Enhancing The Voting System in Saudi Arabia Election

SELP 695 Systems Engineering Integrative Project

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Introduction

• The importance of voting is something that most people around the world would agree to, as there is a human desire to feel a part of something greater.

• When state or local systems adopt new democratic processes, a type of facilitation of the voting process, so that the number of people that take part in this new reality is truly representative of the eligible population.
Introduction

- The Merriam Webster dictionary defines voting as “an expression of opinion or preference,” and the Saudi people are finally being solicited for their choice of the lower officials for their kingdom.

- The more people that turnout to vote, the higher the approval and acceptance of the practices of the government, which results in a more harmonious society.
Problem Statement

- Democracy is a new inclusive effort on the part of the Kingdom of Saudi Arabia, which makes it something that the people have not yet completely assimilated into their civic practices.

- In the year 2005, which was the first time that members of Saudi Arabia could directly participate in the functions of their state, “of the 19 million eligible Saudis that could have participated, only 1.2 million registered to vote, and even fewer appeared at the polls.”

- A variety of reasons have been cited for the lack of turnout, and among them are a lack of connection with the candidates, inconvenient voting times and locations, and a lack of information about candidates and issues.
Problem Statement

Saudi Arabia municipal elections 2005 voters

- 93.70%
- 6.30%

Did not vote
Vote
Project Objective

• The objective of this project is to increase the participation of the eligible citizens in the voting opportunities of the municipal elections of Saudi Arabia by creating an online voting system.

• The use of technology will appeal to the younger generation, which represents 60% of the voting population, and will be user friendly for both younger the older generation whose wise participation is also sought out in this project.
Interrogatives

- **Who:**
  - The eligible voters
  - Government

- **What:**
  - The project will be the creation of an online voting system in which information about candidates, elections, and online voting options will be made available in order to increase the number of participating voters.

- **How:**
  - The system will include information about all running candidates, as well as the issues they are presenting in their platforms. Furthermore, the main portal of the website will allow voters to cast their vote for the election from the convenience of their personal computer or mobile device.

- **When:**
  - February 2018.

- **Where:**
  - All Saudi Arabia provinces.

- **Why:**
  - The need for this program is sufficiently supported by the extremely low voter turnout in previous elections, as well as the predominantly young population that is eligible to vote and would find this platform both convenient and modern.
History

- In 1939, the first municipal elections were held, but only male voters and male candidates were allowed, and the representatives selected accounted for only a few of the municipal chancellors.
- The following election did not take place for 20 years, and it was also limited in its participants.
History

- Another 40 years had to pass for elections to occur, and it was once again limited to the male population and for each elected chancellor, another chancellor was appointed by the government.

- In 2011, the people were once again brought back into selection system, and they were given the opportunity to elect the 150 members of the Consultative Assembly.
Current System

- The current voting system of Saudi Arabia is limited to the selection of municipal council members, of which there are 285 throughout the country, and Consultative Assembly.

- The ability to register is limited to male members of the society, and the registration must take place 6 months prior to the election.

- In 2015 municipal elections, women will be allowed to vote.
Alternatives

Phone System

- The phone system could theoretically be used because most people own phones.
- The reality is that people will be turned off by the complex phone menus and instructions.
Alternatives

Online System

- An online portal can be made user-friendly and provide information about the referendum options, candidate profiles and background, permit registration and voting.

- A public forum section will allow for dialogue within the community of voters, as well as between candidates and their constituents.

- The voting section of the portal will be created with heightened security and a number of secure-point access protocols to prevent fraud.
Literature Review

USA

- There were attempts to stop the system from being used because it was considered discriminatory to minority groups that did not have access to the internet.
- Voter turnout increased significantly, with even the minorities recording over 800% increase in participation.
- This election was a major step towards adoption of online election in the USA and the world at large.
Literature Review

Brazil

- Brazil is regarded as a pacesetter in conducting online voting, having implemented the system in 1990.
- During the October 1998 elections, over 57% of the Brazilian voters cast their vote online to elect state, local and national representatives.
- This historic online system was used to elect over 2060 officials including the president, senators, governors and local representatives.
Literature Review

Norway

- The Norway’s Ministry of Local Government undertook online voting pilot projects during the 2003 elections.
- Nonetheless, 38% of the 2013 registered voters voted online.

Australia

- The online voting system was first used during the October 2001 parliamentary elections, in which 8.3% of the votes were cast electronically.
Selected Solution: Online Voting System

- This method is chosen because of the solution it offers to voters of both genders without having to leave their homes to vote, as well as the attractive nature that it offers to the younger voting population.

- The online voting system helps to cut down on the fraud that occurs in the traditional manual system.

- The platform will be opened a year prior to elections, thus giving time for the voters to inform themselves on the issues and those who represent them.
System Architecture Process

Requirements

- The system should offer information about candidates and issue of the election
- The system shall verify on a regular basis responsible user ID and location
- The system shall provide voters with accurate data about candidates and voting dates
- The system shall provide means for protecting and securing both initial counts and recounts of ballot cast in election
- The system shall report continual user data to those involved in the decisionmaking process
System Architecture Process

Block Definition Diagram (BBD)

- This BBD shows the relationship between signals in the online voting system.
System Architecture Process

Internal Block Diagram (IBD)
System Architecture Process

High Level Model - Human View (OV-1)

- OV-1 Provide high-level graphical description of what the architecture is supposed to do.
System Architecture Process

High Level Model - Technical View (OV-1)

- It is a representation of conceptual expression of process (election event) in the system. Their architecture has shifted from human view to application software space.
Risk Management

Cost Risk

- According to Alarabia News the cost of the online voting system is high.
- High cost due to staff turnover (KSA has low job stability).
Risk Management
Design and testing online voting risks

- **Risk**: Lack of review of the audit trails is risky, as any alteration cannot be detected.
Risk Management

Security Risk

• **Risk:** The personal information of citizens entered to register for vote could be stolen (identity theft).

• **Risk:** A breach of security in the online voting system could result in election fraud.

• **Risk:** Double registration.

• **Risk:** Voting software hacking.

• **Risk:** Lack of thorough verification of data during voting can result in undetected alteration.
Risk Management

Political Risk

- **Risk:** even a single flaw could cause the loss of credibility and invalidate the voting (like the Obamacare launch)
- **Risk:** Lack of control by government.
Risk Management

Cultural Risk

- **Risk:** The system is new and employs new technology, which might lack the acceptance by older population.
- **Risk:** Voting online might reduce the seriousness deserved of the democratic process.
Risk Management

Risk Table
## Risk Management

<table>
<thead>
<tr>
<th>Risk</th>
<th>Explanation</th>
<th>Probability</th>
<th>Impact</th>
<th>Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and Testing Risk</td>
<td>Lack of review of the audit trails</td>
<td>20%</td>
<td>2</td>
<td>Import expert from abroad.</td>
</tr>
<tr>
<td>Security Risk</td>
<td>Lack of verification</td>
<td>20%</td>
<td>2</td>
<td>Develop a verification plan.</td>
</tr>
<tr>
<td>Security Risk</td>
<td>Hacker attack</td>
<td>30%</td>
<td>1</td>
<td>Appoint expert team to mitigate situation.</td>
</tr>
<tr>
<td>Security Risk</td>
<td>Double registration</td>
<td>30%</td>
<td>1</td>
<td>Prevent double registration.</td>
</tr>
<tr>
<td>Political Risk</td>
<td>If the program has a single flaw, an election could be invalidated and the system would lose its credibility</td>
<td>20%</td>
<td>2</td>
<td>Assign an expert to repair the program and test it again.</td>
</tr>
<tr>
<td>Political Risk</td>
<td>Lack of control by government</td>
<td>20%</td>
<td>1</td>
<td>Provide a consultant.</td>
</tr>
<tr>
<td>Cultural Risk</td>
<td>Risk of a lack of acceptance on the part of the older population.</td>
<td>20%</td>
<td>3</td>
<td>Popularize the online voting system.</td>
</tr>
<tr>
<td>Cultural Risk</td>
<td>Voting online might reduce the seriousness deserved of the democratic process.</td>
<td>20%</td>
<td>2</td>
<td>Educate the voters.</td>
</tr>
<tr>
<td>Cost Risk</td>
<td>The equipment necessary and inherent to such a project is costly and vast.</td>
<td>50%</td>
<td>2</td>
<td>Use lean and increase the amount of resources available</td>
</tr>
<tr>
<td>Cost Risk</td>
<td>Staff turnover will be high</td>
<td>60%</td>
<td>2</td>
<td>Meet with current staff to determine cause for turnover. Assign the backup staff member for every critical technologist.</td>
</tr>
</tbody>
</table>
Project Management

Budgeting, Funding and Financing

- High-level costs require that funding sources be identified early.
- The funding can only come from the government to prevent outside influences.
- System integrity requires that a dedicated workforce (staff plus consultants) be hired.
- According to Alyoum News the proposed cost for the program is $5 million initially. Plus $500,000 for each election year.
System Implementations

Login Page

Online Voting System

Home
Admin Section
Public Section
Staff Section
About it
Contact us

User Name
Password

Remember me next time
Log In

Home
Admin Section
Public Section
Staff Section
About it
Contact us
Quality

Ishikawa Diagram (fishbone) for the Current Low Turnout.

- Environment
  - Limited polling station
  - Process done internally
  - Inadequate information
  - Limited time for voting
- Method
  - Laziness
  - Insufficient motivation
  - Out of town voters drive for long distance to vote
- Voters
  - Traditional voting
- Material

Online system should be helpful
Quality

Proposed Remedy

- Men and women cannot be together comingling in a public place, and online voting addresses this problem successfully.

- This benefits working people, as they might not otherwise have time to leave their jobs to go vote at polling stations.
Quality
Methodology for implementing the remedy

- Smart phones and personal computers will be used to facilitate voting.
- Government will enter into a partnership with developers of a secure electronic voting system.
- Voters who register to vote online should be issued smart cards.
- Voters can then use the smart cards as an identification tool during the voting.
Quality

Methodology for making the improvement permanent

• The government needs to promote and instill high levels of confidence for the online voting process.

• Women have to be truly included, not marginalized.
Quality
Reflection and Adjustment

- The main concern would be failure of the system on the voting day.
- A main risk is that the system can be hacked and the votes changed.
- Political controversy and security concerns should be addressed to make the system safe.
# Quality

## System Economics

<table>
<thead>
<tr>
<th></th>
<th>Previous System Cost</th>
<th>New System Cost</th>
<th>Implementation Cost</th>
<th>Annual Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training</strong></td>
<td></td>
<td>50 x 4000</td>
<td>$200000</td>
<td>-200,000</td>
</tr>
<tr>
<td><strong>Application</strong></td>
<td>Assume 1,200,000 voters x $0.83/app. = $996,000</td>
<td>Assume 1,200,000 voters x $0.03/app. = $36,000</td>
<td></td>
<td>$960,000</td>
</tr>
<tr>
<td><strong>Eligible voter cost</strong></td>
<td>Assume 1,200,000 voters x $7/app. = $8,400,000</td>
<td></td>
<td></td>
<td>$8,400,000</td>
</tr>
<tr>
<td><strong>System set up</strong></td>
<td></td>
<td>$5,000,000</td>
<td>$5,000,000</td>
<td>$-5,000,000</td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td></td>
<td>$150,000</td>
<td></td>
<td>$-150,000</td>
</tr>
</tbody>
</table>

Annual saving = $9,210,000  
Implementing coast = $5,200,000  
SPP = IC/AS 7 months
Ethical Issues

Ethical Concerns for Voters

• Voters feel that the online technology does not guarantee anonymity.

• A lack of anonymity results in conformity voting, rather than selection of the candidate that the voter really wants.

• Challenges in the technology, such as failed electronics, may frustrate the voters, as they may not cast their vote appropriately.
Ethical Issues

Threat to Democracy

- An emerging concern is the inability of online voting to enhance democracy.
- Citizens are only minimally involved in the online voting process.
- Citizens may not pay as much attention to the issues and candidates if they vote online.
- Often, voting in work place does not guarantee the privacy required.
Lean in Online Voting System

- A lean voting system eliminates numerous wastes in the current system.
- A lean voting system will significantly reduce voting time and tallying process, as well as release of the election results.
- Voter identification and verification will be instantaneous.
Lean in Online Voting System

Flow Streamlining

- Successful implementation of the online voting system requires the relevant stakeholders to adopt the best management practices.

- The political climate and all indicators in Saudi Arabia should mirror towards democratic maturity, to remove the possibility of trivialization of the positive effects that online voting can avail to the country.

- An open public debate that addresses the benefits, implications and disadvantages of online voting should be convened and supported by the relevant stakeholders.

- Election authorities should embrace impartiality and transparency, as they are essential in building trust and must be enforced.
Lean in Online Voting System

Perfection

- Future problems are being addressed by extensive system testing that has been undertaken and emerging lapses fixed.
- Constant evaluation of the online voting system through comprehensive evaluation as well as certification is critical.
Lean in Online Voting System

Implementation methods

• Comprehensive voter education programs to the voters and election officials should be rolled out early.
Lean in Online Voting System

Current State and Future State VSM

Current State

Start

Find the polling station
30 min

Check the eligibility of voter
5 min

Register voter
5 min

The voter inserts his or her ballot into the ballot box
5 min

The voter records his or her vote
3 min

The polling clerk shows the voter the list of candidates of the designated electoral region
5 min

End

Total time = 53 minutes
Lean in Online Voting System

Current State and Future State VSM

Future state

Start

Register voter
1 min

Voter login
1 min

Issued and mail smart card
1 day

update vote count
1 min

Save to database
1 min

Vote
1 min

Municipal election
1 min

Show confirmation
1 min

End

Total time = 7 minutes
**Lean in Online Voting System**

**The Improvement Summary Table**

<table>
<thead>
<tr>
<th></th>
<th>Current system</th>
<th>Online system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery time</td>
<td>57 minutes</td>
<td>7 minutes</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Good</td>
<td>Better</td>
</tr>
<tr>
<td>Vote Secrecy</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Voter turnout</td>
<td>Low</td>
<td>Around 60% higher</td>
</tr>
</tbody>
</table>
Conclusion

- An online system is needed to engage the voting population of Saudi Arabia in the democratic voting process.
- The online system facilitates voting, but also yields potential risks for integrity and security of the voting process.
- A carefully selected and limited crew of system developers and maintenance professionals will be needed for complete control over the system.
- The use of continual vigilance and systems checks will help make the system impregnable to fraud and hacking.
Thank You
Backup Slides
Lesson Learned

1. When a new system is proposed, both the system requirements and architecture need full stakeholder agreement.

2. In order to create a system that covers all necessary bases, it is important to hire the right number of experts to allow the appropriate and efficient level of design and programming to take place.

3. It is imperative to identify all risks early to allow the system to be built in a way that reduces potential threats to the integrity of the program.

4. Planning and training must be ensured in order to reduce the possibility of leaks or violation of safety protocol.

5. The project has to be planned in a way that shows the interconnectedness of all of the parts and players, thus allowing for any potential problems to be addressed, or watched, from the beginning.
Lesson Learned

6. The mental predisposition of the users to the new system has to be taken into account, so that the design can be both attractive and accessible to all.

7. Regular software maintenance must be performed by the highly skilled developers.

8. The firewall and security system must be constantly updated, as a single breach in a system of this great importance could result in a failure of the democratic process, as well as a loss of credibility for the on-line voting system.

9. Creating multi-use platforms requires intricate planning in order to allow that the individual entry ports communicate with each other.

10. A significant investment must be made up front with the right staff and equipment in order to create a system that is credible and safe, but in the long run, if done correctly, can be cost-effective.
References


References


