Al-Uqair Beach Development by Using Computer

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Abstract

We present a comprehensive plan to develop a beach destination area on the east coast of Saudi Arabia, including an introduction to the site, the purpose of the report, history of the area, the Al-Ahsa Municipality proposal plan, the risk management of Al-Uqair project, quality management considerations, final remarks, and a conclusion. The target area of this hypothetical project is Al-Uqair area, which belongs to Al-Ahsa city.

Introduction

Al-Uqair coast was an old international sea port that linked the eastern side of Saudi Arabia to many countries. It was used for the commercial transactions between Saudi Arabia and other countries next to the eastern side of it. According to Al-Ahsa Municipality which is the responsible for Al-Uqair coast, the total area of Al-Uqair is 33,180,610.1 sq.m[2]. The Municipality has made a plan to develop the area to a tourism project to attract people from everywhere around the Middle East and may be the world. The importance of Al-Uqair is it location where it is 40 km from Al-Ahsa, 215 km from Dammam, 406 km from Riyadh, 260 km from the Kingdom of Bahrain, and 355 km from Qatar country according to Al-Ahsa Municipality (Fig. 1.)[3]

Purpose of the Report

Al-Ahsa Municipality has already started about 30 percent of it is plan for developing the coastal area subject of this report.[4] We evaluate the Municipality's plan and suggest alternatives. We aim to accomplish the following:

- Raise the economic profit of the area.
- Attract more people by offering better services.
- Decrease the expenses that will be paid by the government to develop the area.
- Give the Municipality more time and opportunities to conduct other important work.
- Challenge the companies which want to have their own business in the area.
- Manage the use of land.
- Provide an opportunity to rent land to the investors for different periods to guarantee having better services.
- Establish different prices per meter based on how long and what kind of use.
- Give the Municipality the time to focus on the infrastructure and roads of the area more than do the hall job.

[1] A master's project submitted to the Industrial Engineering and Engineering System Management factually at St. Mary's University, Prof Rafael Moras, Ph.D., P.E. Supervisor, May 2012.
[2] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)
[3] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)
[4] Al-Ahsa Municipality, Plan for the Development of Al-Uqair Beach, (originally in Arabic language, 2011.)

- Guarantee that the area is serving all social classes.
- Attract international investors.

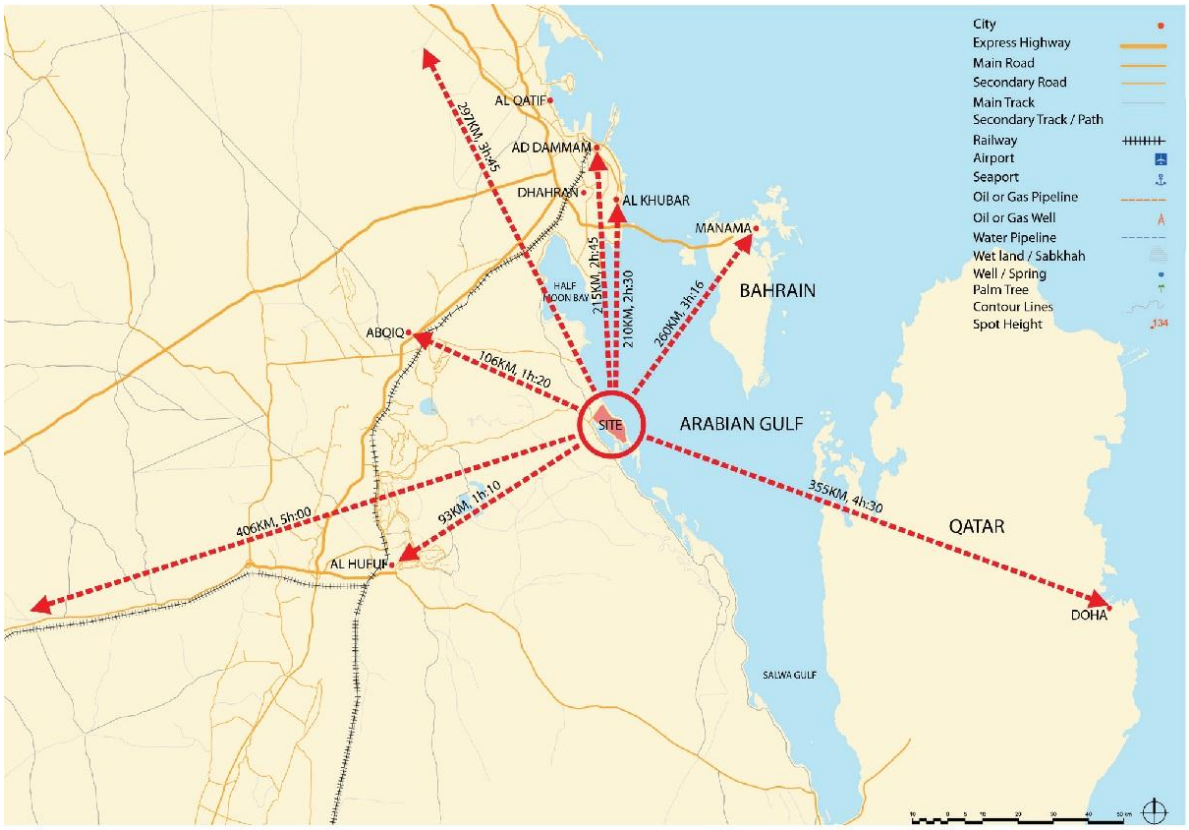

Fig.1 Site Distance

- Compare the Municipality plan to this report study.

History of the area

Al-Uqair sea port was the first sea port in the eastern side of the Kingdom of Saudi Arabia. The coast of Al-Uqair is characterized by a sandy beach along the coast of winding which gives a natural and beautiful form narrow and expands in some areas. The beach is 12 km long and 2.5 km wide.[5]

The Municipality proposed plan

The Municipality of Al-Ahsa decided to open to project to public investment. Their goal was to take the whole responsibility of the project. This, in our view, would result in a high cost, much man power, heavy use of materials, and a long development time. In Table 1 we illustrate the Municipality's proposal. Also, the Municipality has provided important information about

[5] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)

the land (Fig.2). The broad land-use around the project site is depicted in Figure 2, providing the main information on the location, like pattern, and configuration of land-uses. [6]The proposed land used map is depicted in Fig 3[7]. It includes zoning consideration including the location of the industrial city, regional roads, local airport, agriculture institution, urban expansion, fish planter, fish industry, railway network, and main roads.[8]

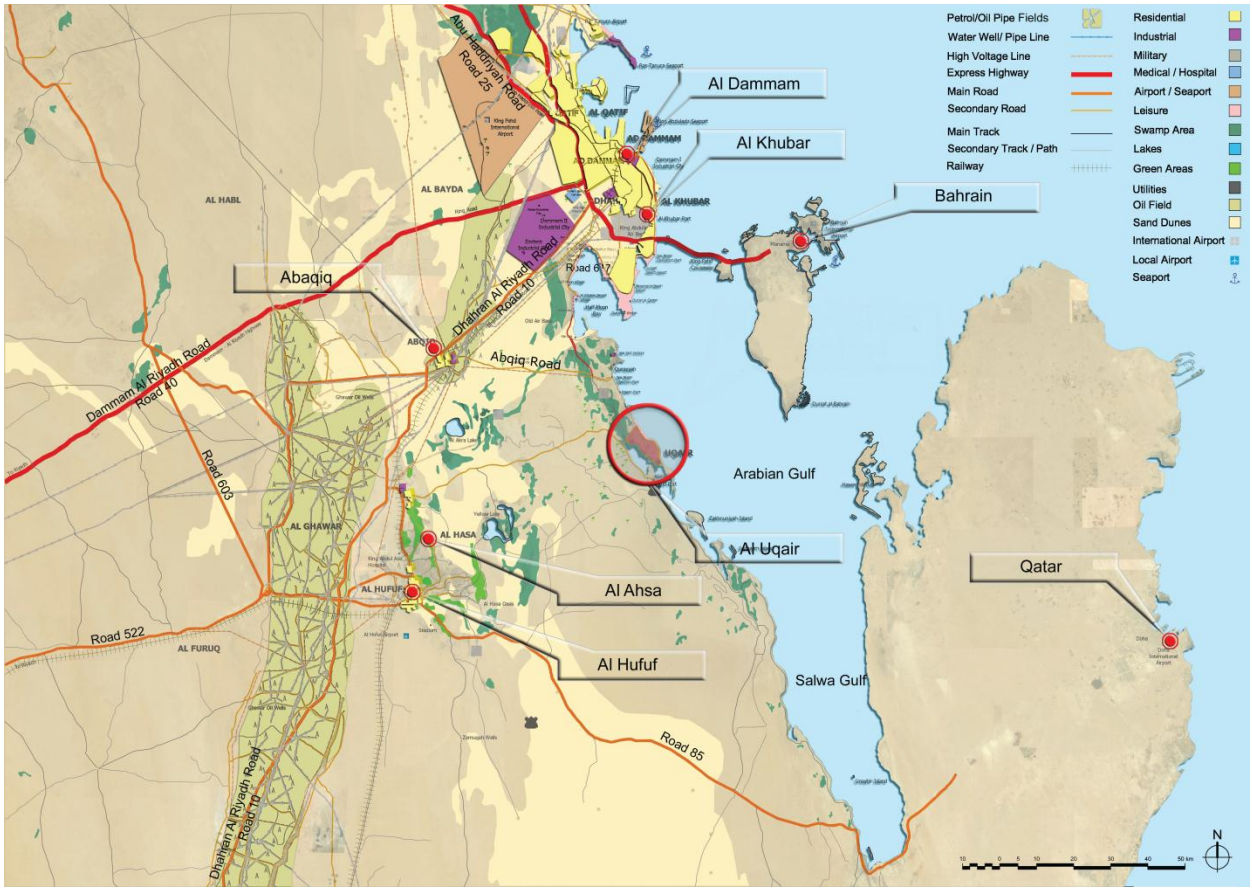

Fig.2 Actual land-use map

The Municipality has divided the area into several sections, each for a different use. In its proposal plan, it decided to have nine main uses on the site. Five uses have to be developed by the private sectors and the other four would be developed by the Municipality. Also, the Municipality has put different prices/sq.m for each using, as shown in table.1.

[6] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)
[7] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)
[8] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)

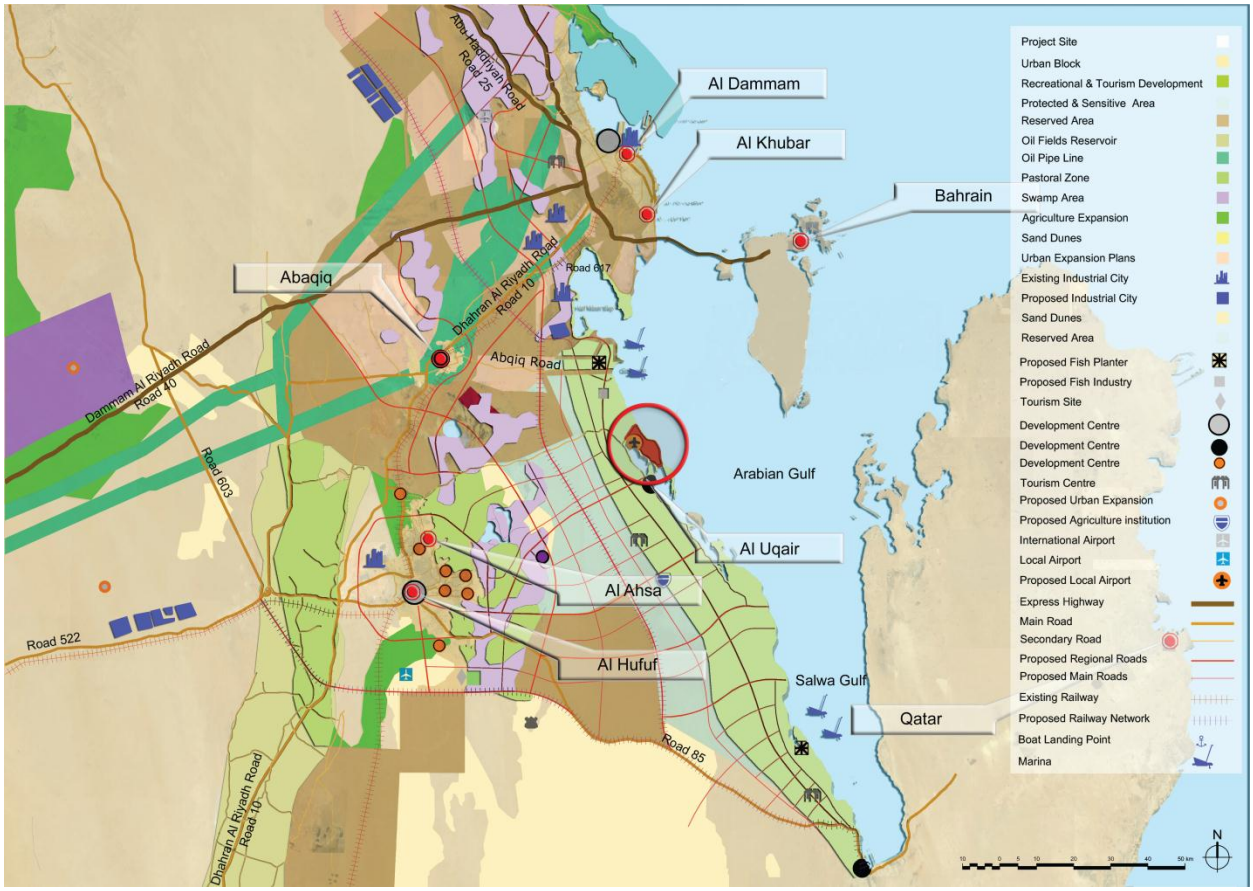

Fig.3 Municipality proposed land-use map

		Municipality	
		Area%	Price
Private development	Hotels	3	532
	Beach / water activite	12	558
	Tourist facilities	7	479
	Commercial	3	558
	Residential	12	612
Public development	Facilities	3	
	Open / green areas	35	
	ROW / parking	22	
	Utilities	3	
		100	

Table.1 Municipality land-uses plan

The following are perceived advantages of the Municipality proposal:

- The services are free for all users.

- The variety of public services such as parks, playgrounds, and swimming pools will be appearing to be sufficient for all users.

On the flipside, we estimate that the Municipality's proposal has the following disadvantages:

- The quality of services is expected to be low.
- The Municipality will likely focus on this project instead of other projects because it is magnitude.
- It is not expected to be profitable.
- Operation and maintenance costs are expected to be high.
- The implementation of the project will take a long time.
- The Municipality will pay for the maintenance, operation, and follow up plus build the facilities.

The Municipality's plan to develop Al-Uqair Coast has many weak points. We propose that the Municipality allow investors to embark on the development project. Our plan is presented next.

Proposal

The Municipality decided to give 37 percent of the area to investing. On the other hand, it decided to build and operate 63 percent of the area, a move that is likely to result in high costs of materials and labor. We present two alternatives to the Municipality's proposal. On the basis of valuable information provided to us via personal communication, [9]we suggest different land use schemes (percentages and prices per square meter) for the Municipality. We show this information in Table 2.

The aim of alternative 1 is to have the Municipality share the work in the area with investors to minimize the cost. In alternative 2 we feature a higher share of private investment. We considered eight categories when analyzing the three options. Each category has different subcategories. A description of these categories is presented next.

1. Cost:
   1.1. Lands: build, operate, and own the lands in the site.
      1.1.1. Public: The Municipality will pay for building and operating the lands when it owns them.
      1.1.2. Public/Private: The Municipality will share building and operating the lands with the investors which makes the cost half and half.
      1.1.3. Private: The investors will pay for building and operating the lands when the Municipality will rent the lands to them.
   1.2. Administration: follow-up, control, and evaluation.
      1.2.1. Public: The Municipality will be responsible for administering everything in the project.

[9] Hard copy documents by Al-Ahsa Municipality, Eng. Al-Haboob, Mohammed. (Originally in Arabic language, 2011.)

		Municipality		Alternative 1		Alternative 2	
		Area%	Price	Area%	Price	Area%	Price
Private development	Hotels	3	532	14	452	29	399
	Beach / water activite	12	558	13	505	17	479
	Tourist facilities	7	479	8	465	12	447
	Commercial	3	558	7	518	12	492
	Residential	12	612	13	604	17	602
Public development	Facilities	3		5		1	
	Open / green areas	35		25		5	
	ROW / parking	22		10		5	
	Utilities	3		5		2	
		100		100		100	

Table.2 Municipality proposal and alternatives plan

1.1.1. Public/Private: The Municipality takes a part of the project such as managing the use of lands and organizes them.
1.1.2. Private: The investors will have a large part of the administration on the site. However, they still refer to the Municipality.

1.2. Roads: building, operation, and maintenance
1.2.1. Public, public/private, and private: The Municipality is responsible for the roads.

1.3. Operating: buildings, roads, services, and parks
1.3.1. Public: The Municipality has to operate the whole area.
1.3.2. Public/Private: The Municipality manages the operation system of the main services.
1.3.3. Private: The investors have to operate all the facilities they owned.

1.4. Design: site plan, site management, and roads.
1.4.1. Public: The Municipality has to design the site facilities.
1.4.2. Public/Private: The cost will be sharing between the Municipality and the investors.
1.4.3. Private: The investors are going to design their own work.

1.5. Materials: steels, concretes, trucks, wood, sand, building insulation, …etc
1.5.1. Public: The whole cost will be paid by the Municipality.
1.5.2. Public/Private: The Municipality will pay half of the cost.
1.5.3. Private: The investors will be responsible of the cost.

1.6. Services: public facilities, parks, pedestrians, and playgrounds
1.6.1. Public: The Municipality will do the whole services in the site.
1.6.2. Public/Private: The Municipality will just take the public area.
1.6.3. Private: The investors have to do the whole services.

1.7. Manpower: labors, workers, supervisors, and housing.

1.7.1. Public: The Municipality has to provide manpower for all facilities and jobs.
1.7.2. Public/Private: Both Municipality and investors provide manpower for their own work.
1.7.3. Private: manpower has to be provided by the investors.

2. Property: the Municipality owns the whole lands in the site and they will offer it for rent to prospective investors.
3. Maintenance: Infrastructure, cleaning, roads and services
   3.1.1. Public: All maintenance will be offered by the Municipality.
   3.1.2. Public/Private: The Municipality will be responsible for the public facilities, but the private services will be carried out by the investors.
   3.1.3. Private: The maintenance will be provided by the investors.
4. Construction: Roads, man power, time, design, implementation, infrastructure, and materials.
   4.1.1. Public: All constructions have to be done by the Municipality.
   4.1.2. Public/Private: The constructions will be shared between the Municipality and the investors, but the roads have to be provided by the Municipality in any case.
   4.1.3. Private: The construction will be provided by the investors except the roads.
5. Added value: Job opportunities, investment value, and fees.
   5.1.1. Public: The value will be low.
   5.1.2. Public/Private: The value will be moderate.
   5.1.3. Private: The value will be high.
6. Duration: Design, and duration of starting until finishing the work.
   6.1.1. Public: The duration will be acceptable.
   6.1.2. Public/Private: The duration will be acceptable.
   6.1.3. Private: The duration will be high quality.
7. Consultation: project evaluation, and penalties.
   7.1.1. Public: There is no evaluation and penalties.
   7.1.2. Public/Private: In some cases, there are penalties and evaluation.
   7.1.3. Private: The investors' work will be evaluated by the Municipality and there are penalties for not following the rules.
8. Benefits:
   8.1. Revenues:
      8.1.1. Public: No revenue.
      8.1.2. Public/Private: Revenue is moderate.
      8.1.3. Private: Revenue is high.
   8.2. Profits:
      8.2.1. Public: No profits.
      8.2.2. Public/Private: The profits are going to be average.
      8.2.3. Private: Profits are high.
   8.3. Losses:
      8.3.1. Public: High losses.
      8.3.2. Public/Private: The losses will be divided between the Municipality and the investors.
      8.3.3. Private: Low losses.

In Table 3 we feature an analysis of the alternatives using three levels of burdens (High, Medium, and Low).

		Public			Public & Private			Private		
Main Categories	Sub Categories	High	Medium	Low	High	Medium	Low	High	Medium	Low
Cost	Area	√				√				√
	Administration	√				√				√
	Roads	√			√			√		
	Operation	√				√				√
	Designing	√				√				√
	Materials	√				√				√
	Services	√				√				√
	Man power	√					√			√
Property	Owned	√				√				√
	Rented			√		√		√		
Maintenance	Infrastructure	√				√				√
	Cleaning	√				√				√
	Roads	√			√			√		
	Services		√			√			√	
Constructions	Roads	√			√			√		
	Man power		√			√				√
	Design		√			√				√
	Time	√				√				√
	Implementation		√			√				√
	Infrastructure	√			√			√		
	Materials		√			√				√
	Total cost	√			√					√
Added Values	Job Opportunities		√			√			√	
	Investment Value			√		√		√		
	Stimulate the Area		√			√				√
	Fees		√			√			√	
Duration	Design Time		√			√				√
	Starting Time	√				√				√
	Finishing Time	√				√				√
Consultation	Project evolution	√				√			√	
	Penalties	√				√		√		
Benefits	Revenues			√		√		√		
	Profits			√		√		√		
	Loses	√				√				√

Table.3 Alternative analysis

An analysis of the information provided in Table 3 suggests that the Municipality should consider assigning the project to different companies which want to have their own investment in the area. Firstly, the Municipality should rent the real estate to the investors to have constant revenue as long as the investment exists. It is customary for municipalities to offer land to investor on ten-year contracts. Based on the information contained in Table 1, the average price in alternative 1 would be $548 per square meter. Suppose an international hotel such as Holiday Inn wishes to rent 20,000 square meters in the site, for a total of $584 * 20,000 = $10,960,000. Therefore, if the Municipality generates that amount of money in its proposal plan with small percentage of land that designated for private sectors they can double the price in alternatives 1 and 2. Secondly, the quality of the services and operations would be much higher if it is operated by private sectors. Back to the previous example, Holiday Inn will provide many facilities in high condition to keep its reputation strong and to attract more visitors. Thirdly, investors are likely to speed up the development process as they wish to start conducting business as soon as possible. Lastly, having international investors in the area is likely to attract different people from different places using their reputation and provide many job opportunities. In Figure 4 we present a map with our proposal for private development.

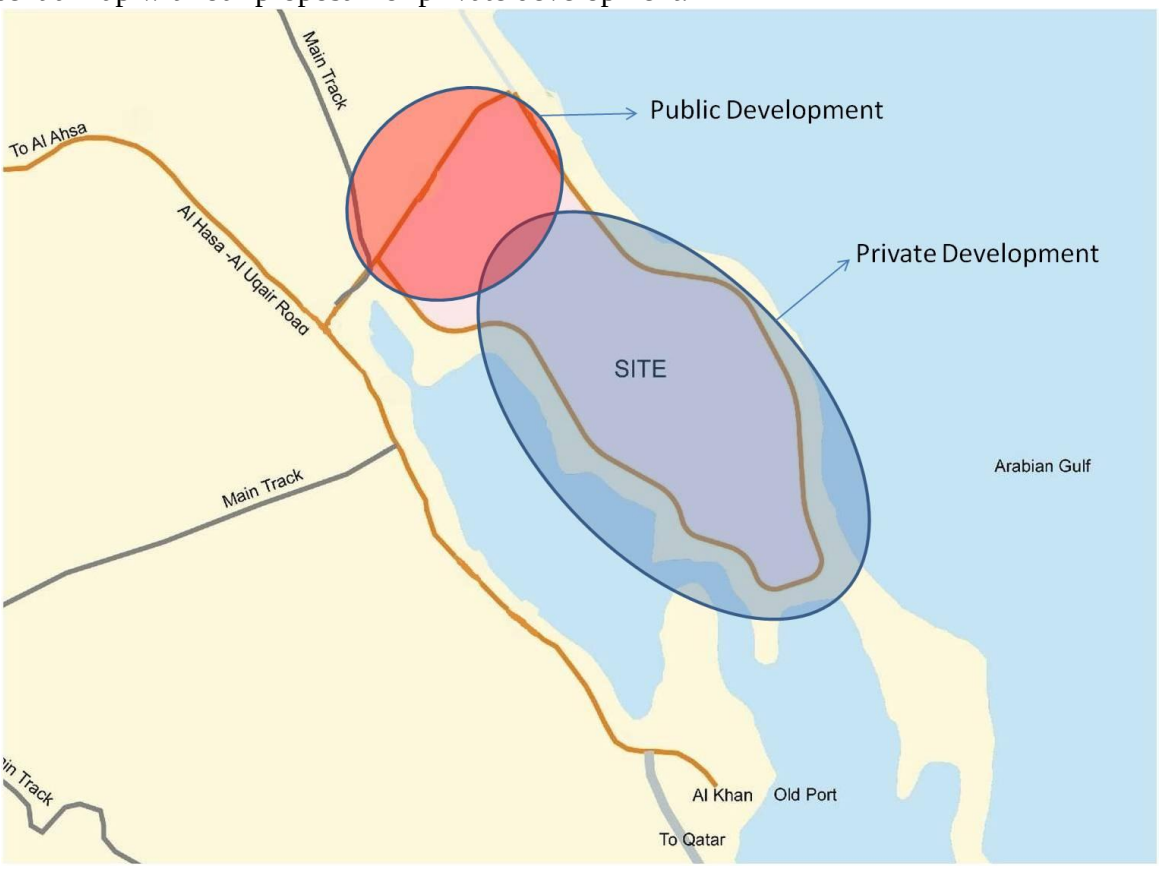

Fig.4 Report's proposed development map

An analysis of the alternatives reveals that the best choice for the development of Al-Uqair beach is alternative 2, in which we consider private investment. In Figure 5 we show a representation of this investment plan.

Fig.5 Report's proposed distribution of uses in the area map

Risk management

Risk management is the process of measuring and assessing risk and developing strategies to manage them. Such strategies include risk transfer to the other activities and avoidance or minimization of its negative effects. It also features the acceptance of some or all of its consequences. It can be defined as administrative activity which aims to control risk and reduce it to acceptable levels

Risk management of Al-Uqair project

Al-Uqair is one of the largest development projects in Saudi Arabia. The Municipality must think seriously about giving this kind of projects to international investors if it wants to eliminate or minimize the project risk. Most of those investors have a full department working hard just to eliminate risk and threats to the success of the project. They try to save money and minimize any damages to the integrity of the project.

We developed an Excel spreadsheet to model risk analysis. The analysis is based upon the information originally provided in Table 1. Firstly, we made the assumption that the maximum demand for each of the subareas of the property hotels, beach, tourist, commercial, and residential, could be 30, 18, 15, 15, and 18 percent, respectively. These percentages need not add to 100%, as the demand for real estate may exceed availability. Secondly, we considered five scenarios for each proposal. The scenarios reflect the possibilities that the actual demand would be very low (20 percent of the maximum), low (40 percent), medium (60 percent), high (80 percent), and very high (100 percent of the maximum). As shown in Table 4, revenues are calculated according to the formula

Revenues=min (demand, availability)*(revenue/sqm)

RISK ANALYSIS		Municipacility					Alternative 1					Alternative 2				
		Very low	Low	Med	High	Very high	Very low	Low	Med	High	Very high	Very low	Low	Med	High	Very high
Top demand		20%	40%	60%	80%	100%	20%	40%	60%	80%	100%	20%	40%	60%	80%	100%
30	Hotels (demand)	6	12	18	24	30	6	12	18	24	30	6	12	18	24	30
	Capacity provided	3	3	3	3	3	14	14	14	14	14	29	29	29	29	29
	Revenues	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 2,712	$ 5,424	$ 6,328	$ 6,328	$ 6,328	$ 2,394	$ 4,788	$ 7,182	$ 9,576	$11,571
				.												
		20%	40%	60%	80%	100%	20%	40%	60%	80%	100%	20%	40%	60%	80%	100%
18	Beach (demand)	3.6	7.2	10.8	14.4	18	3.6	7.2	10.8	14.4	18	3.6	7.2	10.8	14.4	18
	Capacity provided	12	12	12	12	12	13	13	13	13	13	17	17	17	17	17
	Revenues	$ 1,915	$ 3,830	$ 5,746	$ 6,384	$ 6,384	$ 1,627	$ 3,254	$ 4,882	$ 5,876	$ 5,876	$ 1,436	$ 2,873	$ 4,309	$ 5,746	$ 6,783
		20%	40%	60%	80%	100%	20%	40%	60%	80%	100%	20%	40%	60%	80%	100%
15	Tourist facilities (den	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15
	Capacity provided	7	7	7	7	7	8	8	8	8	8	12	12	12	12	12
	Revenues	$ 1,596	$ 3,192	$ 3,724	$ 3,724	$ 3,724	$ 1,356	$ 2,712	$ 3,616	$ 3,616	$ 3,616	$ 1,197	$ 2,394	$ 3,591	$ 4,788	$ 4,788
		20%	40%	60%	80%	100%	20%	40%	60%	80%	100%	20%	40%	60%	80%	100%
15	Commercial	3	6	9	12	15	3	6	9	12	15	3	6	9	12	15
	Capacity provided	3	3	3	3	3	7	7	7	7	7	12	12	12	12	12
	Revenues	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,356	$ 2,712	$ 3,164	$ 3,164	$ 3,164	$ 1,197	$ 2,394	$ 3,591	$ 4,788	$ 4,788
		20%	40%	60%	80%	100%	20%	40%	60%	80%	100%	20%	40%	60%	80%	100%
18	Residential	3.6	7.2	10.8	14.4	18	3.6	7.2	10.8	14.4	18	3.6	7.2	10.8	14.4	18
		12	12	12	12	12	13	13	13	13	13	17	17	17	17	17
	Revenues	$ 1,915	$ 3,830	$ 5,746	$ 6,384	$ 6,384	$ 1,627	$ 3,254	$ 4,882	$ 5,876	$ 5,876	$ 1,436	$ 2,873	$ 4,309	$ 5,746	$ 6,783
	TOTAL	$ 8,618	$14,045	$18,407	$19,684	$19,684	$ 8,678	$17,357	$22,871	$24,860	$24,860	$ 7,661	$15,322	$22,982	$30,643	$34,713

Table.4 Risk analysis: point estimates

Consider, for instance, the case of having medium demand for hotel land in Alternative 2. This level of demand results in an 18 percent level. While the capacity provided by the plan is 29 percent, revenues are accrued for only 18 percent. Conversely, in the very high case, the demand for hotel land is 30 percent, while available land is 29 percent, and the revenues are calculated based on the available land. The bottom line for each scenario and each proposal is revealing. Thus, alternative 1 would be favored (with expected revenues totaling $8678 over the others when demand is very low and with expected revenues of $17,357 for a low demand. In

the cases of medium, high, and very high demands, the preferred proposal would be alternative 2.

We next considered a probabilistic analysis by including an element of variability. We now assumed that the five demand levels (20, 40, 60, 80, and 100 percent) would be modeled by a normal distribution, with a mean equal to the original estimate and a standard deviation of 4 percent. We used the function = norminv (rand (), mean, 0.04) to model these estimates on Excel and proceeded to conduct 30 replications of each scenario. One of these replications is shown in Table 5.

PROBABILISTIC ANALYSIS		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
St. dev	0.04			Municipacility					Alternative 1					Alternative 2		
		Very low	Low	Med	High	Very high	Very low	Low	Med	High	Very high	Very low	Low	Med	High	Very high
Top demand		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
30	Hotels (demand)	6.7	14.1	17.9	25.0	29.1	6.7	14.1	17.9	25.0	29.1	6.7	14.1	17.9	25.0	29.1
	Capacity provided	3	3	3	3	3	14	14	14	14	14	29	29	29	29	29
	Revenue	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 3,049	$ 6,328	$ 6,328	$ 6,328	$ 6,328	$ 2,691	$ 5,643	$ 7,132	$ 9,988	$11,571
		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
18	Beach (demand)	4.0	8.5	10.7	15.0	17.4	4.0	8.5	10.7	15.0	17.4	4.0	8.5	10.7	15.0	17.4
	Capacity provided	12	12	12	12	12	13	13	13	13	13	17	17	17	17	17
		$ 2,153	$ 4,515	$ 5,706	$ 6,384	$ 6,384	$ 1,829	$ 3,836	$ 4,848	$ 5,876	$ 5,876	$ 1,615	$ 3,386	$ 4,279	$ 5,993	$ 6,783
		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
15	Tourist facilities (den	3.4	7.1	8.9	12.5	14.5	3.4	7.1	8.9	12.5	14.5	3.4	7.1	8.9	12.5	14.5
	Capacity provided	7	7	7	7	7	8	8	8	8	8	12	12	12	12	12
		$ 1,794	$ 3,724	$ 3,724	$ 3,724	$ 3,724	$ 1,524	$ 3,196	$ 3,616	$ 3,616	$ 3,616	$ 1,346	$ 2,822	$ 3,566	$ 4,788	$ 4,788
		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
15	Commercial	3.4	7.1	8.9	12.5	14.5	3.4	7.1	8.9	12.5	14.5	3.4	7.1	8.9	12.5	14.5
	Capacity provided	3	3	3	3	3	7	7	7	7	7	12	12	12	12	12
		$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,596	$ 1,524	$ 3,164	$ 3,164	$ 3,164	$ 3,164	$ 1,346	$ 2,822	$ 3,566	$ 4,788	$ 4,788
		22%	47%	60%	83%	97%	22%	47%	60%	83%	97%	22%	47%	60%	83%	97%
18	Residential	4.0	8.5	10.7	15.0	17.4	4.0	8.5	10.7	15.0	17.4	4.0	8.5	10.7	15.0	17.4
		12	12	12	12	12	13	13	13	13	13	17	17	17	17	17
		$ 2,153	$ 4,515	$ 5,706	$ 6,384	$ 6,384	$ 1,829	$ 3,836	$ 4,848	$ 5,876	$ 5,876	$ 1,615	$ 3,386	$ 4,279	$ 5,993	$ 6,783
	TOTAL	$ 9,292	$15,945	$18,327	$19,684	$19,684	$ 9,755	$20,360	$22,803	$24,860	$24,860	$ 8,611	$18,058	$22,822	$31,550	$34,713

Table.5 Probabilistic risk assessment of the three alternatives.

An analysis of the 30 replications of the Excel model reveals that when the demand is very low, the Municipality proposal was the preferred solution 14 times (46.7 percent of the time,) while Alternative 1 was the best solution 16 times (53.3 percent) and Alternative 2 was the solution of choice 0 times.). When the demand is low, alternative 1 was the best solution 30 times (100 percent) which municipality and alternative 2 were 0 times. When the demand is medium, alternative 2 was preferred solution 21 times (70 percent), alternative 1 was the best solution 9 times (30 percent) and the municipality was used 0 times. When the demand is high and very high, alternative 2 was the preferred solution 30 times (100 percent). This result appears

to reaffirm what we found in the point estimates we presented in Table 6. This result appears to contradict our findings for the point estimates we presented in Table 6. We present the results of the 30 replications in Table 6.

	Very low	Low	Med	High	very high
1	m	1	2	2	2
2	1	1	1	2	2
3	m	1	1	2	2
4	1	1	2	2	2
5	m	1	2	2	2
6	1	1	2	2	2
7	1	1	1	2	2
8	m	1	2	2	2
9	1	1	2	2	2
10	1	1	2	2	2
11	1	1	1	2	2
12	1	1	2	2	2
13	1	1	2	2	2
14	m	1	2	2	2
15	m	1	2	2	2
16	1	1	2	2	2
17	1	1	2	2	2
18	m	1	2	2	2
19	m	1	1	2	2
20	1	1	2	2	2
21	m	1	2	2	2
22	m	1	2	2	2
23	1	1	1	2	2
24	m	1	1	2	2
25	1	1	1	2	2
26	1	1	2	2	2
27	1	1	2	2	2
28	m	1	2	2	2
29	m	1	2	2	2
30	m	1	1	2	2
Total Revenue	m=46.7% 1=53.3%	1=100%	1=30% 2=70%	2=100%	2=100%

Table.6 An analysis of the 30 replications of the Excel model

Quality management

Quality management is strategic management concerned with quality in all operations. It is a system includes a set of integrated intellectual philosophies and tools of statistical and administrative processes used to achieve the goals and raise the level of customer satisfaction and employee alike. Investors realize how important the quality is. Quality can eliminate barriers between departments so than can collaborate and make the best products or services. Quality teaches each department to take all responsibilities and take on leadership. A large number of companies use the on Kaizen principle (the continuous improving philosophy) on which the DMAIC process is based. DMAIC stands for defining problems, measuring these problems, analyzing the process, improving the system or the process and controlling (or maintaining) the changes.

The DMAIC process would be applied to Al-Uqair project in different ways. Firstly, the investors should define the business opportunity by conducting appropriate research and also define the customers' requirements as well by surveys and questionnaires. This would provide a perspective for the investors and the Municipality to attract more visitors. Then, we would measure and gauge customer satisfaction about the services provided; survey results would help us showcase any shortcoming and disadvantages which could be avoided in the future. The three options (public, public/private, and private) would be measured according to eight different categories. Thirdly, we would compare and analyze the three potential alternatives in order to chose and select the best solution that will meet the customer specifications while maximizing revenues. Fourthly, by selecting Alternative 2 which according to our risk analysis appears to be the most attractive choice if the demand for services is high, we would expect that the private sector would improve the facilities and services to insure that number of visitors would increase continuously. Lastly, opting to undertake Alternative 2 would give the Municipality more time to focus on other projects as the private sector is entrusted with the task of developing and improving Al-Uqair.

Final remarks

We have presented a comprehensive study submitted to Al-Ahsa Municipality for the development of Al-Uqair Beach. Our report, which is informed by the systems approach, we have made an attempt to improve the quality of the services to be provided to visitor. Economic considerations include the expected revenue to be realized by allowing the private sector including international companies to develop, maintain, and improve the beach development.

While the initial goal of this project was to produce a merely fictional report, at the time this manuscript was completed the team members were considering presenting their findings to the Municipality.

Conclusion

We have suggested two alternatives to the Municipality's original proposal our alternatives present varying degrees of private investment in this major development project. The proposed alternatives appear to be more attractive than the original proposal. Risk analysis indicates that as moderate amount of private investment would be the preferred alternative in

case the demand for real estate is at a medium level. More pronounced levels of privatization (alternative 2) would prove beneficial if they are experiences high levels of demand for land.