Assessing e-Readiness in the Arab Countries: Perceptions Towards ICT Environment in Public Organisations in the State of Kuwait

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Abstract: In the information age, the gap between the developed and developing countries increased due to the ease of access to new technologies and the usage of information and communications technology (ICT). The first step in promoting e-Government is conducting the e-Readiness assessment**.** E-Readiness is defined as the degree to which a community is prepared to participate in the information age (networked world). It is measured by assessing a community's relative advancement in the areas that are most critical for ICT adoption and the most important applications of ICT. E-Readiness assessment is meant to guide development efforts by providing benchmarks for comparison and gauging progress. It can also be a vital tool for judging the impact of ICT, to replace wild claims and anecdotal evidence about the role of ICT in development with concrete data for comparison. The main purpose of this paper is to explore the e-Readiness assessment models and to investigate the perceptions towards the IT environment in some public organisations in the State of Kuwait. Three main variables (human skills, infrastructure and connectivity) have been used. These variables were derived using the terms suggested by Harvard CID and APEC models. The results show that less than half (46.57%) of the participants agreed that their organisations have adequate and appropriate connectivity, infrastructure and IT human skills to implement the electronic government systems.

Keywords: e-Readiness, Assessment models, e-Government, e- Services

1. Introduction

The rapid rate of Internet penetration throughout the world, coupled with dramatic advances in uses of information technology in business and industry, is creating an extensive literature on various aspects of 'e-business', 'e-commerce' and 'e-Government'. e-Government means different things to different people. Some observers define e-Government in terms of specific actions: using a government kiosk to receive job information, applying for social security benefits through a web site, or creating shared databases for multiple agencies. Other observers define e-Government more generally as automating the delivery of government services. While perceptions of e-Government vary widely, a broad definition of e-Government is "the use of information and communication technologies (ICT) in improving the activities and services of government" (Heeks 2004) and a more value-laden definition is "the use of ICT to transform government by making it more accessible, effective, and accountable" (InfoDev 2002). The first definition reflects the basic model of e-Government where government services delivered on-line to citizens and implies efficiency and customer-service; the second derives from a governance model of increased participation of citizens in the affairs of their government. The main objective of this paper is to identify and analyse the primary issues, opportunities and challenges that e-Government initiatives present in the State of Kuwait.

2. e-Government in developing countries

2.1 Challenges for a successful implementation of e-Government in developing countries

The adaptive challenges of e-Government go far beyond technology; they call for organisational structure and skills, new forms of leadership, transformation of public-private partnerships (Allen et al, 2001). Many developing countries suffer from the digital divide, and they are not able to deploy the appropriate infrastructure for e-Government deployment (World Bank, 2003). Ndou, (2004) represents seven main challenges for e-Government development and implementation in developing countries as follows:

1- ICT infrastructure 2- Policy issues 3- Human capital development
4- Change management 5- Strategy 6- Leadership role.
7- Partnership and collaboration

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2.2 e-Government in the state of Kuwait

Kuwait is one of the Gulf Cooperation Council (GCC) that made up of six countries, Saudi Arabia, the United Arab Emirates, Oman, Bahrain, Qatar, and Kuwait. All GCC countries score very high on the human capital index that means that citizen readiness is not an issue. However while the cooperation agreement materialised in other domains of economic activity; this does not seem to be the case for e-Government where each country is going it alone (Sahraoui, 2005). The only country that holds tangible promise to continuous increase in its e-Services is Bahrain and it is pioneering in its adoption of open standards for its e-Government initiatives in order to benefit from reduced costs and increased flexibility (AlSabti, 2005). Based on a UN report in 2004, not a single Middle East country has made it into the top 25 global e-Government readiness ranking. The e-Readiness report has shown a decline of the readiness index for all Arab countries (UN, 2004). In addition, the Economist Intelligence Unit assesses the Arab countries' e-Readiness at the Global level and ranks them. Three countries appeared only in this rank (Algeria, Egypt, and Saudi Arabia). The best level is the 46th out of 65 for Saudi Arabia in 2005 e-Readiness assessment as shown in the following table (EIU 2002, 2003, 2004and 2005).

Table 1: Arab countries e-Readiness rank at the global level

Country	2002	2003	2004	2005
	Rank (60)	Rank (60)	Rank (64)	Rank (65)
Saudi Arabia	47	48	48	46
Egypt	48	51	51	53
Algeria	58	58	61	63

Despite of the enormous efforts of the public organisations in the State of Kuwait to apply e-Services, the information environment within these organisations is not adequate for applying the e-Government. The first step in promoting e-Government in the state of Kuwait is conducting the e-Readiness assessment**.**

3. e-Readiness assessment models

E-Readiness is defined as the degree to which an economy or community is prepared to participate in the digital economy (APEC 2000). The value to a community of assessing its readiness lies in evaluating its unique opportunities and challenges. For developing countries, an e-Readiness assessment can help establish basic benchmarks for regional comparison by market verticals and for national planning. Numerous existing e-Readiness assessment models vary in terms of objectives, methodologies and results. This is to say that no assessment model is likely to cover all topics and deliver the complete set of required data. Generally, the e-Readiness assessment models cover one or more of the following topics (Peter 2005):

- Physical infrastructure – the telecommunications infrastructure: including teledensity (usually the number of telephones per 100 people), Internet access, bandwidth, pricing, and reliability;
- ICT use - levels of use throughout society including: homes, businesses, schools, and government;
- Human capacity – literacy, ICT skill levels, and vocational training;
- Policy environment – the legal and regulatory environment affecting ICT sector and ICT use: including telecommunications policy, trade policy, e-commerce taxation, universal service provisions, consumer protection, and privacy; and
- ICT economy (the size of ICT sector).

A wide range of studies on e-Readiness assessment models and tools has developed to measure a country or economy's e-Readiness over the past several years. The APEC economies (2000) develop an e-commerce readiness assessment guide. The guide provides a general framework that any economy or community can apply. Its purpose is not comparison between economies, but for analysis within them. It consists of six indicators as follows:

- Basic infrastructure and technology (access to basic infrastructure, price, speed and functionality of the infrastructure, reliability, availability of terminal equipment, infrastructure market conditions and interconnection and interoperability);
- Access to necessary services (Internet service providers and non-IT services and distribution channels);
- Current level and type of use of the Internet;
- Promotion and facilitation activities;
- Skills and human resources; and
- Positioning for the digital economy.

Whereas Bridge.org (2001) builds an e-Readiness assessment model based on the following criteria:

- Number of users or computers - Infrastructure - Access
- Affordability - Training - Relevant content
- Poverty - IT sector geography, race, age, religion, gender, and disability

Economist Intelligence Unit (2001) suggests six categories used to assess and ranking country's e-Readiness as follows:

- Connectivity 30% - Legal and regulatory environment 15%
- Business environment 20% - Social and cultural infrastructure 5%.
- E-commerce consumer and business adoption 20% - Supporting e-Services 10%

In addition, (EIU 2002) modifies these indicators to be:

- Business environment 20% - Consumer and business adoption 20%
- Social and cultural infrastructure 15% - Legal and policy environment 15%
- Connectivity and technology infrastructure 25% - Supporting e-Services 5%.

United nations economic commission for Europe (2002) recommends different categories of indicators to assess the e-Readiness. These categories are interdependent and mutually reinforcing and fall within eleven groups as follows:

- Network access - Networked society - Network policy - Media
- Networked economy - networked learning - Intellectual capital
- Labour force - Research and development - Education

Applied Research and Communications (ARC) (2002), suggests four main indicators to assess the Bulgarian e-Readiness. These indicators are network access, e-education, e-society and e-economy. Brown (2002) examines some culture variables of e-Readiness that governments can easily alter to improve digital opportunity and move forward with e-Government. These variables reflect patterns of behaviour that may thwart or impede the establishment or progress of sustainable e-Government. The six cultural variables are:

- Policy discourse culture - Legal culture - Democratisation culture
- Diversity culture - Trust culture - Communications culture

The Centre for International Development at Harvard University (2002) develops a five indicators model for e-Readiness assessment as follows:

- Network access - Networking learning - Networked society
- Networked economy - Network policy

Moreover, in (2003), the centre modifies indicators to be: Network use (1/2); and Enabling factors(1/2) (networked economy, network policy, networked society and network access)

Krull (2003) mentions five indicators used to assess ESTONIA e-Readiness as follows:

- Networked society - Network access - Networked learning
- Networked economy - Networked government (ICT in public administration)

Choucri et al (2003) suggest a framework of critical factors for e-Readiness measurement as follows:

- Access (infrastructure and services);
- Capacity (social factors, economic factors and policy factors); and
- Opportunities (specific application and opportunity penetration).

Najjar et al (2003) propose five groups or categories of criteria and use it in assessing e-Readiness of Lebanon, these criteria are:

- Access and infrastructure (network infrastructure, access, affordability, reliability and speed and international connections);
- Government leadership (national ICT strategy, ICT policies and regulations, central bank initiatives, partnerships and funding for ICT and e-Government and organisational efficiency);
- Human capacity (ICT as formal education, ICT as informal education and the ICT brain drain);
- E-business and economic environment (economic climate, ICT as a production sector and e-commerce; and
- Social environment and public awareness (usage of ICT in everyday life and the internet society).

Bakry (2004) develops a framework for e-Readiness assessment model (STOPE) consisting of five categories as follows (Al-Osaimi et al 2006, Bakry 2004 and Bakry et al 2005):

- Strategy (ICT leadership and ICT future development plans);
- Technology (ICT basic infrastructure, ICT e-Services infrastructure, ICT provisioning and ICT support);
- Organisation (ICT regulations: government, ICT cooperation and ICT management);
- People (ICT awareness, ICT education and training, ICT qualifications and jobs and management of ICT skilled); and
- Environment (knowledge, resources and economy, organisation and general infrastructure).

Ifinedo (2005) classifies the indicators of e-Readiness assessment in three main indicators as follows:

- Demand forces (culture, understanding and effectiveness, knowledgeable citizens);
- Measuring the supply forces (industry competitiveness, skilled workforce and investments); and
- Societal infrastructure (cost of living and pricing, advanced infrastructure and macro economic environment).

Peters (2005), summarises the criteria used in assessing country's e-Readiness as follows:

- Legal and regulatory environment for ICT use;
- Affordability of ICT in the local context;
- Availability of locally relevant content and services;
- Integration of ICT into peoples' lives;
- Socio-cultural factors that affect ICT use;
- Macroeconomic environment affecting ICT use; and
- Government's role in driving e-Readiness.
- Appropriateness of ICT;
- ICT capacity and training;
- Use of ICT in business;
- Physical access to ICT;
- Security and peoples' trust in ICT;

The analysis of the literature shows that most of the reviewed articles deal with infrastructure and technology, people and human skills and accessibility and connectivity. In this work, we deal with three interrelated variables: Human skills, Infrastructure and Connectivity.

4. e-Readiness assessment methodology

There are many models and tools used to assess the e-Readiness. Each assessment tool or model has a different underlying goal and definition of e-Readiness. Of course, no tool will fit every user's needs. The user should choose carefully and with a clear understanding of the kind of results that any particular tool is likely to lead them.

4.1 Research variables

In this study, we measure e-Readiness by the status and progress on three interrelated variables, these variables derived using the terms suggested by Harvard CID (2002) "Readiness for the Networked World: A Guide for Developing Countries" and expanded and amended by parts from APEC's "E-Commerce Readiness Assessment Guide" APEC (2000).

- Human skills: A major challenge of an e-Government initiative is the lack of ICT skills in the public sector. This is a particular problem in developing countries. (UNPA and ASPA 2001).
- Infrastructure: ICT infrastructure is recognised to be one of the main challenges for e-Government (Taspscott, 1996)
- Access and connectivity: Beyond the availability of affordable, high-quality basic communications services, the adoption of e-commerce will also depend on the capacity, availability and pricing of value-added services, which provide applications such as access to the basic infrastructure, and content hosting (APEC 2000).

4.2 Research tool

In this work, a questionnaire designed to investigate the participants' perception towards the IT environment in some public organisations in the State of Kuwait. The questionnaire has 11 items to assess Human skills, 16 items to assess Infrastructure and 11 items to assess Connectivity. The participants were asked to indicate the extent of their agreement or disagreement on a five-point Likert-type scale (completely agree – agree - don't know – disagree - completely disagree)

4.3 Sample size

Existing plans for e-Government and available infrastructure are two criteria used to select the organisations under study. Twenty public organisations stated that they have a plan for e-Government applications. The rage for applying these plans is between 3 to 10 years. Four criteria applied to select the participant organisations. These criteria are percentage of expenditures on IT, percentage of IT staff, percentage of employees using computers and level of education. Ten public organisations (out of 20 organisations under study) selected and the sample was made up of employees from the selected organisations. Two hundreds and fifty copies of the questionnaire were distributed (25 for each organisation).

4.4 Collected data

As the result of conducting personal interviews, and distribution of questionnaires, one hundred forty two questionnaires received (56.8%), the respondents classified according job title and experiences as follows:

Table 1: Respondents classification according job title and experiences

Job title	No.	%
Computer technician	19	13.38
Programmer assistant	8	5.63
Programmer	24	16.90
Senior programmer	11	7.75
Applications designer	8	5.63
Systems analyst	16	11.27
Senior systems analyst	6	4.23
Systems consultant	6	4.23
Senior systems consultant	3	2.11
Other	41	28.87

Experience (in years)	No.	%
1-3	15	10.56
4-6	37	26.06
7-10	24	16.90
11-13	21	14.79
14-17	19	13.38
More than 17	26	18.31

5. Assessment results

To reveal the participants opinions regarding to the study variables, questions on each variable grouped and the average of the "completely agree" and "agree" answers taken. The results show that the average of participants' agreements regarding to the appropriateness of IT environment in public organisations in the State of Kuwait are 51.79% for Human skills, 53.06% for infrastructure and 34.84% for connectivity as shown in the following tables.

Table 2: Human Skills

No.	Human skills items	%
1	Percentage of Internet users within the organisation > 80%	38.73
2	Assistance, such as a help desk, provided during hours that meet customer needs.	65
3	Methods, tools or training provided to assist individuals who lack the skills or have special requirements for accessing electronic services.	54
4	Training and support keep personnel skill sets current with e-Government developments.	70
5	The organisation provides encouragements that attract and retain qualified, highly skilled personnel encourage superior performance	40
6	IT Personnel understand the move towards e-Government, what are the roles and expectations.	54
7	IT Personnel kept informed about the necessity and benefits of e-Government.	52
8	IT Personnel held accountable for achieving the organisation's e-Government goals.	53
9	Ongoing security training is conducted for all relevant personnel	42
10	The IT organisation is well respected by high management	56
11	The technical experience and expertise of our e-Government teams (internal or partner) is adequate for success	45
Average		51.79

Table 3: Infrastructure

No.	Infrastructure items	%
1	No. of PC per 100 of employees within the organisation > 80%	50.00
2	Systems performance and reliability standards defined and monitored to ensure fulfilment.	58
3	Systems designed to integrate with important internal and external databases and applications and change as needs change.	59
4	A formal system/application development methodology, designed for e-Government, used for all information and communications technology (ICT) projects.	54
5	Measurable targets/results and milestones for e-Government are documented in organisation planning.	44
6	E-Government is an integral part of the organisation's strategic and business planning.	56
7	A unified direction for e-Government is set for the organisation, with clear objectives	44
8	Senior management and staff demonstrate a clear commitment to the implementation of e-Government.	50
9	The organisation's disaster recovery planning deals with e-Government issues, and reviewed regularly.	43
10	e-Government systems are comprehensively and regularly tested and reviewed to provide assurance that controls are present and effective	44
11	The Bandwidth for speedy and quality access of information is suitable for information transactions between public organisations	55
12	The organisation has the technical maturity to successfully design, develop and implement it's own e-Government projects	65
13	The organisation IT architecture has enough flexibility to allow for the implementation of new e-Government technologies as they become available	58
14	The organisation has committed to the success of e-Government projects by adopting appropriate quality control and performance measures.	54
15	The Internet solutions are flexible to contain rapid change and scalability	58
16	The organisation has technological infrastructure and competencies to effectively engage in e-Government initiatives	57
Average		53.06

Table 3: Connectivity

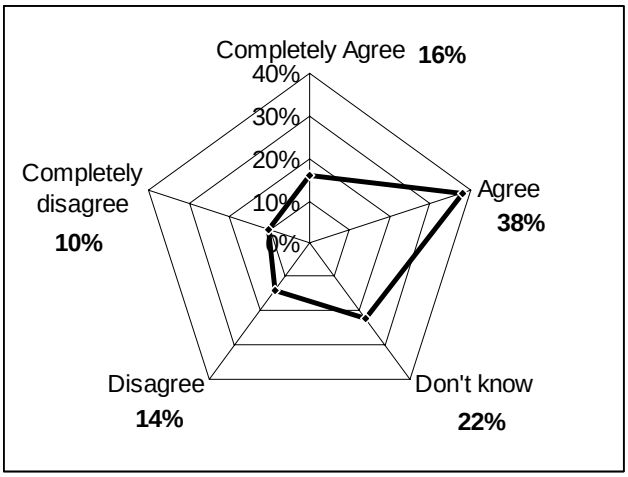
No.	Connectivity items	%
1	Opportunities for working with other organisations electronically are explored continually (when needed)	39.44
2	What is the number of public organisations that fully attached electronically to the organisation? (< 3)	31.69
3	What proportion of the employees has access to PCs - through the home? (< 5%)	47.89
4	What is the highest connection speed supported by organisation's infrastructure? (385kbps-.5Mbps)	22.54
5	What is the average connection speed available to users? (57-384 kbps)	23.24
6	What is the highest connection speed available for wireless Internet access? (385kbps-.5Mbps)	19.72
7	Percentage of users have dedicated or other high-speed (>1.5Mbps) digital access to the Internet? (< 20 %)	23.94
8	How many dial-up attempts /connections failed to access to the main servers because they are busy or interrupted within the last year? (< 1%)	29.58
9	How high is the rate of packet loss? (< 5%)	42.25
10	The Network backbone technologies and infrastructure that connect the organisation to the public Network is ready for applying the e-Government	50
11	The main, external e-Gov web site enables employees to appropriately interact with the customers	53
Average		34.84

6. Discussion

6.1 General discussion

The results show that:

- Total average percentage of participants' agreements regarding to the appropriateness of IT environment in public organisations in the State of Kuwait are 54%, whereas 22% do not know and 34% disagree or completely disagree as shown in the following figure,



Participants' answers

- Less than half (46.57%) of the participants agreed that their organisations have adequate and appropriate connectivity, infrastructure and IT human skills to implement the electronic government systems,
- Over seventy two percent (72.54%) of them agreed that their organisations have over 60 PC per 100 employees,
- Over sixty six percent (66.19%) agreed that over 60% of the employees use internet in there works,
- Less than forty percent (38.03%) communicate with other organisation electronically in daily base, and
- Only 21.83% of the employees have PCs and can use internet from home as shown in the following table.

Table 4: Distribution of internet usage

Question	Percentage of Internet users within the organisation.				
Item	< 20%	20-40%	40-60%	60-80%	>80%
Percentage	2.11%	7.04%	19.72%	27.46%	38.73%
Question	No. of PC per 100 of employees within the organisation.				
Item	< 20	20-40	40-60	60-80	>80
Percentage	3.52%	6.34%	10.56%	22.54%	50.00%
Question	Opportunities for working with other organisations electronically are explored continually.				
Item	Never	When needed	Seasonally	Daily	Full attached
Percentage	8.45%	39.44%	9.15%	24.65%	13.38%
Question	What proportion of the employees has access to PCs - through the home?				
Item	< 5%	5-10%	11-20%	21-30%	>30%
Percentage	47.89%	9.15%	10.56%	4.93%	16.90%

6.2 Human skills

The results show that:

- Seventy percent (70%) of the participants agreed that training and support system keep personnel skills sets current with e-Government developments,
- Sixty five percent (65%) of them stated that IT assistance, such as help desk (that meet customer needs) is available during hours within their organisations. This percentage gives perspective on the qualification of the IT staff within the public organisations,

- Fifty six percent (56%) of the participants approved that the IT organisation well respected by high management, and
- Lastly, fifty five percent (55%) of the participants doubt about their technical experiences in applying e-Government.

6.3 Infrastructure

The results show that:

- Although fifty five percent (55%) of the participants doubt about their technical experiences in applying e-Government, sixty five percent (65%) of the participants agreed that their organisations have the technical infrastructure to successfully design, develop and implement their own e-Government projects,
- Fifty nine percent (59%) agreed that the systems could integrate with important internal and external databases and applications, and
- Moreover, 58% of the participants agreed that systems performance and reliability standards defined and monitored to ensure fulfilment.

6.4 Connectivity level

LAN speed:

- More than 76% of the participants believe that their organisation's LAN speed is between 57 kbps – 45 Mbps, and
- Only 19% of them believe that their organisation's LAN speed is more than 45 Mbps.

Wireless speed connection:

- Although 50% of the participants think that their organisation's wireless speed between 57 Kbps to 45 Mbps, about 40% of them don't know whether their organisations have a wireless speed or not,
- More than forty five percent (40.07%) stated that the failure to access e-service is less than 2% whereas about 10% of the participants stated that they fail to access e-Services more than 6%, and
- Lastly, 52.71% stated that the loss rate is les than 5% as shown in the following table.

Table 5: Connection Speed

Question	What is the highest connection speed supported by your infrastructure available to your organisation?				
Item	< 56Kbps	57-384kbps	385kbps-1.5Mbps	1.6-45Mbps	> 45Mbps
Percentage	4.93%	14.08%	22.54%	21.13%	19.01%
Question	What is the highest connection speed available for wireless Internet access?				
Item	< 56Kbps	57-384 kbps	385kbps-1.5Mbps	1.6-45Mbps	> 45Mbps
Percentage	9.15%	14.79%	19.72%	11.27%	4.93%
Question	How many dial-up attempts/connections failed to access to the main servers because they are busy or interrupted within the last year?				
Item	< 1%	1-2%	3-4%	5-6%	> 6%
Percentage	29.58%	15.49%	13.38%	13.38%	10.56%
Question	How high is the rate of packet loss?				
Item	< 5%	5-10%	11-15%	16-20%	> 20%
Percentage	42.25%	10.56%	9.15%	7.04%	5.63%

7. Conclusions and recommendations

Despite of the enormous efforts of the public organisations in the State of Kuwait to apply e-Services and the promotion of e-Government were frequently on the political agenda, the information environment within these organisations is not adequate for applying the e-Government. The overall e-Readiness of the public organisations for applying e-Government is only 54%. Ninety percent of the public organisations have adopted ambitious plans to deliver their e-Services within the 10 coming years, while others have seen a more unstructured development. In addition, 50% of the information technology employees in these organisations agreed that the network backbone technologies and infrastructure that connect their organisations to the public network is ready for applying the e-Government and they satisfied about the performance of their organisation towards applying e-Government. Finally, there are several trends in public organisations in the state of Kuwait towards the development of a networked e-Government, which will require:

- Strengthen co-ordination and collaboration among organisations,
- Paying more attention to qualify their employees by raising the rate of e-Government training, and
- Enhancing network connectivity speed and with other public organisations.

8. Future work

The total image about public organisations e-Readiness in the state of Kuwait is still not clear due to study only three variables. More investigations should be studied regard to the other variable such as budget, management skills and leadership, etc. In addition, e-Government is not one-man show. All organisations should study the way to establish special e-culture strategies within it.

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