

TECHNOLOGICAL THOUGHT SUSTAINABILITY IN CONTEMPORARY ARCHITECTURE

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Summary

Technology is consider as the key feature of the contemporary architectural which make the field "technology architecture" one of the most important fields of architecture knowledge, the deep sustainability of its thought was the reason for its promoting in the world. Nevertheless, the use of sustainable technological thought applications in the countries described as developing countries, including Iraq which have poor technological experiment compared to what is available in the world; is the subject of discussion and questioning.

Keywords: Sustainability, Technological Thought, Contemporary Architecture, Iraq

1 Introduction

Despite the great transformation experienced in Iraq after April 2003 at the level of development & strategic planning, several structural plans & master designs for Iraqi cities had been assigned into many foreign companies specialized in the regional & local development and in the fulfilling of the new cities requirements. However, the implementation of sustainable development locally still difficult, sustainable development has become an urgent need to accommodate the new variables of conservation of water resources, energy sources, knowledge-based economy as well as to take advantage of modern technology in achieving these sustainability.

The general aim of the research is to find useful and appropriate approach for sustainability in Iraqi conditions and to give to all parts involved in the process of planning and building tools how to achieve in their projects balanced development.

1.1 Research problem

There are limitations of knowledge about planning by using clean development mechanism depend on sustainable technology to realize Integrated and Viable (political, economic and social) development.

As a result the city of Samawah (Centre of Muthanna Province) like all other Iraqi cities is facing important demands to meet the presents needs regarding lack of infrastructure, unemployment, poverty, water scarcity, beside long-term strategy that requires positive future decisions meet the future needs by using the governorate unused potential in decision making processes with the regard to the sustainable development.

Facing above mentioned problems, the sustainable development must be more facilitated by the knowledge and examples of good practice.

So, we will now define the study general theory as a starting point for it, through the perceptions of projects and experimental projects which had been implemented in similar circumstances. And at the end of the paper there will be comparison ending with some conclusions.

1.2 Research assumption

There is a possibility to develop a plan which achieve sustainable development in Samawah desert (Valley Rehab) through using unconventional & unrecognized means at the local levels, such means will accompany international & neighbouring countries experience so it can solve the problems of (desertification and the environment) in sustainable ways with less waste of available natural and untapped resources without relying on the river as a source of water because these rivers already suffers from scarcity.

2 Sustainable development and eco-friendly cities

Humans consider as the most vital factor in environmental changes & in the breach of natural diversity, since its existence, humans deals with the components of the environment, and as time passed they became more control over it, especially after the scientific & technological progress that provide further opportunities to change the environment in correspond to the increased need for food and clothing. As environmental problems raises especially these revolve around the poor economic & social planning, or around the poor use of resources which result in pollution of the natural environment on land, sea and air.

We can summarize the increase global awareness regarding sustainable developments as follows: By recognition of the environmental problems facing the planet according to the definition of the World Commission of Sustainable Development. Based on the commission report named "Our common future", there is a need for a new path for development – a sustainable path not just for few years or in few places but for the whole Earth into its distant future.

Sustainable development as defined & developed by the committee will work to meet the needs of the present without the destruction of the future generations ability to meet their own needs, the idea of saving the planet began at "Rio" conference, 1992. Several other global conferences had been hold such as: the United Nations conference on environment & humans in Stockholm, 1972 which was attended by the representatives of 113 countries, earth summit on sustainable development in the "Rio de Janeiro", 1992 which was attended by 179 countries, its focus on the environmental & social considerations as an integral part of sustainable development policy, and the right of future generations in order to achieve sustainable development & environmental protection, beside the responsibilities developed countries have in case of the environment damages.

So the interest in green buildings, renewable energies and emission-free carbonate cities began, and its reach to the interest in eco-friendly cities which meet the following goals:

- Reduce greenhouse gas emissions as much as possible
- Less consumption of energy as possible
- Rely on green energy (renewable energies)

- Create new invention areas in certain cities which might be now unused or deserted and can be tuned into small & medium size business & trades with living ways do not cause any carbon emissions, we can say that such areas are the seeds of the new ways of the urban living.

The good new cities planning based on climates & commitment to innovation will lead to the activation of urban areas and prepare local companies for global competition to become a magnet for talent and new thinking

3 Chosen examples form the Middle East Region for sustainable technology & cities

3.1 Masdar City in Abo Dabai

The project is headed by Masdar, a subsidiary of Mubadala Development Company. Initiated in 2006, the project was projected to cost US\$22 billion and take some eight years to build, with the first phase scheduled to be completed and habitable in 2009. Construction began on Masdar City in 2008 and the first six buildings of the city were completed and occupied in October 2010. However, due to the impact of the financial crisis, Phase 1 of the city, the initial 1,000,000 square meters (0.39 sq. mi), will be completed in 2015. Final completion is scheduled to occur between 2020 and 2025. The estimated cost of the city has also declined by 10 to 15 per cent, putting the development between US\$ 18.7 and 19.8 billion. The city is planned to cover 6 square kilometres (2,3 sq. miles) and will be home to 45,000 to 50,000 people and 1,500 businesses, primarily commercial and manufacturing facilities specializing in environmentally friendly products, and more than 60,000 workers are expected to commute to the city daily.

The initial design considered that automobiles would be banned within the city as travel will be accomplished via public mass transit and personal rapid transit (PRT) systems, with existing road and railways connecting to other locations outside the city. The absence of motor vehicles coupled with Masdar's perimeter wall, designed to keep out the hot desert winds, allows for narrow and shaded streets that help funnel cooler breezes across the city. Nevertheless, a test fleet of 10 Mitsubishi i-MiEV electric cars was deployed in 2011 as part of a one-year pilot to test a point-to-point transportation solution for the city as a complement to the PRT and the freight rapid transit (FRT), both of which consist of automated electric-powered vehicles.

Masdar City will be the latest of a small number of highly planned, specialized, research and technology-intensive municipalities that incorporate a living environment, similar to KAUST, Saudi Arabia or Tsukuba Science City, Japan.

Partners in the project through its Clean Tech Fund are Consensus Business Group, Credit Suisse and Siemens Venture Capital. Construction of the first phase of the project is being managed by CH2M Hill. Infrastructure construction for the city will be handled by the Al Jaber Group and design of the central Masdar headquarters building has been awarded to Adrian Smith + Gordon Gill Architecture

*Fig. 1 Masdar City**Fig. 2 Masdar City*

3.2 The city of north in Qatar

AECOM Company design the largest city in the world free of carbon emissions and the first Institute for Sustainable Technology in Qatar, the city of the North, which will be completed by 2020.

The city is based on the following bases:

- It's located in the north of Qatar on the Arabian Gulf, in a desert area with transportation network and highways to link it with other cities up to Bahrain.
- Dealing with nature, water, energy & waste in one integrated cycle.
- Energy cycle: The sun's energy reflected in solar mirrors is stored in thermal tanks, powers the development even at night. 100% sufficient
- Water Cycle: Salt water to desalination plant powered by solar energy, fresh water for drinking, water for cooling towns district, waste water irrigate landscape, additional cooling through evaporation, waste water irrigate agriculture, fully recycled/water supply
- Waste cycle: recyclable waste to recycling plant 42 %, organic waste to anaerobic digestion to generate biogas and fertilizer 14 %, solid waste incinerated to produce energy (bio char) 44 %. Finally 0 % waste, and 100 % recyclable energy.
- Nature cycle: urban park, mangroves green the coastline, wildlife attracted, fish and agriculture for food, roof garden and living wall increase biodiversity. Local food produce = food miles reduce.

Master Plan formation

- Wind from the North West, solar infrastructure, agriculture, road and transport network, monorail link, development area, island
- Urban form: orientation and narrow street for shade
- Urban prototype: energy walls, shading structures, green walls, habitable roof tops and balconies, recycled waste and recycled water creates energy.
- The Master Plan will include: island living, residential green spaces, hotels, commercial district, heritage village and pier, marina, mangroves, agriculture, earth tech. institution campus.



Fig. 3 Plan of Qatar, in the North Al Sh (Al-Shamal City)

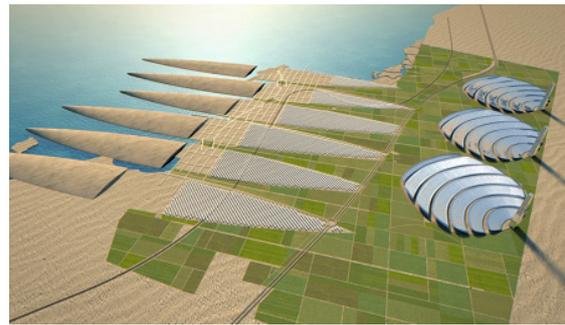


Fig. 4 Plan of Al-Shamal



Fig. 5 Scheme of different cycles used in project



Fig. 6 Scheme of different cycles used in project

4 Analysing chosen examples

By analysing the two examples we can see their similarity with the suggested study area:

- Hot weather with high temperature
- Desert lands
- Geographical similarity between the 3 cities with a possibility of knowledge integration
- Relying on clean technology and green energy
- Adoption of innovative approaches to sustainable development

The differences & local similarities for the research are as following:

- The availability of large areas of lands & future development in the proposed areas according to the future changes
- Relying on groundwater & springs for watering, which reduces the cost of sustainability
- The availability of cultivated & already planted lands with wheat and barley (summer) and corn (in winter)
- The area represents a tourist attraction for fishing and recreation landscapes.

5 Current & future development projects in Al-Muthana Province

Al-Muthana Governorate Study – regarding the establishment and construction of giant fans in the desert of the governorate to generate electricity. The study indicated "Wind can be exploited in places that are considered permanent streams to rotate these large fans in order to generate electric power".

The Plan of the ministry of tourism and antiquities – encouraging investment in these important sectors as well as, "the construction of nature reserve in Samawah desert to settle the Bedouin & to create oases and settle its sands, develop its springs and provide support in the field of tourism investment in Sawa lake.

Directorate of Agriculture in Muthanna – the expansion of nature reserves, one of them was constructed in 2012 beside the expansion of cultivated land in the desert, this year its reach to 17,500 hectares (wheat and barley).

Agricultural – Clean industrial investment opportunities (present & future) given by Al- Muthanna Investment Commission such as, textile and agriculture projects, strategic crops and livestock fields projects.

6 Case study – Project in Al- Muthanna Province

6.1 Current Conditions

The below foreign companies had done studies regarding Al-Muthana governorate & Samawah

- SGI Company/Italian (Structural plan for Al-Muthana Governorate), 2008.
- BOCP Company (Czech) Samawah & Khider Development Strategy & Updating its Master Plans, 2011.

There are also local plans & studies such as following:

- Spatial development for Al-Muthanna Governorate 2020, The Ministry of Planning – Al-Muthanna Planning Divison.
- Al-Muthana governorate development strategy 2010–2014, Al-Muthana governorate – Supreme Committee of the strategy preparation.
- Al- Muthana investment map 2011–2014, Al-Muthana Governorate – Al-Muthana Investment Commission.

According to the SWOT analysis of the previous studies, Al-Muthana governorate & Samawah city characterized with the following:

- The total area of the governorate is 51740 sq. kms, the desert represents 91 % of it (8 % of Iraq total area), according to the official statics of Al-Muthana agriculture directorate, there are vast areas in the southern desert can be considered as arable lands (estimated with 100,000 hectares.).
- Al-Salman district (its include the south desert lands) lies between Samawah City (150 km) & Al-Rafha City in Saudi Arabia (130 km), there is a paved road between the two cities & a border access (closed now) which can be considered as an important economic development factor in the governorate .

- Agricultural considered as the main economical resource, wheat & barely planted in summer and corn in winter, the total area of cultivated lands in 2013 reach to 17,500 hectares.
- There is huge amount of renewable groundwater which can be used for agriculture (more than 1 billion cubic meters), the directorate of water resources in Al-Khidher district estimate it in 30 wells & springs, the region characterized with fertile soil & water, with low levels groundwater & low levels of salt in it, all these features make the region very fertilized.,
- 65% of the governorate population depend on agricultural activities.
- The possibility of using renewable energies (mainly solar radiation) as the brightness of the sun reach to 12.3 hours/day during July and higher average temperatures during June, July & August reach to (34, 36, 35) °C while wind power came secondary with speed rate up to 3 m/sec.
- There are several investment opportunities (cement industry/estimated limestone with 600 million tons, raw salt with 50–60 million tons), beside other agricultural, livestock & tourist investment opportunities.

6.2 Description of the Project

Proposal research suggests the nucleus of a friendly environmental sustainable city in the area of Wadi Al Rehab within Samawa District, Al- Muthanna governorate in the Republic of Iraq. This suggestion is based on the availability of ground water, springs & arable lands within the area of study, all which contribute in creating a source of sustainable economic & social development to fight poverty by sustainable technology.

One of the contributing factors is the existence of a nature reserve with an area of 100 hectares, the Lake of Sawa and a trading road with the Kingdom of Saudi Arabia (now closed) as shown in Fig. 1, Fig. 2 and Fig. 5.

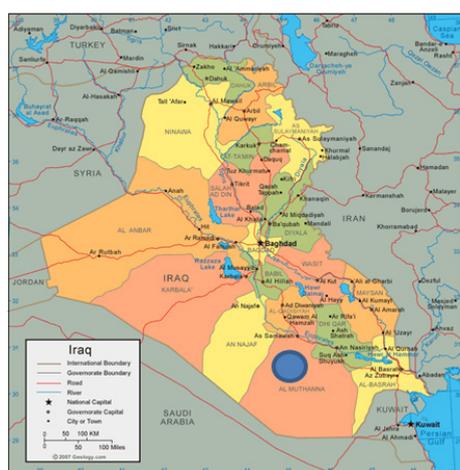


Fig. 7 Iraq and Location of the project



Fig. 8 Proposed location – Nucleus of a friendly environmental Sustainable City in Al-muthanna

6.3 Location of the Project

The project is situated in Al-Muthanna Governorate, which is in the south – west part of Iraq, on the outskirts of alluvial plain in the southern part of it, part of it lies on the south – west of the Western Plateau, a position within the Middle Euphrates region.

The governorate of Al-Muthana is 51740 km² which represent 11.8 % of Iraq total area / 437393 km². It is considered as the second largest governorate in Iraq after the governorate of Al-Rumadie, the area of desert in the governorate reach to 47000 km².



Fig. 9 Technology to use irrigation in Wadi Alarab Area



Fig. 10 Technology to use irrigation in Wadi Alarab Area

6.4 Relation of the Project to the Research Topic

Several studies and databases published by the Ministry of Planning of republic of Iraq and by the Central Bureau of Statistics indicate that Al-Muthanna governorate is the first in poverty for the year 2012 in the whole country.

That means the need of Government's support of sustainable economy to increase suitable opportunity for local people to develop their lives and businesses.

Based not only on the reports from the ESCWA (United Nations Economic and Social Commission for Western Asia) about using technology to reduce poverty following suggestions and implications can be proposed in Al-Muthanna region. One of possible ways for renewable city will depend on proper technology to use the ground water, generate power from sun, while saving the water in Euphrates River, which is decreasing each year due to several circumstances places beyond the direct influence of regional authorities. Very important for the region of Al-Muthanna Governorate is to save current agricultural fruitful land uses. That really means new economy of the city and the region depends on global technology assessments to create sustainable society development. The design in this area and sustainable proposals should reflect the local conditions. The use of sun is very problematic by using photovoltaic cells because of sand storm in the region.

7 Conclusion

There are spatial elements in Al Samawah desert, and through the study of examples such as Masdar City & the city of the north which show the possibility of sustainable development, use of green energy and natural reserves depending on modern technology

such as GIS, satellite image, modern irrigation systems, covered & tissue agriculture, all that will enhance the treatment of poverty and the fight against desertification and will connect the environmental concerns with agricultural & industrial economy of the city, It also will strength the idea of emigration from the City of Samawah to the countryside, which reduces the problems of the shortfall in infrastructure, housing deficit and unemployment.

All these factors shows that Samawah desert has all the elements for multi-faceted sustainable development (resources of water, resources of energy and available land), and has the ability to maintain that development steadily, such factors with all its elements can be enhanced beyond the limits of current potentials to reach the willingness of the population in providing all means of support, stability and momentum to achieve sustainable development plans & ambitions.



Fig. 11 Natural reserve area near Sawa Lake



Fig. 12 Picture of the agricultural lands in Al-Samawa desert chosen for the project

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