

## The Effect of Sustainable Architecting on Planning Science and Technology Parks

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**Abstract:** One of successful ideas in current era in the field of local and national economic development is establishment of science and technology parks and growth centers which their main aim is developing technology and making proper conditions for growing and appearing various technology based innovations. Scientific researches as one of the main and crucial ways for reaching to hidden and obvious facts of the world and discovering new sources and solutions for responding the problems are requirements and needs of today's human. Thus, to reach the aims of country's development the role of Universities and research centers will be prominence. Therefore, support of policy makers in the field of development and broadening of science and technology parks is important. These people can apply modern managerial methods as well as providing fundamental basics to achieve these aims. Science and technology parks as research and development centers can eliminate most of the existed problems and promote situation. The new methods of transmitting information can lead to build new atmosphere for making technology more accessible and using facilities effectively. Regarding environmental crisis that threatens the earth and enhancement of fossil fuel use that makes this crisis more extreme the necessity of using clean energy resources are becoming bold. The concept of sustainability in architecting is the same as correspondence architecting with ecosystem or environment. According to this approach building designers not only can help in energy consumption but also help in prevention of air pollution that is a great help for next generations.

**Keywords:** Clean energy, Park, Science and Technology Park, Sustainable architecting

### 1. Introduction

Architecting should be considered as an unavoidable mean for life not only for construction but also a set of thoughts, functions and consumption. The architecting structures should not be used physically only, but they should be used spiritually or socio artistically. Such structures should be followed by harmonically balances which gain their aspiration from nature not from 3-D society where follows routine sciences and technologies. Especially in recent decades that human recognition and knowledge have been increased, ecological and natural systems are paid attention more than before. Some groups of architectures have pointed

out to the concept of "sustainable construction" and defined it as "managing a clean and healthy place on the basis of effective extraction from ecological resources". Regarding this definition, the aim of designing sustainable construction is reduction of its damages on environment, nature and energy resources. Today science and technology parks have became new issue that draws lots of educators' attention. Although today's technology and civilization bring facilities to humans life, it also imposes some problems such as pollution to natural environment. Fossil fuels vehicles and companies' fumes and lack of landscapes inside or at the suburbs of metropolises make the problem of oxygen

reduction and expand cities' air pollution. Each residential unit, each vehicle or each factory plays role in making the city polluted. Such pollution spreads different disease. Air pollution also affects plants. One of the other impacts of human activities on environment is water pollution that is rooted in mixture of industrial wastes and garbage with consuming water. City water disposal goes through the lower layer of soil along with factories water wastes and makes underground waters polluted. Such pollution also enters to rivers and lakes directly or indirectly and kills animals.

## 2. Method

The research method of present paper is descriptive-analytic in which it is tries to consider all the aspects of issue by referring to libraries and valid documents.

## 3. Review of literature

Science and Technology Park is studied in some books and paper that some of them are listed below:

Year	Researcher	Title and publication	Main issue
2012	Shaghghi, S. & Yousefpoor, K.	Science and technology parks in Iran and in the world, Shabestar: Azad University press	Familiarity with main principals in planning science parks
2001	Bahreini, S. H.	Developing a sustainable city from plan to practice, ecology journal, Tehran University press	Consideration of different aspects of city sustainable development
	Shaghghi, S.	Strategies for sustainable physical city development, Shabestar: Azad University press	Offering patterns and approaches for city sustainability
2002	Mofidi, S. M.	The concept of sustainable architecting, Tehran, 3 <sup>rd</sup> conference on efficacy of energy consumption in buildings	Considering existed concepts in sustainable architecting
2010	Gorji Mahlabani, Y.	Sustainable architecting and its critics in environment field, ISC journal of scientific association of architecting, vol1, autumn	Ecological, economic, social-cultural consideration of sustainable development

#### 4. The purposes of study

The pace of world changing is so quick in a way that without continuous innovations in the field of science and technology survival will be impossible. In fact, for developing countries, technological development is a prerequisite for economic development. Technology parks recognize relative technological advantages and consider approved technological policies and national supports can be proper solution for economic growth at the level of nation or region. Functional success in these parks is due to clear and compiled strategies of countries' technological development [1]. The aim of this paper is considering following items and it is tried to study above items to achieve suitable method for planning science and technology parks which will become able to respond planning needs along with sustainability approach.

- Considering how a bond can be made between economic and technology
- Considering how a sustainable approach can be made in science and technology parks
- Considering how a science and technology park can be designed according to aboriginal architecting

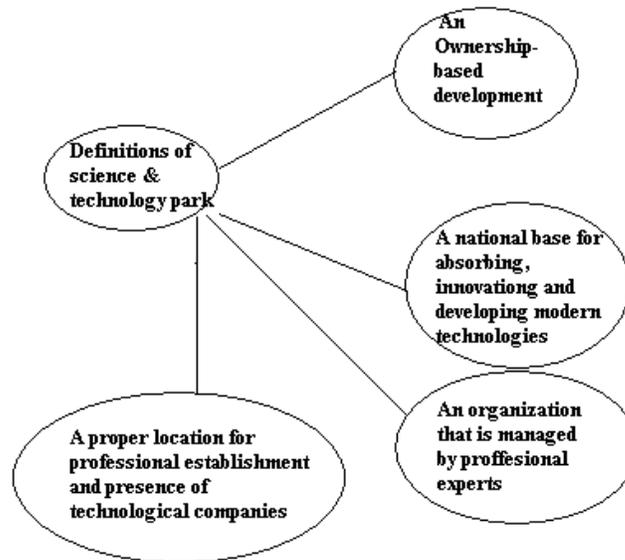
#### 5. Theoretical basics

##### *The definitions and history of science and technology parks*

Science Park is an organization that is managed by professional experts and its main goal is "enhancement of wealth in the society through encouragement and promotion of innovation culture and enhancement of competition power among science and technology based companies that act in the park. To achieve such aims, scientific park flows and manage knowledge and technologies among Universities, research centers, companies and markets. Moreover, scientific parks benefit from incubators and make a spin-off and facilitate the growth of innovation based

companies." In the related literatures, various definitions and terms have been used. Kong's considerations indicate that about 30 terms exist in this field. Technology parks can be an answer to entrepreneur educators, who tend to commercialize their technological innovations and keep their relations to Universities and high education centers [2]. The first science and technology park was built in 1951 named Stanford University Park. This park was begotten of Fredrik Trueman, who later was named *Father of Silicon Valley*. He established this park to improve financial issues of University and its international face. This park is the first industrialized region which was planned to absorb companies and research opportunities; it is also the first superior technology based park beside a University. Later, the idea of establishment of the same parks was widely adopted in Europe and America. In 1955, seven companies entered this park. In 1960, their numbers reached to 32, and now over 140 companies work in 655 hectare of this park's land. According to definition of International Association of Science Parks (IASP): "A science park is an organization that is managed by professional experts and its main goal is enhancement of society's wealth through improvement of innovation culture and enhancement of competition power among science and technology based companies that act in the park. To achieve such aims, scientific park flows and manage knowledge and technologies among Universities, research centers, companies and markets. Moreover, scientific parks benefit from incubators and make a spin-off and facilitate the growth of innovation based companies. In addition, science parks provide other services with high additive value along with work places and high quality facilities" [3].

To express other definitions for science parks, following items can be mentioned:



## 6. The concept of science and technology parks

The existed parks in the world named differently according their aims and policies for instance, Science Park, Technology Park, Industrialized Park, Entrepreneurs Park, Innovation center, and science and technology town. One of the motives for establishing technology parks is assisting development and formation of middle and small sized companies, research centers and light industries by the help of private section. Science and technology parks particularly those that aim to develop scientific atmosphere and enrich research markets, try to support these small companies and provide opportunities for their growth and development [4].

In a general classification, science and technology parks can be grouped into 3 main classes:

- Growth centers and incubator institutes that are good for startup companies  
The building of growth center mostly consists of some independent multiplex small units, for startup companies activities. Companies that are located there are tenant and can be located there maximum for five years and also can benefit from service-tax and cost subsidies.

- Science and technology parks that are good location for research and technology institutes and incubator centers.
- Research and science town that contain several parks, Universities and residential centers.

## 7. Theory of sustainability and sustainable development

A sustainable environment is an environment that owes its existence to reasonable consumption of natural resources and presence of discipline in its surrounded area. If an environment exists physically, it should be sustainable. Presence of unsustainable environment is unacceptable. Regarding attractiveness of sustainability issue and attention of lots of unfamiliar architectures to this movement and because of chaos in the definition of this term among experts, consternation is observable in lower developed countries.

## 8. Definitions and concepts of sustainability

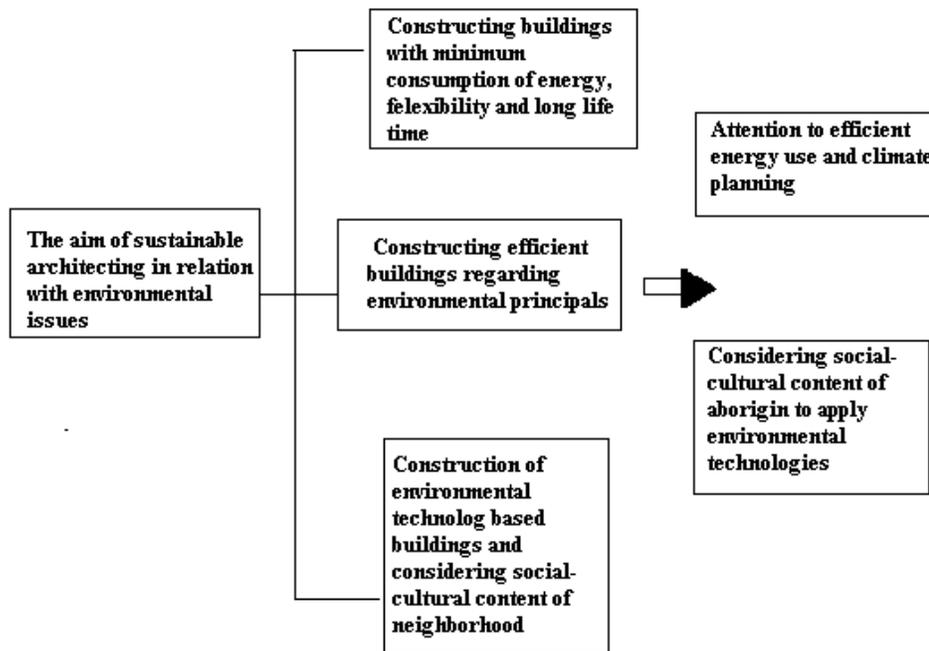
Regarding Telan's definition, sustainability means providing current generation's requirements, without sacrificing next generation abilities. In this definition two key concepts of "foresight" and "preservation of resources" are recognizable. This issue that, current generation owes next generation makes current generation responsible for keeping

the earth safe and healthy. To preserve resources, it is necessary to protect all the renewable and non-renewable resources [5].

### 9. The purposes of sustainable architecting in relation with environmental issues

In most of the solutions that sustainable architecting offers, climate attitude is considered. By “Climate attitude” human being reduces to

easement needed creature. Attention to climate conditions is one of the main basics of Iranian architecting, but all things don't end to this item. Here, a set of various factors hands together to form the final shape of a building, one of these factors is climate. In a way that human feels comfort in an atmosphere meanwhile receives lots of messages inside that atmosphere [6].



### 10. Solar energy

Solar energy is one of the clean and free energy resources, which has been used in various ways since long years ago by human. Energy crisis in recent years makes world's countries to encounter energy issues differently, among these ways substitution of fossil energy with renewable energies such as solar energy to reduce energy consumption, manage supply and demand and decrease emission amount of pollutant gases has been received popularity [7].

### 11. History

Recognition of solar energy and its usage for different means has a long history. May be its history is related to pottery era, in that time, clergymen lightened the fire boxes of adytum by huge polished golden goblets and solar radiation. One of the Egypt's pharaohs had made a temple

which its door opened by sunshine and closed by sunset. But the most important story about solar energy was related to Archimedes, the great Greek scientist who fired Rome's navy by solar energy. It has been said that Archimedes installed lots of small mirrors besides each other on a removable base, which focused sun radiations on Romans' ships from far distance and fired them in this way. In Iran as well traditional Iranian architecting is an indicator of their specific attention to correct and effective use of solar energy in previous era [8].

### 12. The application of solar energy

In current era solar energy is used by different systems that are listed below:

- Supplement of light from solar energy
- Cooling and heating the air

- Heating water
- Desalination
- Using solar energy for domestic, industrialize and generation consumptions
- Direct transforming solar energy to electricity by photovoltaic devices (International bulletin, 2004).

### 13. Photovoltaic (Solar cells)

Photovoltaic is a system that is able to transform solar energy to electricity. Use of photovoltaic systems enables us to have a clean environment, because this system has ignorable side effects on nature and despite of fossil fuels which are non-renewable, solar energy is considered as a renewable resource; it exists till life exists on the earth. Solar cells are semi conductive. These cells are produced in different shapes and sizes. Each solar cell produces only 1-2w electricity. These cells usually link to each other to provide a huge solar system. A solar cell has a battery in addition to electricity production, that stores achieved electricity for nights or cloudy weathers [8].

### 14. The advantages of using solar energy

- Clean and pollution-free (eliminating emission of greenhouse gases)
- Endlessness
- Free and accessible
- Reduction of fossil fuel consumption
- Safe and secure [8].

### 15. Conclusion

It can be concluded that science and technology park has a direct connection with economic and these growth centers can be income sources for city and country. Planning science and technology parks that are based on sustainable architecting patterns and base on renewable energies can be proper bed for science growth in Iran. In addition, attention to these principals can cause reduction of fossil fuels consumption, reduction of air pollution and perseverance of environment for next generation etc.

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