordan[9]	--							-1
	Egypt[10, 11]	--							-1
	Yemen								
Non-Arab countries	Australia[17]			++					+1
	Malaysian[18]		--						-1
	South Africa[19]		--						-1
	Indonesia[20]					--		--	-2
	Botswana[21]		--						-1
	India								
	Nigeria								
	Bangladesh[25]	--						--	-2

3.4 CULTURAL CHALLENGES

Cultural aspects are clear barriers to adoption of information technology at large and to e-government more specifically. Literature highlights most important cultural challenges to e-government adoption as shown in Table (4), namely: lack of awareness of availability, means of access and benefits of e-government services, lack of IT and Internet access expertise, IT literacy, limited education, social awareness and influence.
Literature highlights the following cultural challenges to e-Government adoption as shown in table 4:

1. Awareness: i.e. lack citizen's knowledge and e-government interesting in e-government services.
2. Internet experience: i.e. ability to use internet.
3. IT literacy: i.e. ability to use IT in general.
4. Social influence: i.e. society driving citizens to use or not e-government services.
5. Education: i.e. low level of education impact on using e-government.
6. Gender: i.e. gender discrimination impact on using e-government.
7. Citizen expectations: i.e. too high level of expectation toward government services, results disappointment.

Country		Table(4): Cultural challenges							
		Awareness	internet experience	IT literacy	Social influence	Education	Gender	Citizen expectations	Sum
Arab countries	Emirate								
	Saudi Arabia[7]				--	--	--		-3
	Qatar[8]	--				--	--		-2
	Jordan[9]	--	--						-2
	Egypt[10, 11]	--							-1
	YEMEN [12, 26]	--	--	--		--	--		-5
Non-Arab countries	Australia[17]			--					-1
	Malaysian[18]		--						-1
	South Africa[19]			--					-1
	Indonesia[20]			--					-1
	Botswana[21]			--					-1
	India[22, 23]			--					-1
	Nigeria[24]			--		--		--	-3
	Bangladesh								

Table 4 summarizes the literature findings related to the different cultural challenges facing eight countries during e-government implementation and adoption. Awareness, education, and gender are the most repeated challenges in Arab World as compared to IT literacy in other countries. According to literature review Nigeria and Qatar are the countries that face the most cultural challenges followed by Jordan and Saudi Arabia.

3.5   ORGANIZATIONAL CHALLENGES

Existing organizational structures and related human resources allocation, workflows and operation are not originally designed to cope with ICT integration and high level of openness. Well established and rigid organizations tend to present a high level of resistance to e-Government implementations. Several related challenges could be identified and are summarized in table (5).

In general the organizational challenges mostly encountered are resistance to change, administration reform and collaboration. Egypt is the country that faces the most organizational challenges, followed by Bangladesh as shown in table (5). Resistance to change is found to be the most repeated organizational challenge in Arab World compared administration reform and collaboration challenges in other countries.

1. Administration reforms: Administration reforms are modernization technique to improve the management performance in any public organizations in government such as structure reforms (management reform, financial reform
2. Internal policy: Internal policy is a set of documents guidelines that establish standards that help us to understand how to organization operates.
3. Resistance to change: employees may see e-government as a threat to their positions and fear from losing their jobs and their power.
4. Lack of competencies (on level of organization): Lack of management skills
5. Collaboration: inter- intra cooperation organization as well as with private sector.
6. IT Management (on level of organization): is the discipline whereby all of the information technology resources of a firm are managed in accordance with its needs and priorities.
7. Objective and Motivation: the real drive behind e-government projects and the reason it is formulated.
8. Consistent Evaluation and Monitoring: necessary to ensure commitment to scope, quality and performance.

IV. Government Maturity In Arab Countries

Budget seems to be one important factor affecting other factors supporting or impeding e-government implementation and adoption. In the following section, we evaluate the e-government maturity evolution in Arab Countries based on United Nations' e-government development index (EGDI) and its three sub-indices:
1. Online services,
2. Telecommunication infrastructure index (TCII) and
3. Human capital (HCI).

We group the countries according to the World Bank classification of countries based on the national level of Income. Arab countries fall into 4 groups:
1. High income.
2. Low income
3. Upper middle income and low middle income

As shown in table (6). We will analyze the evolution of (EGDI) for the countries in each group.

Country		Administration reforms	Internal policy	Resistance to change	Lack of competencies	Collaboration	IT Management	Objective and Motivation	Consistent Evaluation and Monitoring	Sum
Table (5) Organizational Challenges										
Arab countries	Emirate[6]					++				+1
	Saudi Arabia[7]			--	--					-2
	Qatar									
	Jordan[9]		--		--					-2
	Egypt[10, 11]	--				--	--	--		-4
	Yemen[12, 14, 16, 27]	--		--		--	--			-4
Non-Arab countries	Australia[17]	++		--		--				-1
	Malaysian[18]	--				--				-2
	South Africa									
	Indonesia[20]					--				-1
	Botswana[21]			--						-1
	India[22, 23]		--						--	-2
	Nigeria									
	Bangladesh[25]	--	--		--					-3

These countries were unaffected by the Arab Spring.

The upper middle income as shown in figure (2) and the lower middle income countries as shown in figure (3) demonstrate a rather fixed ranking, with the exception of Egypt and Morocco. Egypt achieved an initial progress, which lapsed by 2011, mainly due to the Arab Spring, allowing Morocco to catch up with it. Libya progress seems to be rather erratic, with a large lapse during the Arab Spring events, which still prevails. The Low income countries mostly show a deteriorating performance as shown in figure (4).

The above remarks infer dependence between the e-Government performance and the national income.

Table (6) Classification of the Arab world's economies in 2014

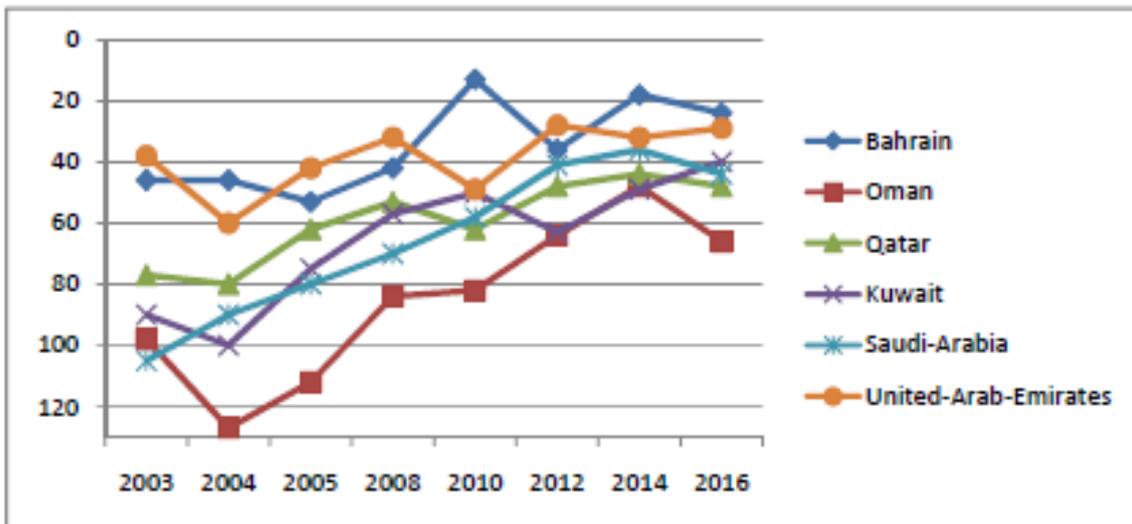| level of Income	Gross National income (GNI) per capital	Countries
High income	$12,746 or more	Gulf countries
Low income	$1,045 or less	Somali and Madagascar
Low middle income	More than $1,045 and less than $4,125	Syria, Martian, Sudan, Morocco ,Egypt and Yemen
Upper middle	More than $4,125 and less than $12,746	Lebanon, Jordan, Iraq, Algeria, Libya and Tunisia

Figure2. Rank of e-government in high income countries
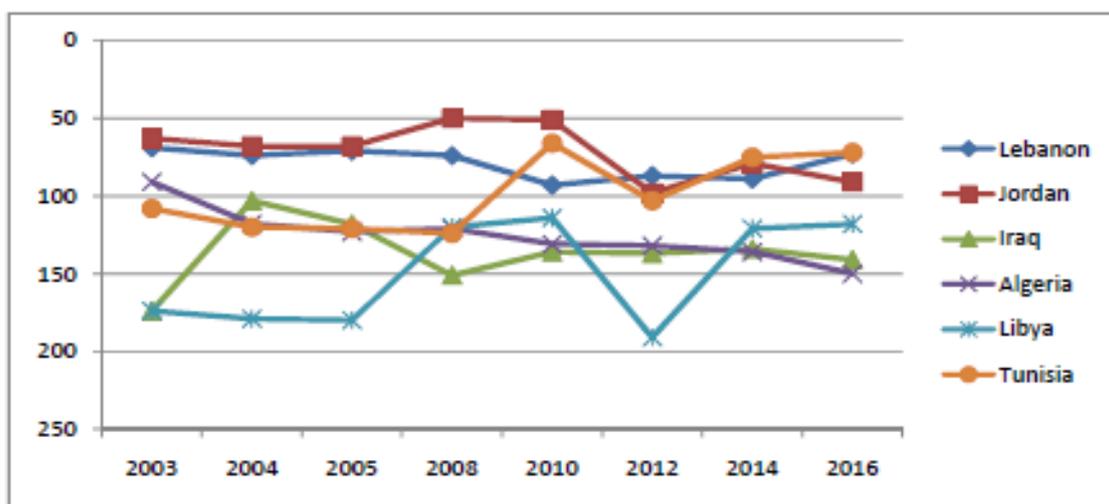

Figure3. Rank of e-government in upper low income countries
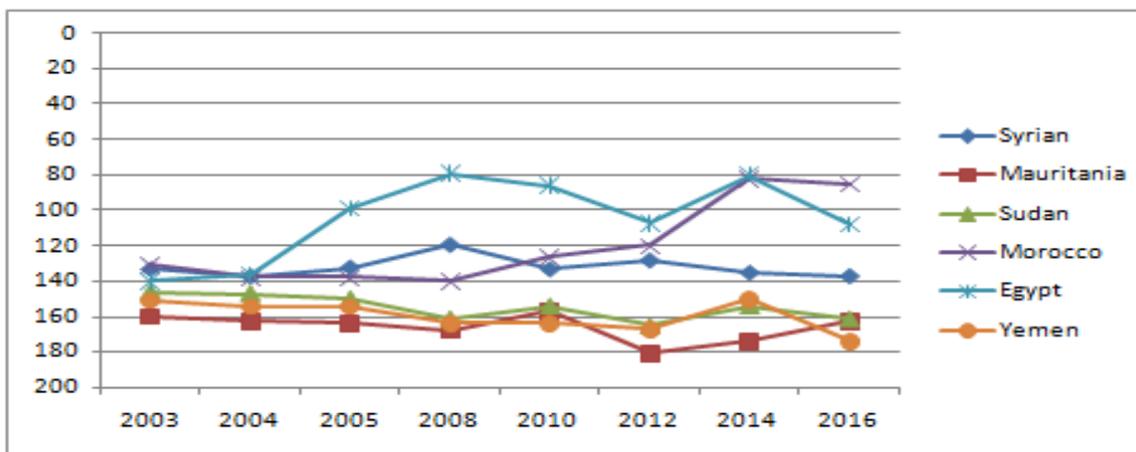
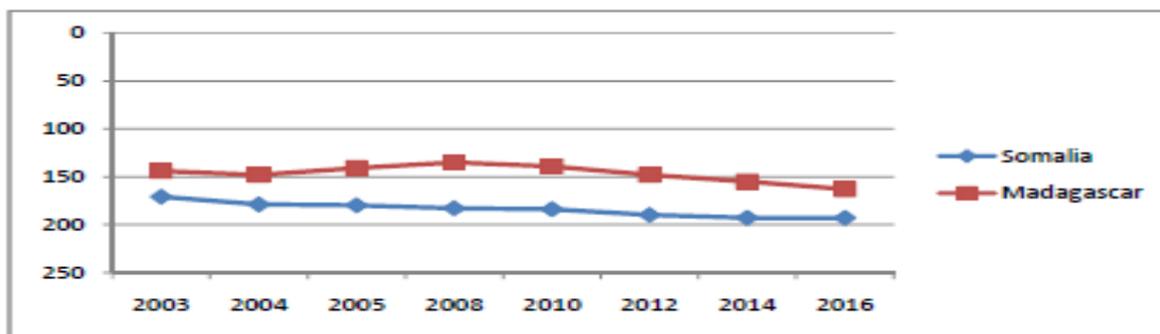**Figure4.** Rank of e-government in low middle income countries

F**igure5**. Rank of e-government in low income countries

- **ARAB SPRING COUNTRIES**

In 2010 and 2011 the protests were started in Tunisia, Egypt, Yemen, Libya, and Syria by citizens. The demonstrators expressed political and economic concerns. Tunisia and Egypt are in process of stabilizing. We aim to discuss the impact of the Arab spring on e-government ranking in 2012 and 2014

In 2012 Egypt's, Libya's and Tunisia's ranks dropped and, in 2014, almost immediately recovered their previous ranking prior to the unrest as shown in figure (6). This is not the case for Syria. Yemen, on the other hand, seems to have improved in ranking despite
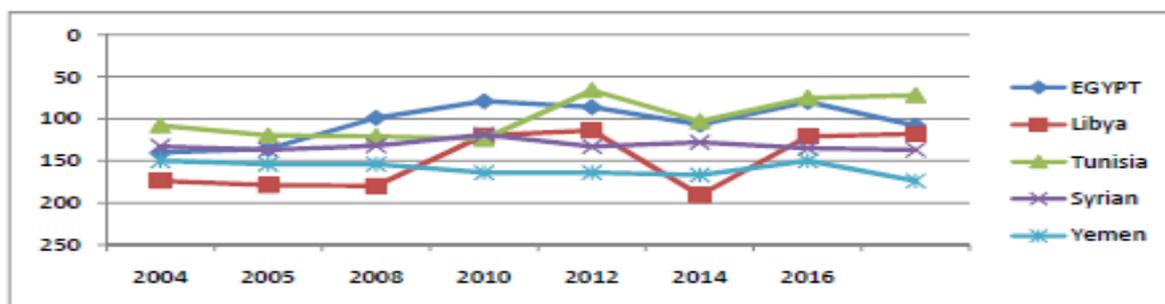

Figure 6 Ranks of Arab spring countries

V. Analysis

In this section we try to relate the e-government challenges presented earlier (technical, organization, adoption, strategic, and cultural) and e-government indices according to UN report in 2014.We "quantify" each of the challenges main categories for each country: we count the issues identified in the literature in each challenge category as citied in section (2), the result shown in table (7).

1. For each issue listed a (+) is awarded for positive remark and a (-) awarded for negative remark.
2. The total of (-) and (+) is then counted for each country.

3. The calculated sum above is then normalized to a maximum of 1 by dividing it by the total count of elements in each category. (For example, the Emirates have two (+) in technical category, the total of the technical category elements is 11, the total score of the technical category for Emirates =2/11=0.18; and so on.)

Multiple linear regression analysis reveals existing relation between:
1.   Adoption challenges and online services.
2.   Strategic challenges and online services.
3.   Technical challenges and TCII.
4.   Technical challenges and HCI.

VI. Finding And Discussion

The above findings suggest dependence between technical challenges and HCI. As previously noted in Section 3, the country e-government performance is dependent on the income level. Identifying the independent factors effects of each of the different challenges' categories on the different EGDI sub-indices requires the elimination of the effect of the economic conditions of the country. This was achieved by dividing TCII and OSI by HCI, HCI actually representing the level of well-being of the country, yielding normalized indices NTCII and NOSI respectively. Re-applying linear regression analysis to NTCII, NOSI and e-government challenges, we notice the significant difference between NTCI and NOSI (0.04) compared to TCII and OSI (0.0007), justifying our elimination of the economic impact. Actually, TCII inherently reflects the economic capacity of the country expressed in the telecom infrastructure and the citizen ability to access high tech.

From Table 8, we can conclude that there is no significant relation between NTCI, NOSI and the organization, cultural and technical factors.

Table 8, also shows a more significant relation between NOSI and the strategic factors (0.006) as well as a slightly better significance between NTCII and the adoption factors

Table (7) E- government challenges vs. sub-indices

Country	Technical 11	Organization 8	Adoption 10	Strategic 7	Cultural 7	online services 2014	HCI 2014	TCII 2014
Emirate	0.18	0.12	+0.2	+0.57	0	0.88	0.66	0.59
Saudi Arabia	-0.27	-0.25	-0.2	0	-0.28	0.77	0.74	0.55
Qatar	-0.09		-0.1	0	-0.42	0.65	0.66	0.58
Jordan	-0.18	-0.25	-0.2	-0.14	-0.28	0.51	0.72	0.31
Egypt	-0.45	-0.5	-0.2	-0.14	-0.14	0.59	0.59	0.35
YEMEN	-0.45	-0.5	-0.5	0	-0.71	0.30	0.38	0.84
Australia	0	+0.12	-0.1	0.14	-0.14	0.92	0.99	0.12
Malaysian	-0.09	-0.25	-0.1	-0.14	-0.14	0.67	0.71	0.44
South Africa	-0.09		-0.2	-0.14	-0.14	0.38	0.72	0.34
Indonesia	-0.09	-0.12	-0.3	-0.28	-0.14	0.36	0.67	0.30
Botswana	-0.18	-0.12	-0.2	-0.14	-0.14	0.34	0.65	0.09
India	-0.25	-0.25	-0.2	0	-0.14	0.54	0.46	0.13
Nigeria	-0.25		-0.1	0	-0.42	0.30	0.38c	0.19
Bangladesh	-0.18	-0.37	-0.1	-0.14	0	0.34	0.38	0.29

Table 8 Significant Differences between P values Challenges and Indices

Challenges	HCI	TCII	NTCII	OSI	NOSI
Technical (x1)	0.02	0.01			
Strategic(x2)				0.01	0.006
Adoption (x3)			0.022	0.048	
Organization(x4)					
Cultural(x5)					

VII. Conclusion

In this paper, we discussed the different challenges facing e-government, particularly in Arab countries, and compared them with other countries based on the United Nation EGDI index from 2003 to 2014.

E-government challenges were classified into five categories: technical, adoption, strategic, cultural and organizational. IT infrastructure, training, privacy and security were found to be the main technical challenges that appeared the most in Arab countries as well as others. Regarding adoption, the most challenges found in the Arab countries are top management support and citizens' encouragement to participate in e-government. However, the most common challenges for all countries that we have surveyed, including the Arab countries, are limitation in both funding and the internet subscription.

For strategic challenges, it has been found that the Arab countries suffering the absence of vision and mission while the absence of framework strategy was a common challenge in the other countries. We also found that the most cultural challenges that the Arab world countries have faced are a lack of awareness and education and gender discrimination. While IT literacy is mainly a cultural challenge in the other countries. Resistance to change is a common organizational challenge for all countries that have been surveyed. However, the lack of administrative reforms is an additional organizational challenge in non-Arabic countries.

It was also shown that income level has a considerable impact on e-government ranking for Arab countries. It is evident that the online services index improves with the existence of clear strategy and good adoption. We can conclude that whenever the good HCI exist, the growth of OSI and TCII will increase. We can also conclude that when there is no good HCI, the growth of OSI and TCII will decrease. So if HCI and TCII are scoring well, it can be anticipated that technical will also fair well. Finally, we can conclude the adoption and strategy factors are the major elements in e-government frameworks that will be proposed in the future work

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