Solution to the Shortage and High Costs of Homes in Saudi Arabia

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SELP 695
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Outline

- Introduction/ background
- Problem statement
- Project objectives
- System requirements
- Stakeholder description
- Solution elements
- Analysis of the system
- Systems architecture
- Risk management
- Verification and validation
- Ethical issues
- Conclusion
- Lesson learned
- Population of Saudi Arabia are growing by 2.55% yearly.
- Current population 30,77 million (Fall 2015)
- 68% of population age from 15 to 64 (Fall 2015)
Introduction/ Background

<table>
<thead>
<tr>
<th>Regions</th>
<th>Population</th>
<th>Percent Saudi</th>
<th>Percent region wise</th>
<th>Persons per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Riyadh</td>
<td>6505509</td>
<td>69.3</td>
<td>24.9</td>
<td>5.6</td>
</tr>
<tr>
<td>Makkah Al-Mokarramah</td>
<td>6662597</td>
<td>64.2</td>
<td>25.5</td>
<td>5.0</td>
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<tr>
<td>Al-Madina Al-Monawarah</td>
<td>1694749</td>
<td>76.5</td>
<td>6.5</td>
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<td>Al-Qaseem</td>
<td>1184365</td>
<td>80.8</td>
<td>4.5</td>
<td>5.8</td>
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<tr>
<td>Eastern Region</td>
<td>3799773</td>
<td>78.2</td>
<td>14.6</td>
<td>6.1</td>
</tr>
</tbody>
</table>

- The highest intensity of population are in the three regions: Mecca, Riyadh, and Eastern rejoin
- Average home size is 500 m² (5,382 ft²)
- Layers of privacy for People in Saudi Arabia
Typical home of 1000 m²
Introduction/ Background

Average land prices in KSA

<table>
<thead>
<tr>
<th>Region</th>
<th>Sales Price (US $/Km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Riyadh Region</td>
<td>768.2666667</td>
</tr>
<tr>
<td>Mecca Region</td>
<td>1079.733333</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>572.2666667</td>
</tr>
</tbody>
</table>

Jeddah (Mecca Region)

<table>
<thead>
<tr>
<th>Area</th>
<th>Sales Price (US $/Km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>1013.3</td>
</tr>
<tr>
<td>NE</td>
<td>1066.6</td>
</tr>
<tr>
<td>NW</td>
<td>1597.3</td>
</tr>
<tr>
<td>C</td>
<td>2133.3</td>
</tr>
<tr>
<td>W</td>
<td>2133.3</td>
</tr>
</tbody>
</table>

Riyadh Region

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sales Price (US $/Km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>560</td>
</tr>
<tr>
<td>West</td>
<td>626.7</td>
</tr>
<tr>
<td>North</td>
<td>634.7</td>
</tr>
<tr>
<td>Central</td>
<td>813.4</td>
</tr>
<tr>
<td>East</td>
<td>840</td>
</tr>
<tr>
<td>S</td>
<td>1066.7</td>
</tr>
<tr>
<td>C</td>
<td>1080</td>
</tr>
<tr>
<td>N</td>
<td>1093.4</td>
</tr>
</tbody>
</table>

Eastern Region

<table>
<thead>
<tr>
<th>City</th>
<th>Sales Price (US $/Km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Khobar</td>
<td>826.6</td>
</tr>
<tr>
<td>W. Dammam</td>
<td>853.3</td>
</tr>
<tr>
<td>Dahrn</td>
<td>906.6</td>
</tr>
<tr>
<td>S. Dammam</td>
<td>1066.6</td>
</tr>
<tr>
<td>E. Dammam</td>
<td>1066.6</td>
</tr>
</tbody>
</table>
Problem Statement

- 30% of citizens own their own homes, which leaves about 70% of the Saudi population in need of housing
- This project is focused on providing affordable homes for the citizens of Saudi Arabia
- And on making land available for development
Summary of Current Problem

1. Parcels are held by royal princes and other wealthy people.
2. Land is too expensive for middle- and low-income families.
3. Home sizes are excessively large and expensive.
Project Objectives

- Ensure housing affordability for the average Saudi citizen
  - Average monthly income per person is SAR 2,262 ($604), or SAR 13,610 riyal ($3,630) per family.
- Tackle the socially disruptive habit of hoarding property forever without allowing development
- Ensure fast and efficient delivery of new houses and multi-family buildings
System Requirements

- The system shall be implemented in all regions of Saudi Arabia (including the Mecca, Riyadh, and Eastern regions)
- The system shall provide housing that is affordable for 60% of the Saudi population in 5 years, including home options of multi family building and single-family houses
- The system shall be regulated by a government oversight committee, accountable to the Ministry of Housing.
- Using progressive taxation, the system shall remove the incentive for landowners to hold undeveloped property in areas targeted for development.
Stakeholders

- Owners of undeveloped property
- Real estate developers
- Ministry of Housing
- Department of Zakah and Tax
- Ministry of Justice
- Municipalities
- Banks
- KSA citizens in need of housing
Solution Elements

1) Tax collection system ("P-OUltcs") applied on private owners of undeveloped land.
   - Each year, property tax doubles if the land remains undeveloped
   - Tax rate will be highest for undeveloped land in the city center, and lower tax rates for areas further away

Riyadh, Saudi Arabia
2) Open new public lands for development
- Open public lands for development (increase supply of available land)
- Develop suburban areas

Riyadh, Saudi Arabia
Solution Elements

3) Improve cooperation between government and real estate developers

- Government to guarantee loans from banks to developers
- Speed up the permit process
- Require all new houses to meet stricter requirements for building materials and construction
4) Motivate construction of smaller homes
   • Separate higher tax assessed for houses over 500 m² in size
KSA citizens in need of housing
- Delivering affordable homes
- Site regulation and new laws
- Developing new lands
- Opening new public lands
- Penalties
- Calculating taxes

Figure 1, OV-1 Operational view
Figure 2, SV-4 Activity Diagram
List of Penalties for Non-Payment of Tax

- Late fee of 0.5% per month
- Blocked from government processes (driver license)
- Blocked from international travel
- Blocked from banking transactions
- Court case opened
- Arrest
Figure 3, OV-4 Organization relationship chart
Figure 4, OV-2 Operational resources flow description
## Description of Operational Relationships

<table>
<thead>
<tr>
<th>No.</th>
<th>Source</th>
<th>Destination</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land owners</td>
<td>Ministry of Housing</td>
<td>Notify land owners of tax payment due</td>
</tr>
<tr>
<td>2</td>
<td>Land owners</td>
<td>Ministry of Justice</td>
<td>Issue deeds and register land owners in the database</td>
</tr>
<tr>
<td>3</td>
<td>Ministry of Justice</td>
<td>Ministry of Housing</td>
<td>Register land owners information in the database: Date of purchase, tax amount due, land owner ID number</td>
</tr>
<tr>
<td>4</td>
<td>Ministry of Housing</td>
<td>Municipalities</td>
<td>Provide oversight and send building inspectors</td>
</tr>
<tr>
<td>5</td>
<td>Ministry of Housing</td>
<td>Department of Zakah and Taxes</td>
<td>Calculate tax percentage and register it in the database</td>
</tr>
<tr>
<td>6</td>
<td>Ministry of Housing</td>
<td>Bank</td>
<td>Guarantee loans for developers</td>
</tr>
<tr>
<td>7</td>
<td>Ministry of Housing</td>
<td>Real estate developers</td>
<td>Set and enforce requirements for building materials, sizes, and locations</td>
</tr>
<tr>
<td>8</td>
<td>Ministry of Housing</td>
<td>KSA citizens</td>
<td>Monitor numbers of citizens in need of housing and who have received housing</td>
</tr>
<tr>
<td>9</td>
<td>Real estate developers</td>
<td>KSA citizens</td>
<td>Delivering affordable homes</td>
</tr>
</tbody>
</table>

*Figure 5, OV-3 Operational resources flow matrix*
Systems Architecture

Operational needs

- Development of execution plan
- Development of new laws and legislation
- Hiring and training employees
  - Inspectors
- Database backup and security
  - IT support
  - Internet access
  - Database backup system
  - Cyber-security
Lean House Construction patterned after Doyle Wilson
Ultra-Efficient House Development

- Doyle Wilson Homebuilders
  - Builder of new homes in Austin, Texas.
- Initially focused on new home buyers with only modest success
- Research showed 78% of home buyers buy existing used homes rather than newly built units
  - Affordability
  - Time (1 year building period)
  - Complex paperwork
  - Poor construction quality
- Addressed each problem
  - Centralized all transactions, into one sales center
  - Improved workflow and guaranteed delivery within 30 days
  - Improved quality and workflow rate through standardized equipment, contracts, and quality controls for subcontractors.
- Doyle Wilson gained a huge competitive advantage and took control of the housing market.
Risk Management
Dealing with privately owned properties

<table>
<thead>
<tr>
<th>NO.</th>
<th>Risk</th>
<th>Likelihood</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Refusal to Pay Tax</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Bribes</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Gaming the System</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Lying</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>IT Failure</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Fluctuation in oil prices</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

The diagram shows a risk assessment matrix with likelihood and consequence levels.
1. Refusal to Pay Tax
   - Problem: A wealthy individual refuses to pay tax
   - Solution: The government will execute compliance and apply penalties
2. Bribes

- Problem: Individuals try to bribe officials to avoid paying taxes

- Solution: The system payment and enforcement method will be electronic. Harsh penalties will be executed by the government
3. **Gaming the System**

- Problem: Transferring deeds between family members to avoid assessment of tax

- Solution: financial investigation and penalties executed by the government
4. Lying

- Problem: Claiming the land is built (when not actually built)

- Solution: Regular inspection by municipalities and execution of penalties
5. IT failure

- Problem: Data is lost due to electronic failure

- Solution: implement global IT and cyber-security best practices
Risk Management

6. Fluctuation in oil prices
   - Problem: houses became unaffordable
   - Solution: build cheap housing (multi-units building)
## Risk Management

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<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

![Likelihood vs Consequence Matrix]

- **Likelihood** values range from 1 (low) to 5 (high).
- **Consequence** values range from 1 (low) to 5 (high).
Ethical Issues

• Bribes
  o Some government employees may hold citizens’ paperwork unless the citizen pays a bribe
  o Some citizens will try to bribe government officials to bypass the law

• Not blowing the whistle
  o People not used to reporting corruption in the system encouraging corruption to continue

• Following the laws
  o Some people will not follow the system’s rules and try to game it

• Waste of space
  o Even though their income is low, people buy bigger houses than they can actually afford
## Verification and Validation

<table>
<thead>
<tr>
<th>Requirements/ Verification</th>
<th>Test</th>
<th>Demonstration</th>
<th>Inspection</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The system shall be implemented in all regions of Saudi Arabia (including the Mecca, Riyadh, and Eastern regions)</td>
<td></td>
<td>Inspectors implemented in municipalities in every region.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The system shall provide housing that is affordable for 0% of the Saudi population in 5 years, include a variety of housing options from multi-family buildings to villas.</td>
<td></td>
<td>Count the number of homes of each type. Count the population. Check that there are enough homes for 60% of the population.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Inspection**
  - Inspectors implemented in municipalities in every region.

- **Analysis**
  - Count the number of homes of each type. Count the population. Check that there are enough homes for 60% of the population.
## Verification and Validation

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<tbody>
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<td>The system shall be regulated by government oversight committee, accountable to the Ministry of Housing.</td>
<td></td>
<td>Committee will include members from both the Ministry of Housing and municipalities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The system shall remove the incentive for landowners to hold undeveloped property in areas targeted for development</td>
<td>Measure the number of empty lands sold and developed; measure tax assessed on undeveloped land.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

- The project is focused on solving the housing problem in Saudi Arabia
- Four solution elements have been suggested to solve the problem
- The tax collection system is to encourage real estate development and increase the rate of housing rate
- The system will face some ethical issues
- The system will provide more housing units both apartments and villas
- The system will discourage people from buying houses that are too big
- The system will enable new cooperation between government and developers
Lessons Learned

- The housing shortage is among the biggest issues in the country
- The supply of real estate in Saudi Arabia is not increasing as fast as demand
- Risk management must be considered when attempting to solve this problem
- Applying systems engineering processes helps to analyze the problem and choose the right solution
Questions?
References

- http://www.alriyadh.com/1001886