Enhancing Trust in e-Voting through Knowledge Management: The Case of the UAE

Fadi Salem
Fadi.salem@dsg.ae
Dubai School of Government
www.dsg.ae

Abstract

The United Arab Emirates’ society has grown comfortable with the ubiquitous information and communication technologies. Despite repeatedly ranking high in terms of e-government readiness and social acceptance of ICTs, there were doubts that the government decision to push for using e-voting in the first elections held in the country’s history would be crossing the boundary of social acceptance of technology. This paper assesses the role of knowledge management in the e-voting process in the UAE’s first election. A case study is presented to explore the assumptions on the impact of introducing an e-voting system on the level of trust in government and the role of knowledge management in increasing transparency. The paper argues that knowledge management can play an important role in widening social acceptance in e-government processes such as e-voting through increasing transparency, thus enhancing trust in government. However, a certain reservoir of trust in government is a prerequisite for social acceptance of e-voting, regardless of the e-readiness level in the country.
From No Voting to e-Voting

When Maysa Ghadeir first heard that she would have to use an “e-voting system” in the first election in the United Arab Emirates (UAE), she had mixed feelings of excitement and anxiety. Not only was it the first time she would be voting in a political process in the country, but she would have to do it using a new unconventional method through an electronic system. She would not be signing her vote on a paper ballot nor would her vote be authenticated using her fingerprint as do many polling processes in the Middle East. Instead, Maysa would use a national smart ID card or a barcode on her passport to authenticate her identity using a scanner, then touch an electronic screen with her fingertip to cast her vote, before finally watching the votes counted live on a large electronic screen, just minutes after the end of voting process. “Before trying the [e-voting] system, I was afraid that I might make a mistake while casting the vote electronically and that my vote would unintentionally be invalid or not go to my desired candidates” Maysa stated. When she finally cast her vote in the voting center in Dubai on Monday 18th of December 2006, Maysa’s reaction was: “Overall, I thought the ease of use and speed of the process was very satisfactory.”

Despite the many challenges and controversies surrounding electronic voting, many aspects of its value had been documented. For example, given that certain age groups have better acceptance levels for technology, the authorities in Geneva concluded after their e-voting experience in 2000 that e-voting can reinforce legitimacy of the public’s choice through balancing the age group of voters (encouraging the participation of younger voters). In addition, Sheffield city council in the UK concluded that voting became more convenient and accessible when e-voting was introduced in 2002. The council also viewed e-voting as a crucial point of introduction to e-government through promoting the use of IT deployments such as smart cards and e-voting mock ups in public and educational institutions (UNDESA, 2007). There are several doubts which people have when it comes to e-voting. Is voting trustworthy and safe? Does the process itself affect the results? Does it reduce costs of conducting the voting process? Does it increase the level of participation?

Using a case study on the e-voting experience in the UAE elections held in 2006, the paper explores the assumptions on the impact of introducing an e-voting system on the level of trust in government and the role of knowledge management in increasing transparency.

Background on Political Participation in the UAE

Traditionally, the interaction channel that has been used between citizens and rulers in the UAE was the open majlis (council), where the rulers hold direct gatherings open to the public in their courts to meet directly with citizens. Since the foundation of the United Arab Emirates in 1971, all 40 members of its consultative assembly - the Federal National Council (FNC) - have been appointed by the rulers’ courts in the seven emirates that comprise the UAE. Set up on the 2nd of December 1971, the FNC does not have full legislative power, as its role is limited to suggesting legislative amendments to the UAE cabinet. This majlis tradition has continued in the UAE alongside the FNC as an interaction channel between citizens and government.
In 2005, the president outlined a plan for reforming the political participation process and expanding the role of the FNC. The framework announced included three phases. The first phase took place on the 16th, 18th and 20th of December 2006 through indirect elections of half of the council members by an “Electoral College” (the other half of the FNC were appointed by the rulers’ courts). The second phase will expand the role and legislative power of the FNC and increase the number of its members. Finally, the third phase will be a full public election process of half of the FNC members. To carry out the first phase, the government established the National Election Committee (NEC) in August 2006 to manage the first FNC election process (NEC, 2006b). One of the early decisions reached by the NEC was to use electronic measures for authentication and for the casting and counting of votes in the upcoming election.

Choosing members of the Electoral College was part of the first phase towards the plan for a more representative participatory system in the UAE. The country lacks an election law; therefore the government issued the Election Executive Instructions as the official framework for the election. According to the Executive Instructions, the Electoral College had to be chosen from UAE citizens by the rulers’ courts in the seven emirates. The number of the Electoral College members was determined to be of multiples of a hundred based on the number of seats held by each emirate in the FNC as a minimum. The emirates of Abu Dhabi and Dubai hold eight seats each, Sharjah and Ras al-Khaimah hold six seats each and Al-Fujairah, Ajman and Umm al-Quwain hold four seats each. Based on this, the rulers of the seven emirates had to select at least 4000 citizens as members of the Electoral College (NEC, 2006b). The rulers’ courts had the liberty to chose more members if seen necessary, but 4000 was the minimum number of members. However, the final number of Electoral College members reached 6,595, including 1162 women. The last census carried out in the UAE indicates that the total population in December 2005 was 4.1 million. Out of which, around 825,000 are citizens, with the remaining population made up of multinational expatriates. More than 400,000 of UAE citizens are 20 years old or older and are potential voters (MoE, 2006). Based on this, the Electoral College members constituted around 1.7 percent of the UAE citizens’ potential voters. The estimated total UAE population in 2006 was around 4.7 million (WEF, 2007).

The majority of the Electoral College members were between 21 and 40 years of age, with 21.9 percent between 21 and 30 years old and 36.1 percent between 31 and 40 years old (NEC, 2007). This does represent the young population of the UAE fairly well; according to the latest census in the UAE, around 69 percent of those 20 years or older (potential voters) fall in the age group of 20 to 40 years old (MoE, 2006). In terms of educational level, 63.1 percent of members in the Electoral College have a university-level degree or a postgraduate degree (NEC, 2007). Knowing these voters’ characteristics is crucial in understanding the e-voting acceptance levels and trust in the e-voting process in the UAE.
Sending the e-Voting Message Out

The e-voting approach was chosen by the NEC for several reasons. Based on research conducted before the elections, the NEC reached an agreement on the use of an e-voting system. The decision making process on e-voting was articulated by different members of the NEC: The committee viewed the e-voting system as “modern” and as “a symbol of the progression of the UAE as an IT savvy society.” In addition to this positioning factor, the NEC opted for the e-voting approach because it is “easy to use,” “most secure system for voting,” “more transparent than the manual methods” and can “deliver the election results in very short period of time.” Nizar Maroof, who was involved in an earlier e-voting project in Bahrain and was a consultant with the NEC during the e-voting project in the UAE, stated that “due to the nature of the UAE election system, manual counting needs at least 48 hours to get the results .. while [with] e-voting, counting took less than 5 minutes.” In addition, the cost of conducting e-voting in terms of manpower required, was “around third of that with manual voting per site.” Moreover, Dr. Said Al-Ghufli, the Assistant Secretary-General of the Ministry of State for Federal National Council Affairs mentioned that “a key reason for choosing the e-voting approach was to establish a precedent for future elections.” By introducing e-voting systems and procedures at this early phase, he stated, the stage will be set when the country moves to the third phase of direct general elections.

The value of e-voting as seen by the NEC needed to be conveyed to the public. The NEC carried out an awareness campaign using different ICT and conventional channels on the election process as a whole and its e-voting element. This campaign was conducted using local Arabic and English newspapers and radio stations. Text message updates (SMS) were sent frequently to the Electoral College members. The official website of the NEC (www.uaenec.ae) also made available the details and photos of all the candidates and the latest news and information on the voting process. The website received more than 2.5 million visitors between October 1 and December 25, 2006. It also included information on other contact channels, a frequently asked questions page and official publications including an illustrated brochure on the steps to follow during the e-voting process. A hard copy of the illustrated brochure was sent to all members of the Electoral College by mail and was also disseminated throughout the UAE during public seminars.

In addition to the awareness campaign, the NEC made available different channels to facilitate interaction with the public and respond to candidate and voter enquiries on the election process. The committee members organized a series of interactive forums and seminars in all of the seven emirates, including universities and women associations. A call center established by the NEC received more than 10,000 calls from the public and the members of the Electoral College prior to the election (NEC, 2007).

In order to ensure the smooth operations of the elections, the NEC also conducted training for members of the Electoral College on the election process including the use of the e-voting system. Prior to the election days, two full simulations of the e-voting process were carried out, with more than 1000 students from the UAE Higher Colleges of Technology participating. This served as an audit of the system and as training on e-voting for those interested. Members of the Electoral College were also invited to these
open days where they were trained on using the e-voting system. As a member of the Electoral College, Maysa Ghadeir stated that “After testing and learning more about the e-voting system I was satisfied and found it easy to use and felt it was trustworthy.” Moreover, on the days of the election, a dummy e-voting system was made available outside the voting area for the voters to try before they actually cast the vote to make sure they were comfortable using the system. The administrative and technical personnel who were available in the voting centers were also trained on the “ethical, business and technical issues” for two days before the elections, Maroof added.

**The Technical Team**

The NEC formed a technical team to supervise the electronic systems to be implemented during the election process. The team included experts from different government departments, including the UAE General Information Authority, the Naturalization and Residency Administration, the Ministry of State for Federal National Council Affairs, the Ministry of Interior, the Emirates Identity Authority, the Civil Service Bureau and the Ministry for the Development of Government Sector. The team’s role was pivotal for the success of the voting process as a whole. Its responsibilities included setting the standards for the e-voting process, supervising the development of the technical infrastructure in the polling centers, developing the information system to be used in the voting process, creating contingency plans and risk assessments and training the Electoral College and the poll centers workers on using the system.

The information systems supervised by the technical team were:

1. **The Electorate Registration System**: This included building the official database of voters which would allow each candidate to have a collective overview on his or her constituency.

2. **The Candidates Registration System**: This system allowed managing and updating candidates’ information and verifying their eligibility to run in the election.

3. **The Identity Verification System**: The system ensured the authentication of voters’ identities using an ID card or a passport. To speed the e-voting process, the system was also designed to identify candidates the voter is allowed to vote for, hence limiting the time spent while casting the vote. It was also designed to prevent duplicate voting by flagging the voter’s entry in the system when a vote was cast.

4. **The Vote Casting System**: This system includes the e-voting kiosks, the voting database, the encryption system, the vote counting system and results presentation system (NEC, 2006a, NEC, 2007).

The NEC decided to build on the technical knowledge acquired in Bahrain through an e-voting system proposed earlier in the kingdom. The committee, therefore signed a memorandum of understanding with the Kingdom of Bahrain for sharing the expertise on a consultancy basis. The technical team coordinated with the Central Informatics Organization (CIO) in Bahrain and consultants from the CIO were invited to assist the UAE technical team. Bahrain’s CIO had been involved in designing an e-voting system and the Bahraini government was in the process of making use of the system in its municipal and parliamentary elections on November 2006.
When the Bahraini CIO team designed the e-voting system for implementation in Bahrain, they studied several case studies and recommendations such as those issued by the Council of Europe on e-voting. The voting system’s engine was developed in collaboration with the United Nation Development Program (UNDP) and Microsoft Corporation. The UAE technical team, in collaboration with the Bahraini consultants, customized this system based on the local requirements and legislations in the UAE.

The e-Voting Controversy

Regardless of the voting method used, elections are usually associated with controversy. In 2006, the Bahraini government announced that an e-voting system will be used for its municipal and parliamentary elections, a first in the Arab region. Despite the build up to be the first Arab country to implement e-voting, the Bahraini government announced that it would not be using the e-voting system few weeks before the election date. The voting was carried out using conventional paper ballots instead. The decision was made under pressure from opposition parties who viewed e-voting as something that the government would use to “rig the vote” (Salama, 2006). The issue was politicized during the election campaign when the opposition disputed the e-voting process and argued that it will enable the government to manipulate the results. The controversy forced the government to announce that the e-voting system will not be used in 2006 and that a mechanism similar to the 2002 elections will be followed instead. Minister of State for Cabinet Affairs Shaikh Ahmed bin Ateyallah Al-Khalifa said afterwards, “The government hopes that electronic voting would become acceptable to all parties in the future.”

The day that the press coverage on Bahrain’s abolition of the e-voting system came out, the NEC met and discussed the possible impact on the upcoming e-voting in the UAE. The Bahrain e-voting controversy, however, did not have much negative effect on the trust of the voters and candidates in the e-voting process in the UAE. “It was seen in politically different context .. there was no opposition to the adopted election method neither on the government level nor amongst the national population,” said Lana Nusseibeh, the Director of Media and Communication in the NEC. Unlike the UAE society, Bahrain is “a politicized society that had previous cases of conflict between the government and the opposition .. we did not have parties competing in this election on ideological issues, but rather individual candidates running campaigns on domestic issues, such as education, the economy and transportation.” While the UAE society is not as politicized as the Bahraini society, after Bahrain’s sudden decision, the UAE Minister of State for FNC Affairs, Dr. Anwar Gargash, did make a public statement defending the decision of the e-voting process in the UAE. “Bahrain's decision not to use electronic voting in their upcoming elections is not in any way a reflection of the efficiency of the system. e-Voting is used worldwide and is recognized as being a secure, efficient and more convenient method of voting for the electorate” Gargash said in a press interview (Salama, 2006).
The First e-Voting Project in an Arab State

The process of casting the vote ran in three stages. First, voter identity was authenticated on a separate station using the national smart ID card or by scanning the barcode on the voter’s passport. The second stage is casting the vote on a separate machine. This design was followed to assure voters that no records were kept that link the voter’s identity to his or her vote. From a more technical perspective, Nizar Maroof stated that there were “no database tables links between [voter’s] registration and the vote casting.” At this stage, the voter swipes the national ID card or passport on a passport or ID card reader. A kiosk with a colored 21-inch screen then displays only those photographs and names (in Arabic) of the candidates that the current voter may vote for based on which emirate he or she comes from. The voter touches the screen selecting the candidates desired then confirms the vote by answering a confirmation prompt after each selection and as a final confirmation. The voter’s final confirmation instructs the system to print the voter’s choices of candidates on a paper ballot that was to be dropped in a box as a backup measure and for increased transparency. “The locked and sealed ballot boxes containing the paper printouts of the votes were delivered to the Ministry of State for FNC Affairs by police escort at the end of each election day.” Lana Nusseibeh stated.

According to the Executive Instructions, a specially designed booth in every voting station was made available for voters with special needs. “If help was still needed, then the e-voting process [was conducted] with assistance of the voting center’s manager or his assistant” stated Nizar Maroof. Although the photographs of the candidates were displayed on screen with their names, illiterate voters were provided assistance by the center’s manager or his/her assistant if required.

On the design level, an average voting center had six workstations for voter identity checks and ten workstations for casting the vote (one of them specially designed for people with special needs). On the backend, two servers were running the e-voting software (as a redundancy measure). The software was developed by the Bahraini team under supervision of the NEC’s technical team. Although it was based on a proprietary Microsoft infrastructure, Maroof stated that “The Bahraini government decided to make the source code of the software available to any country that wishes to implement e-voting.”

The technical team conducted several risk assessment exercises and contingency plans were put in place. For example, both an Uninterruptible Power Supply (UPS) system and a power generator were ready in case of a power shortage. In addition, three IT professional were on stand by in each voting center. A plan was made for immediate switch to paper ballot in case of system failure. Two additional e-voting stations were on standby as plug-and-play replacements for any kiosk that might fail. Data was encrypted and stored in different media. The system ran on a closed local network isolated physically inside each voting center.
e-Voting Challenges
The design of the UAE e-voting system was not as complicated as similar systems developed in other countries that experimented e-voting. For example see (Xenakis and Macintosh, 2005, Avergou et al., 2005, Oostveen and Besselaar, 2005). The relatively small number of Electoral College members, their familiarity with smart cards as an identification method, the general technology acceptance among UAE citizens and the relatively high level of intrinsic trust in the government have all contributed to the smooth implementation and success of the e-voting system in the country.

“There were no legal or cultural challenges to introducing the e-voting system in the UAE” according to Tariq Lootah, Secretary General of the NEC and Head of the Election Management Committee. From a legal point of view, the NEC had the legitimacy to design the election process in a way that it sees most fit for the UAE. The Electoral Executive Instructions published by the UAE government acknowledge the e-voting as a legitimate method for participation. Sections 28, 31 and 39 clearly describe the actions to be taken by the NEC in case of using an electronic voting system in different stages of the election process (NEC, 2006b).

However, the technical team had to make decisions that take into consideration the ease of use, process transparency, voters’ secrecy and accuracy of results. As an example, based on the knowledge gathered through the voter registration systems used before the election, the team had to estimate the flow of voters in each voting center and decide the number of e-voting stations to be set in each center to keep the voting process smooth.

Designing an e-voting system that does not affect the equal opportunity of candidates entails special technical considerations. Keeping this in mind, the technical team had to deal with emerging concerns, look into scenarios and work with the consultants to design a system which considers such issues. For example, one of the challenges that faced the NEC’s technical team was selecting the size of the touch screen to be used in the e-voting. The screens needed 3-4 weeks to be delivered as they were not available in the local market, and the technical team had to decide on the size of the screen long before the final numbers of candidates was known. The screen should allow the voter to view all candidates’ photos and select the desired ones within few minutes time. If smaller screens were to be ordered, then having hundreds of candidates would force the voter to scroll through many pages to find the desired candidates. This would have increased the time spent by each voter casting the vote. Tariq Lootah noted how the technical team decided to pre-empt this problem through hardware and software design. The team “opted for ordering the larger 21-inch screens as well as adjusting the software design to display only those candidates that the current voter is eligible to vote for.”

The final list of candidates was announced on 30 November 2006 and included 456 members of the Electoral College. The team’s decisions assured that each voter would only have to scroll through few screens to find the candidates desired. This also reduced the possibility of voter errors while flipping through numerous screens. For example, a voter from the emirate of Ajman only had to go through 24 candidate photos, while a voter from Abu Dhabi had to go though 100 photos, instead of 456, to cast the vote. Lootah noted how “this helped reduce the time each voter spent on the voting process
from an estimated 9-10 minutes to an average of 4-5 minutes per voter.” Overall, this increased usability, decreased the total time needed to cast a vote and reduced the possibility of voter error. Lootah argued that these factors had all contributed to increasing voters trust in the voting process and eventually in the UAE government.

Social Acceptance of e-Voting in the UAE

The overall turnout in the first political participation process in the UAE, and the first e-voting process in an Arab country, amounted to 74.4 percent of the members of the Electoral College across the country. The total number of candidates running for election reached 456, out of which 65 were women (NEC, 2007).

In order to assess levels of satisfaction in the voting process, the NEC, commissioned the Dubai Consultancy Research and Media Center (DCRMC) to conduct a survey into the level of voters’ satisfaction. The DCRMC survey was ongoing at the time of writing this paper; however the preliminary data indicates a high level of satisfaction in the e-voting process (The number of Electoral College members included in the survey at the time or writing this paper were 252). Regarding the identity verification process, 91.8 percent of those included in the survey were satisfied with the system (among those 69.4 were “totally satisfied”). The e-voting system as a whole also received a high satisfaction level among those included in the survey, where a total of 93.5 percent were satisfied (72.4 “totally satisfied” and 21.1 percent “somewhat satisfied”). The e-voting system also facilitated a speedy voting process. This was also clear in the level of voters’ satisfaction in the “amount of time required to conduct the voting process,” where 92.2 percent were satisfied (67.2 percent totally satisfied). The NEC’s website also received a high voters’ approval level as 78.5 percent satisfied with the “effectiveness and comprehensiveness” of the website (DCRMC, 2007).

Perhaps, the clearest indicator of voter trust and satisfaction with the system is the fact that “the NEC received no requests for recount,” according to Lana Nusseibeh. There were also “no recorded attempts of manipulation of the e-voting system.” However, the NEC received a contestation of election results after the election concluded in the emirate of Ajman. One candidate sent an email to the NEC arguing that a technical requirement of an eight-second interval between each choice while casting the vote, jeopardized the chances of many candidates. However, “No time limit was enforced for the voters to cast their votes” Nizar Maroof insisted. The Appeals Committee convened on this issue and denied that there was any technical requirement (time wise) and that all voters were able to take as much time as they needed. “On many occasions it took many voters more than 20 minutes to finish casting ballots,” the committee statement said. The complaint was eventually rejected by the NEC.

“One of the common comments we received was that this process was very organized in comparison to other voting processes in the region. The results coming out at the end of the day avoiding controversy over the results was also a main positive outcome” Nusseibeh stated. She argued that “if instead of the e-voting system a manual system was used, the process would have been less organized.”
As a final testament to success of the e-voting exercise in the UAE, the NEC officially recommended reusing the same e-voting system in future elections in the country, as stated in its report on first election experience in the UAE. The committee recommended that the system should be adapted to any new requirements according to the legislative or implementation developments (NEC, 2007). “Everyone was comfortable that the votes were accurately counted .. avoiding the drama of recounts,” Nusseibeh concluded. As a member of Electoral College, Maysa Ghadeir agreed. “I think that the e-voting system had fulfilled its promise,” she concluded.

Discussion and Lessons Learned
The UAE is a “technologically savvy society .. there is a lot of trust in technology,” stated Lana Nusseibeh. This is a common perception in the country that regularly ranks high in knowledge society-focused benchmarking studies and report. For example, according to the UN e-Government Readiness Index published in 2005, which assesses e-government readiness based on infrastructure, website assessment and human resources endowment, the UAE is ranked 42nd worldwide (UNDESA, 2005). More recently, the 2006-2007 Global Information Technology Report ranked the UAE 4th worldwide on the level of “Importance of ICT to Government Vision of the Future.” The UAE also ranked 7th among 122 countries in both “Government Success in ICT Promotion” and “ICT Use and Government Efficiency” indicators as well as 25th on “Availabilty of [government] Online Services” (WEF and INSEAD, 2007). Clearly, the UAE society enjoys a healthy social acceptance level for information and communication technologies. The successful government policies in promoting ICT use in society is a key factor that contributed to this, which is also referred to as technological trust (Blind, 2006). This in turn has contributed to the high level of trust the government enjoyed in the UAE.

Miller and Listhaug state that political trust is “judgment of the citizenry that the system and the political incumbents are responsive, and will do what is right even in the absence of constant scrutiny.” In other words, political trust is the citizens’ assessment of the government and politicians as fair, efficient, honest and promise-keeping (Blind, 2006, Peters, 2001). The UAE government enjoys a comfortable reservoir of political trust among its citizens. According to the World Economic Forum’s Arab World Competitiveness Report published in 2007, the perception of politicians’ honesty in the country is high. The UAE ranks 9th worldwide in the “Public Trust in Politicians” indicator (WEF, 2007). The steady economic growth, security and political stability in a violently turbulent region have all provided the government with a healthy reservoir of trust among citizens.

The following example displays the contribution of this intrinsic political trust to e-voting acceptance in the UAE:

In the second stage of casting the vote, the voter scans the national smart ID card or the barcode on the passport before the list of candidates is displayed on screen. The technical team insists that the technical design of the system does not record the user data at this
stage and that the identity information is totally separate from the voting information. “This is only done to make sure that the voter will not use a different ID card or passport that might be used to cast a vote illegally,” Nizar Maroof stated. At this stage, a skeptical voter might be hesitant to scan any personal ID document on the same machine he or she will be casting the vote on. The level of intrinsic trust in UAE government among its citizens made this issue irrelevant to voters. This is reflected in the high satisfaction levels of voters in the e-voting system and more specifically in the authentication process (DCRMC, 2007). One would argue that this will be a cause of concern in other countries, where any system proposed by the government would be scrutinized by opposition and civil society, such as for example, the opposition’s rejection of the e-voting system in Bahrain (Salama, 2006) and the controversy over the use of government proposed ID cards in the UK (LSE, 2005).

Perhaps the question that calls for more research while studying e-voting approaches is the following: Would the use of an e-voting approach affect the final outcome of the voting process? In other words, does using an e-voting system affect the behavior of voters in a way that might alter the final results vis a vis a manual system? Some research had been conducted in earlier e-voting exercises and found that the effect is limited (Oostveen and Besselaar, 2005). However, assuming “flawless” technical system design, the use of an e-voting system should theoretically put more control over the final voting results in the hands of the voters themselves, compared to a manual system that is more dependent on the factor of human error while counting the results. A recount in a manual system has a high probability of bearing different outcomes each time it is conducted. This is considerably less probable when using an e-voting system that adopts a theoretical “flawlessly” designed structure for security, privacy and information management.

However, similar to traditional voting approaches, e-voting systems are also susceptible to human errors. Tariq Lootah, recognized the common error margins that all voting systems are vulnerable to, traditional and electronic alike. Lootah argued that “in a traditional voting system, human errors mostly happen while counting the votes. This error is suppressed in e-voting systems; however the possibility of the human error by voters’ unintentional mistakes while choosing the candidates electronically is higher in an e-voting system than that in a manual system.”

How does this change the trust model between voters and the government? If voters reach a level of political trust in an e-voting system that assure them that the government will not use it to manipulate the result (a very difficult goal to reach), or if they reach a level of trust in the government that assure them that it will not manipulate the system, then how would the voters view an e-voting system that puts more control in their hands coupled with higher possibility of error while casting the vote? This paradox and its underlying assumption calls for more research, especially in developing countries where levels of trust in the government are not ranked as highly.

Introducing e-voting might have a positive or negative impact on citizens’ trust. It does not increase the citizens’ trust in the political process per se. While the momentum was building in the UAE for the first voting process using electronic approach in the country,
the same e-voting system proposed in neighboring Bahrain came under vigorous attack by the opposition. One could argue that the intrinsic level of trust between voters and the government in the UAE and Bahrain was one key factor in forming the public perception of the role of e-voting in each country.

Xenakis and Macintosh argue that citizens’ trust in e-voting is developed based on four levels of trust. In the first level, the citizens (voters and potential voters alike) recognize the new and alternate technologies as an acceptable medium for casting the vote. This denotes accepting the new process as well as the results introduced by the e-voting process (Xenakis and Macintosh, 2005). In addition to the generally high level of technology acceptance in the UAE, one would argue that the structure of the Electoral College has itself contributed to the high level of satisfaction and acceptance levels among voters. Firstly, the fact that the Electoral College was chosen by the government is a factor that should be considered while studying the level of trust in the e-voting process in the UAE. Compared with the case of Bahrain, where voting was open to all nationals (supporters and opposition alike), one could argue that the high satisfaction level in the voting process in the UAE might partly be due to the fact that voters were chosen by the government. Secondly, both age and education are related factors to social acceptance of technology. The majority of the Electoral College is relatively young with good levels of education. With such a technology savvy electoral base coupled with comfortable levels of trust in the government, one can argue that introducing the e-voting system contributed to raising the level of approval and trust in the UAE government. This said however, how would the voters react when the next phase of the electoral reform in the UAE takes place where all nationals would be allowed to vote? Moreover, how would introducing an e-voting system impact the trust levels in countries where the population does not enjoy the same technology acceptance levels? Some studies have been conducted in this area (Avgerou et al., 2005), however, this is a question beyond the scope of this paper.

In theory, e-voting systems do limit the possibility of corruption to few senior government employees. In comparison, paper-based elections allow for possible corruption on a wider hierarchy of government employees who interact with the voting process (counting, ballot box transfer, etc.). Paper-based systems are also susceptible to an even wider margin of unintentional error in the counting phase.

In summary, the e-voting system used in the UAE 2006 elections was perceived as trustworthy by the Electoral College because of the following characteristics:

- Openness and transparency of the NEC in making the system available to the public for testing and inspection before the elections.
- Ease of use and simplicity of the e-voting process.
- The perception of security of the process.
- Efficient vote counting process.
- The paper ballot backup.
- The voters’ sense that more control over the results is in their hands (rather than in the hands of the ballot counters in the manual systems).
Utilizing Knowledge Management to Enhance e-Voting Transparency

Knowledge management has been described as a cultural shift from the old maxim “knowledge is power” into a new state of mind that views “sharing knowledge is power.” This relatively new management approach can play a key role in increasing transparency in the e-voting process on the longer run.

Knowledge management approaches and methods have in recent years been used in various government departments and ministries in the UAE on the local and federal levels. For example, the federal e-government strategy highlights the importance of knowledge management among government departments:

“In the digital economy, the creation and strategic use of knowledge - how well it is managed, shared, transmitted and stored - is growing in importance. Government must lever enterprise-wide IT initiatives to manage records, information and knowledge resources in ways that were never before possible. Just as importantly, knowledge must be viewed as a resource to be nurtured and shared in support of broad corporate goals. While knowledge creation, transfer and sharing are principally behavioral, IT can be key enablers in this process. To succeed in the future, government ministries and departments must collaborate to develop the necessary systems, strategies and cultures for knowledge management” (Government.ae, 2007).

To document the lessons learned from the first voting process, the DCRMC conducted a study on the election process in collaboration with the NEC. Tariq Lootah stated that the intended outcome of this study, which will be the first of a series directed by the NEC, is to develop the election culture and “ensure transparency and accountability throughout the election process and boost awareness of the elections.” The overall goal according to Lootah is to “encourage greater political participation in the UAE .. and provide a guideline for future election procedures.” This continued management of the knowledge acquired through the country’s first experience will not only be crucial for its next phase of modernization of the democratic process, but will also be key for countries in the region that share many of the challenges in developing their participatory systems. In general, Arab governments share similar barriers to developing their e-government initiatives with some local variations (Salem, 2006). As an e-government application, one could argue that e-voting implementation would similarly face common social barriers on the regional level with local variations as well. The knowledge acquired in the case of the UAE e-voting experience would prove invaluable on the regional level.

In addition to the knowledge management steps taken by the NEC prior, during and after the election process, the following additional steps will help sustain electorate trust in e-voting in any e-voting process in the future:

- When a new electronic service is introduced in an e-government project, such as e-voting services, users (voters in our case) need to be trained to use the new service efficiently and be kept up-to-date on developments of using the service in
the future. This is an area where knowledge management can play a key role on the government level.

- The knowledge acquired by the government prior and during the voting phases will be invaluable for the development of the next e-voting process in the country. This includes the feedback received from voters and candidates through the website, surveys, training workshops and seminars proceedings.

- The technical team and the system developers’ implicit and explicit knowledge acquired through the development and implementation phases can provide the building stone for developing a next phase of the e-voting system that meets the needs of the future electorate. This includes enhancing the areas of security, privacy, social inclusion, ease of use and efficiency.

- Making the source code of the software used in the e-voting process available for scrutiny by technical universities and IT focused NGOs will facilitate developing a more secure and inclusive system and increase the society’s trust in the e-voting process. This in turn, will increase transparency and knowledge sharing, facilitating wider e-participation. In a related concern, dependency on a sole private sector IT provider or consultancy and having private voters information available to them might put the electorate trust in the e-voting process at risk.

- Transparently developing the systems approach to security and privacy is particularly important to ensuring citizens’ commitment to the e-voting process. The behavioral and cultural knowledge acquired during the e-voting process on citizens use and acceptance of authentication methods will be invaluable for future development of new authentication measures that might be used in future e-voting processes.

- The implicit knowledge acquired by the organizing team (the NEC in our case) and the voting centers staff should be documented to make sure that it does not dissolve through time.

- Transparency in making this knowledge available to society and future electorate base is imperative for sustaining or enhancing the level of trust in the e-voting process in particular and in the government in general. Even in apolitical societies, ensuring transparency in the e-voting process would reduce the possibility of politicizing the process by political powers as the democratic process develops and society gets more polarized.

Figure (1) displays the main information flow map between government and citizens in an e-voting system, based on the case of the UAE election. The diagram could help understand the knowledge acquisition processes and how they could be managed during the e-voting process among different parties.
**Figure (1):** Information Flow Map between Citizens and the Government in an e-Voting System based on the case of UAE e-voting.
Conclusion

“Trust, both in its social and political forms, is the sine qua non of good governance” (Blind, 2006). In developing countries where governments usually suffer from low levels of trust coupled with low level of citizens’ technology acceptance, e-voting should be introduced cautiously. In such countries, knowledge management approaches can be utilized when introducing an e-voting process to accelerate citizens’ acceptance of the process through increasing transparency. However, overall trust in the political system would clearly require a more comprehensive government overhaul of the economic, societal and democratic approaches.

The Council of Europe indicates that no election system can guarantee 100 percent security, neither electronic nor paper based. However, the system has to be perceived as secure by the electorate in order to be implemented. Achieving a certain level of trust in government is one prerequisite for introducing an e-voting system. This has to be coupled with achieving a certain level of social acceptance of ICT by society. Both factors are prerequisites of e-voting in developing countries. While the Bahraini society enjoys a relatively high level of acceptance of new technology (WEF and INSEAD, 2007), the level of citizens’ trust in government is intermediate compared to the rest of the Arab World (WEF, 2007). This contributed to a negative perception held by many citizens on the approach of e-voting introduced in the country and to the eventual abolition of the system. On the other hand, the UAE, which enjoys a high level of government trust coupled with a high social acceptance and trust in technology, e-voting system was endorsed more openly by voters. Moreover, a preliminary generalization can be made from the e-voting experience in the UAE: Introducing an e-voting system in a society that enjoys both an advanced level of technology acceptance coupled with a healthy level of political trust in government can be a catalyst for further boosting the level of trust in the democratic process and enhancing the level of trust in government as an outcome.

Applications of e-government in general and e-participation approaches in particular can play a crucial role in decreasing information asymmetry between citizens and the government (Blind, 2006). Using a case study on the e-voting system in the UAE, we have provided an ample view of the key information flow areas in an e-voting system among the main agents involved. The role that knowledge management can play in making e-voting more transparent and appealing can lead to greater citizens’ participation in policy, one of the cornerstones of good governance. However, lack of sufficient trust in government and fear of inadequate privacy and security can hinder acceptance of e-government applications (EC, 2006). One could argue that e-voting is one of those e-government applications that requires sufficient amount of trust in government beforehand.
REFERENCES


