

Recognition of Dimensions of Sustainable Architecture (Case study; New Shoushtar Residential complex)

M. Taleghani¹• AND B. Dariush¹

**1.Faculty of Architecture, Delft University of Technology, Delft, The Netherlands
2.Shabestan Architectural and Urban Studies Research Center (SHAUR), Tehran, Iran**

Abstract

The main purpose in this research is recognition of dimensions of sustainable architecture. Today, one of the most necessary complicated and delicate specifications of architecture that architects face with is the issue of stability in various types of its comments and interpretations. The issue of sustainability is interpretable and general from many aspects. Therefore, it is necessary to recognize the qualified of this adjective (architecture and its related categories). In the record of bringing this discussion up, we face with titles such as Green architecture, Sustainable development, etc. But the purpose of this article is the study of the nature and recognizing the circumstances and essence of sustainability in all fields that architecture involves in. The innovation of this study is attentive to creating the recognition and feeling the fact of dimensions of sustainability that is studied in procedure of library research, a case sample, and proposal of common but insufficient ideas related to this discussion. This article is devoted to 3 point of views including main environmental, cultural (value), and technical, and it tries to take the proposed topics under the subjection of this 3 factors in an orderly way (presenting a modern pattern) and the minor factors are studied under the subjection of these 3 main factors.

Keywords: Sustainable Architecture, Environmental point of view, Cultural point of view, Technical point of view.

•email:m.taleghani@tudelft.nl

Introduction

Sustainability is the most necessary, complicated, and delicate program that today architectures face with. The verb "sustain" has been used since 1290 in English and is rooted in Latin words "sub" and "tenere" meaning "maintain" or "keep" (Soflaee, 62, 1383). In Oxford dictionary, the background of this word belongs to 1400 years ago. Also in Persian, sustainability is the synonym of "to be resistant, resistance, stability, etc" (Dehkhoda 4707, 1373). The topic of sustainability has been proposed in architecture for less than half a century, and it is generally used as one of the modern specifications of architectural works. In our country, this qualification and specification is used for conventional buildings which are usable yet, and we witness the permanence of life in them. Therefore, this research intends to study the nature of sustainability and essence of its existential circumstances. The innovation of this study is attentive to creation of recognition and feeling the reality of sustainability dimensions that studies a case sample which is tried consciously or unconsciously to be according to sustainability circumstances. Since 1966, sustainability has been presented in field of protection of environment and preservation of non-renewable resources. Now, with the development of science, the excitement of protection of preservation of subterranean resources by pure and renewable resources has subsided, and the modern topic proposed and more considered in this article is sustainability, value, and culture.

Whereas, it is possible to search the most fluent and simple components of sustainability in housing, case sample and residential specimens are also used for better presentation.

Research Background

In the subject of sustainability that we will devote ourselves to it, we can consider that environmental point of view has the record since 1966, when the Apollo spacecraft sent the first pictures of the earth from the space. These pictures proposed two different points of view in proportion to universal life system besides. First, the living universe is a little and

vulnerable phenomenon. Second, the living universe is manageable and programmable. Since then, thinkers and environmentalists found out vulnerability of the environment and habitat of the earth and the issue of protection of life, non-renewable resources, etc was proposed formally. Technical point of view also possesses almost the same background because of its topic relation to the issue of environment. But value-cultural point of view possesses a specific innovation in proportion to the 2 previous points of view that has been studied in bits and pieces and under the subjection of concepts such as sustainable values, praiseworthy traditions of architecture, contextual architecture⁵, etc. But this article tries to consider the above issues from viewpoint of sustainability.

Research Procedure

In this research, the viewpoints related to the domain of architecture are studied through library research procedure, and among the viewpoints, the writer is inclined to the 3 major viewpoints and other minor factors are studied under subjection of these 3 major factors. At the end, to response more objectively to the nature of existential circumstances of sustainability in architecture, a sample suitable for the research (New Shoushtar) was studied and along the study it was tried to indicate that how the existence or lack of any of the 3 presented viewpoints guaranties the sustainability and survival (or non-existence of that) in architectural work.

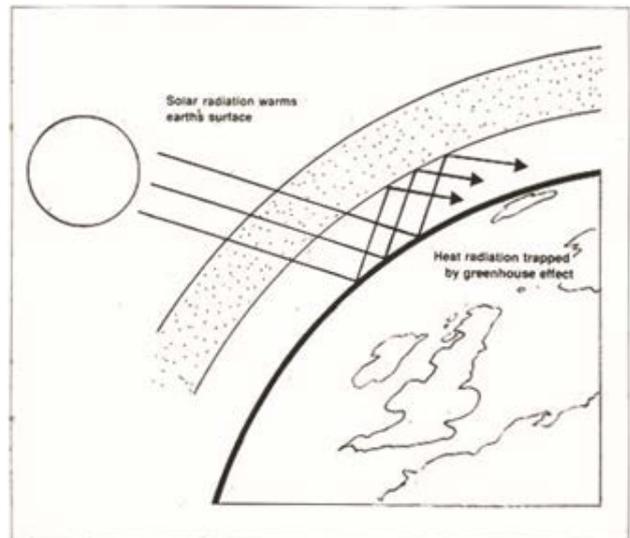
Incidentally, it has been consciously avoided to discuss about instances such as Statement 216 of Rio-dojanaro and Tokyo Conference in field of global warming to devote the study more explicitly to the final pattern of sustainability and to avoid side issues.

Environmental Point of View

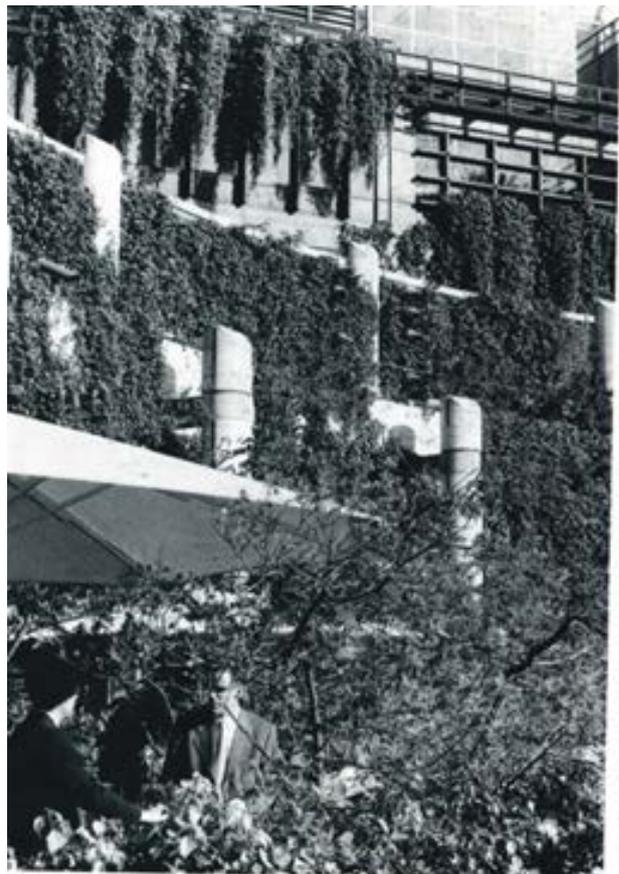
It is possible to consider the concept of environmental sustainability as the result of a logical awareness of universal environmental issues (Bahreini & Maknoun 1380). The most important topic presented in this viewpoint is ecological design or respect to the eco. In this kind of treatment, designer must consider the nature as a dynamic system and the manufactured environment dependant to that. The basis of ecologi-

cal design is the perception of the relationship between live and dead parts of nature. In this field we must evaluate some indices such as if we want to build, where we build, what we build, and how we build, because since the beginning to the end of the process, we interfere in nature, the ground of construction. We cut the trees; extract stone from mine and even in case of inappropriate design, we cause the production of greenhouse gases while using the construction. Therefore it seems that the verb construct is an action contrary to nature. At the present time, some efforts have been done to construct buildings that are self-sufficient in energy, so that they won't damage the environment while being used after the construction process. Practically, ecological design is considered as the human's optimum interference with nature. A research in Europe shows that "50 percent of energy is used for construction and another 25 percent is used for transportation results from civic design". (Hosseinmardi. 111, 1383) In this category, the function of architecture is greatly important as a responsible profession. In natural point of view, sustainability of architecture is based on the combination of building with nature, not overcoming with nature. It means the exploitation of nature and simultaneously protecting it from damaging it. Design accompanied by nature cause attention to major natural factors that we should use them and be conscious of the method of using them. The factors that are related to the affair of construction and ground are usually the glow of sun, the prevailing winds of region, trees and the shade of them, the substance of the ground, the amount of weakness of the soil during rainfall. Now we explain a sample of working with nature and its relation with sustainability: when we plan a stratagem to enjoy shadow in summer and light in winter for a house, using a grapevine (or any autumnal tree) is more profitable than mechanical stratagems. When house is a suitable place for the growth of grapevine, and the grapevine creates shadow in summer and cause the light rays pass through the house, both of the factors will act for their profit and simultaneously help each other in a peaceful co-

existence, and now we say that they have achieved sustainability.



Picture1: The process of warming of the earth. Source: Edwards, 1999, 44



Picture 2: Achievement of sustainability of the construction and the ivies on the façade in a peaceful coexistence.

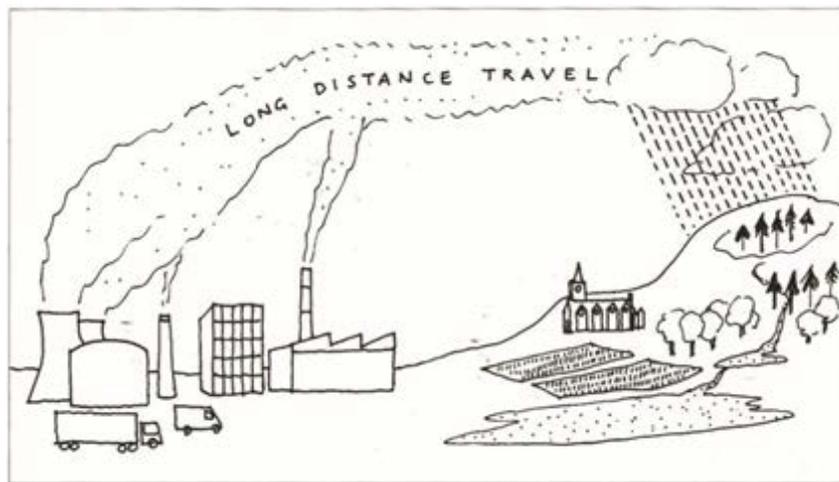
Source: Edwards, 1999, vii

. Et.al (Williamson, 2003, 15). Picture (1) is shown the process of warming of the earth and picture (2) is shown achievement of sustainability of the construction and the ivies on the façade in a peaceful coexistence.

We achieve a self-reliance of public service system (In which water, electricity, etc is provided for all buildings by the municipality) with the use of stratagems such as rain water supply, the use of prevailing wind and sunlight to provide energy for building. This issue will cause waste of energy be minimized. The importance of this issue is clarified when we

know that in our country fossil energy and subterranean resources are used to produce electricity. This process is as follow:

First, gas and coal convert to thermal energy, then to mechanical energy, and finally to electrical energy. Every stage of energy conversion, a lot of energy will be wasted that during the process of producing electrical energy of fossil energy we unfortunately perceive that 60 percent of the primary energy is wasted as heat during the conversions. Picture (3) show that environmental pollution primarily and the most affects the environment of the generator.

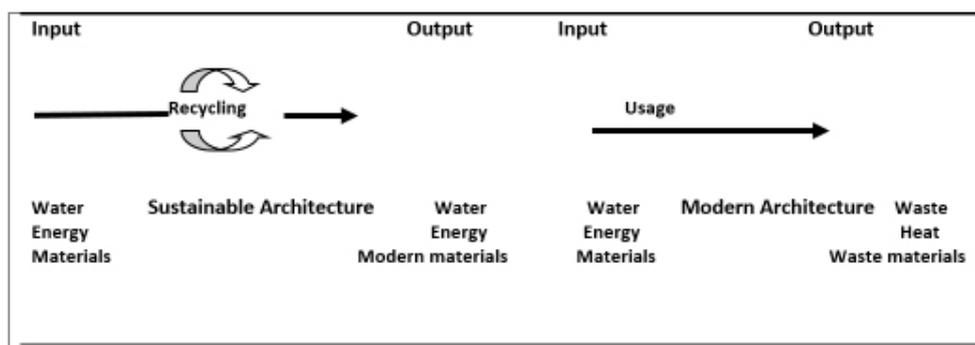


Picture 3: Environmental pollution primarily and the most affects the environment of the generator.

Resource: Edwards, 1999, 54

Eventually, the nature has reserved its special rules and order for millions of years and construction will guarantee its sustainability as much as it is combined with its ground. picture (4) is shown the expected

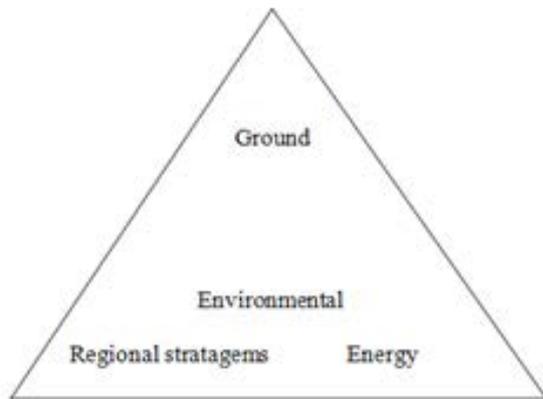
inputs and outputs of contemporary modern architecture with combined with ideal sustainable architecture. Eventually in the environmental category the designer should consider the stratagems that a region



Picture4: The expected inputs and outputs of contemporary modern architecture with combined with ideal sustainable architecture Source: author

provide to the best life conditions while considering the items such as heed to the characteristics of ground and the more important items, so that his architecture will carry less use of non-renewable sources. picture (5) is shown summation of factors affecting on environmental sustainability.

Cultural point of view



Picture5: Summation of factors affecting on environmental sustainability, Source: author

Identity

Identity means the individuality, existence, and whatever identifies a person like personality or quality expresses the characteristics of any person or event. Personality or quality of anything can be evaluated with some good or bad criteria.

Calling people or phenomena unidentifiable, lacking personal integrity, or lacking quality is a current mistake that are used instead of calling them poorly identified, personalized, qualified. Identity is a necessarily dependant characteristic of anything.

But identity is evaluated in various intellectual systems differently. In a society with sustainable value standards such as traditional- scholastic society certain tests and in a society with unsustainable value standards such a modern-social society uncertain test evaluate identity. Sadrolmotalehin believe that the identity of anything is expressed by its special way of existence. He says: “the identity of anything is expressed by its special way of existence; human possesses a united identity that is conducted by some codes. Human beings have some characteristics that human beings are distinct of each other by them

and their solidarity of personality is with them during their life and it is identity”. (Sajadi, 131, 1363) Therefore, any person, work, or construction has identity.

Belonging or not belonging to a total and sustainable identity is a factor that reveals a work as identifiable on unidentifiable. In this viewpoint, an identifiable work is a work that its identity is in direction of total identity, like a historical construction in a historical context. This identity along with its implied vales that are the major factors of its stability has been in fact a great academy for architects. It is an academy that originates from ancient history (Talaee, 413-417, 1376). An unidentifiable work is a work that is in antagonism toward total identity, like a modern construction in a historical context. An architectural work can crystallize a total identity (religious, Country, racial) or only its designer’s personality and identity, independent of social norms.

Genius Loci⁹

If we take into consideration the concept of sustainability as being stable, we have to know the land and its peoples’ culture. Sustainability in this perspective means the reservation and maintenance of the culture of the neighborhood and context which a building is constructed in for its people, considering the limitations and opportunities that the culture demands. Sustainability of a building is achieved by sustainability of soul and genius loci. One of the indices of this perspective is the peoples’ life and relationship with their buildings and their expectation of the buildings that is only responsible in that land and culture. Sense of locality means the individuals’ subjective interpretation of environment and their more or less conscious feelings of their environment that places the individual in an inner relationship with the environment in a way that the individual’s interpretation and feeling connects and integrates with semantic field of environment. This feeling is a factor that converts an area to a place with special sensory and behavioral characteristics for special individuals. Sense of locality supports the peoples’ desired cultural concepts, social and cultural relationships of

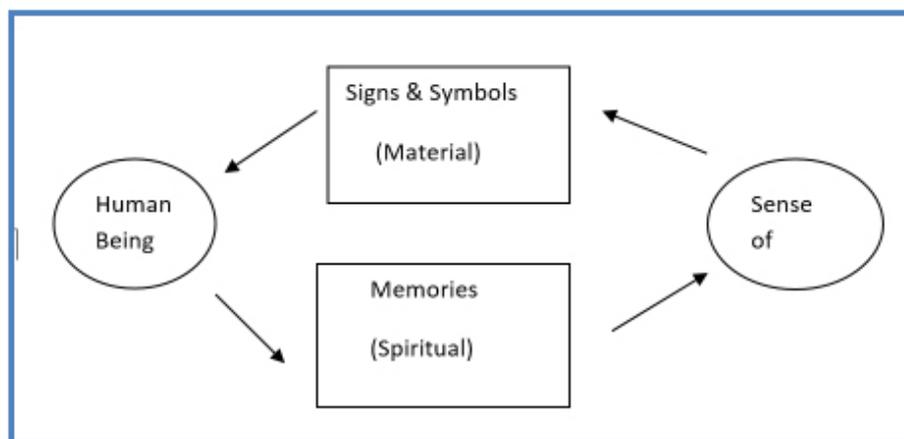
the society in a place, reminds last experiences and makes achievement to individuality possible as well as producing comfortably in an environment Norberg Schulz , adapting Hideger ideas about the existential essence of residence, regards inhabiting as the purpose of architecture and believes that human being inhabits when he can conform to the environment and become coherent with it. Therefore, inhabitation is nothing more than sanctuary and indicates the areas that life appears in a real concept of the word in them (Hale, 2000,48-51). Norberg comprehend residence in this way:

1. Visiting other people with the intention of exchanging goods, thoughts and feelings meaning trying life as arena of various possibilities.
2. Agreement with other people, meaning acceptance of a collection of common values

3. Attainment of existence by means of minor universal selection process which is of one's own.

“Totally, lack of things and places will result in losing the universe. Modern human being is losing the universe, and his identity as well as he is losing his social understanding and association. Existence will become senseless and human being will become homeless, because he doesn't belong to integrity with sense. Also he becomes indifferent, because he has no motivation to support and improve the universe” (Norberg- Schulz 2000).

Therefore, we can infer that human's mind is has the specification that after remembering some memories, creates sense of locality in his mind, and then if he feels other skeletal signs and symbols of the memories somewhere (ex: a country), sense of locality will be inculcated to him. picture (6) is shown human's Reciprocal socialized Relationship with Sense of Lo-



Picture6: Human's Reciprocal socialized Relationship with Sense of Locality

Source: author

cality.

Circumstances and levels from Shamai's perspective are classified as follow:

- 1- Indifference to location
- 2- Awareness of being placed in a location
- 3- Belonging to location
- 4- Affection to location
- 5- Integration with aims
- 6- Presence in location
- 7- Self- Sacrifice for location (Shamai, 1991,347-351)

Therefore, knowledge of the user's sense of local-

ity, signs, and indigenous patterns can guarantee the sustainability of value in architecture.

Because as a region has its sunlight and material and through watching the white walls of Boushehr we understand that construction belongs to south of Iran, or through watching 4-row houses we recognize that the building belongs to Zavvareh not Kashan, signs and patterns such as introversion, maintenance of superintendence, and allocation of the largest and most splendid area of house (5-door) to the guest, etc shows sense of belonging and dependence to location and culture.

. As nature is vulnerable to little interference (ex: although CO₂ gasses have not been used for some years, the hole in the ozone layer is expanding) culture also seems to descend by rough factors.

When a building is placed in a valuable construction, it sends a message to the addressed person, and if this building is placed in an untouched jungle, it will send another message. Now the issue of limit and measure is proposed. This common word that is used in conversation is suggested in architecture by mentioning an example: consider one block of residential buildings of Ekbatan Township and a cottage placed on the top of a mountain. The block located in the township is bigger than the small cottage, but its affection on a person is less than the cottage. The indifference and senselessness is felt now. Of course, this problem is proposed for valuable constructions, because it is not possible to expect a building to send a message and to be considered an icon in metropolises. This is the crisis which we face with today. In any alleys of Tehran, each building is tried to expand in height and be separated and display its organ to the adjacent construction. But it is possible to build a house based on its resident's demand so that it will have a message for him/her. In the past no house used items in the outside wall which separated them from each other and principally they didn't open to outdoors, but house was considered as an individual's inner world that after daily struggle, provide a shelter and habitation for him and its precincts provided inner and outer part for it. Ancient Greeks considered Delphi as the center of the world, the Romans called their metropolis "Rome" the center the top of the world, and the construction of Kaaba in Mecca is yet considered as the center of Islam World as the past times.

"Each ethnic that has created architecture, has transformed its special characteristics such as language, clothes, and public culture. Before the disintegration of cultural boundaries in last century, there were separated local figures and details in architecture, and the buildings of any site were considered as Children

of the beautiful engagement between people's imagination and the needs of the land." (Norberg Schulz, 1984)

Outer and Inner Skeleton- Precincts

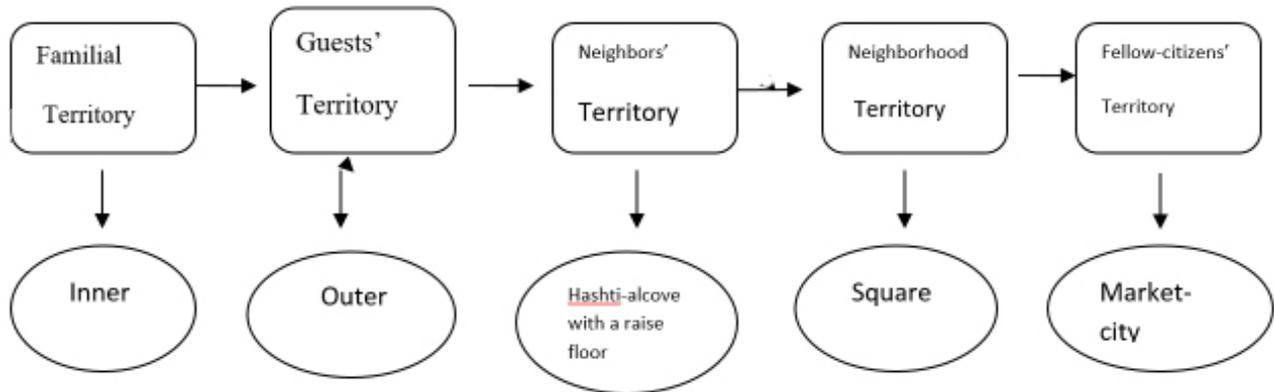
Like other arts, techniques, and human productions, architecture, in addition to its apparent skeleton, possesses also thoroughbred spiritual aspect that is designed to response human's needs such as spiritual and material (in harmony with his spiritual aspect). It means that a building possesses a skeleton whose soul is the manifestation of culture and worldview of society. The word "architecture" in Iranian thought which has always been based on the relationship between human and what lies beyond nature, possesses a meaning higher and a concept more spiritual than idiomatic and common meaning.

Late Dehkhoda described the meaning of "architect" as: construction supervisor, of construction science who instructs master bricklayer, master of bricklayers, elder of bricklayers, extremely constructive, and who constructs, elevates, and improves. (Dehkhoda, 1377, 14j, 21148s). Schulz narrates Kevin Lynch¹¹ that he said, "Each pleasant environmental image present to whom understands it a greatly important sense of lack of stress so that he will be placed in the opposite point of the fear which comes to his heart because of his unawareness of the situation." (Norberg- Schulz 1984)

From Hideger's perspective, consideration to sustainability in visage and morphology and then the bricklayer's honest and inner performance are important. He states, "Frontier (outer visage) is not only a thing in which something stops progress but also, as the Greeks believed, is a thing in which progress advents¹². (Norberg- Schulz, 1984) but traditional architecture consider the frontier beyond Hideger's idea and calls it territory of precincts. Human as the most social living creature needs to have precincts and territory, and long ago from the major level (gate of country, city, and neighborhood) to the minor places of life of these precincts is observed. Lack of

this characteristic, honestly, has caused much of the chaos and abnormality of the past. Existence of territory whether private, semi-private, or public shows

the wealthy culture and responsibility to human's inner needs and wishes, as in homes the limits such as completely private or familial precincts. Guests' pre-

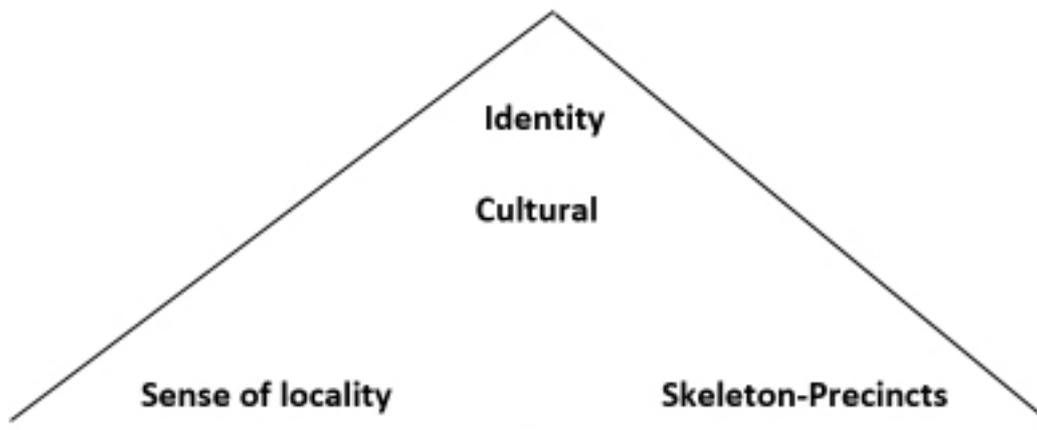


Picture 7: Levels & territories of kinship with them Source: Haghighat Naeini & Ashrafi, 1376,311

cinets, neighbors' precincts and strangers' precincts are also separable. picture (7) is shown levels & territories of kinship with them.

Finally, sustainability from cultural perspective also

considers design that must take into consideration establishing identity and sense of the location, and skeletal territories which build frontiers of an architectural work must be able to reveal in the ground of



Picture8: Summation of Factors Effective on cultural & Value Sustainability. Source: author

human environment. Picture (8) is shown summation of Factors Effective on cultural & Value Sustainability.

Technical Approach

Since Stone Henge's13 time or when we possessed traditional observatories, architectures were familiar with technical and vocational aspects. It is not possible to consider technology separated from the culture and soul of an architectural work. Technical

approach in field of sustainability is related to vocational innovations of finding solutions for modern problems. The study of architectures' role in finding numerous solutions for different types of designs guarantees that we can expect architectures to provide various solutions for problems.

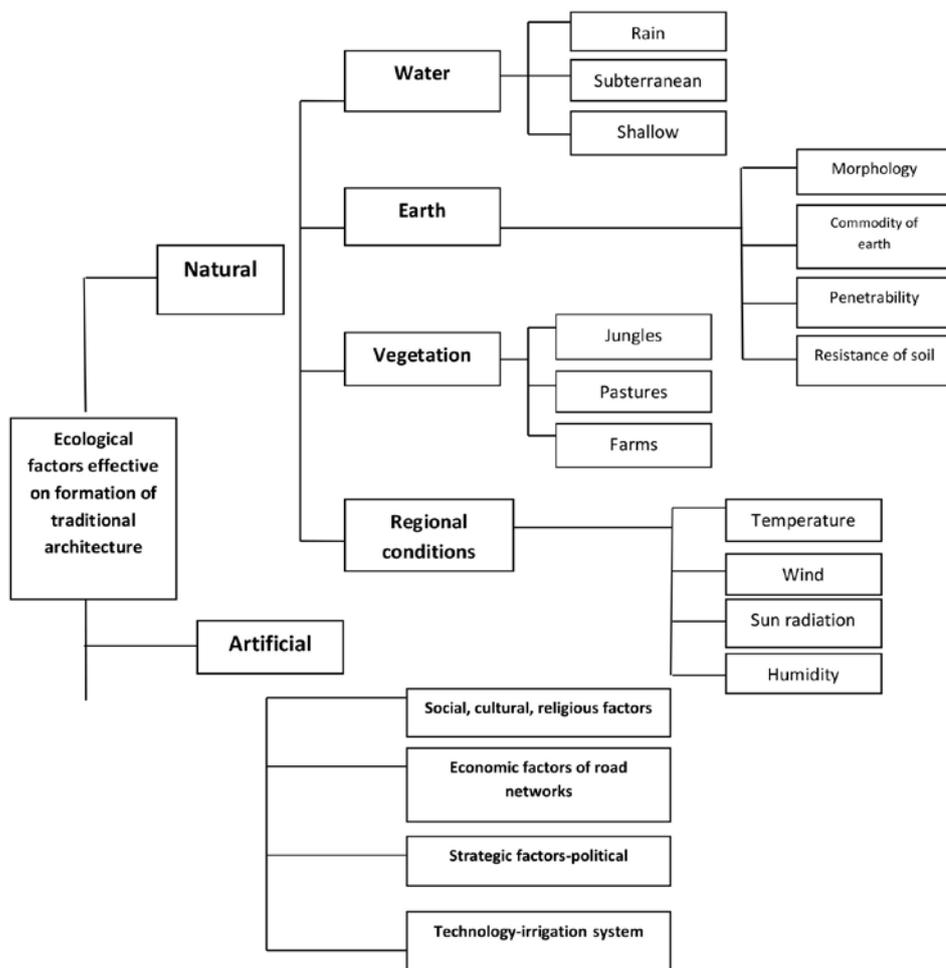
The purpose of providing solutions for applying social and economic tools and physical science is to analyze the situation and to discover perfect solu-

tions. However, providing and using solutions and tools will not be possible simply. Technical approach considers measurable issues and environmental facts that include air, degree of sound and light, usable resources, etc that are materially measurable. Then, the key point of architect's knowledge and self-reliance is based on programming, functionality of materials, and optimum constructional system. The aesthetic aspect of this pattern can be the use of contemporary materials of architecture such as intelligent windows¹⁴ modifying light, rustproof metals, aluminum panels (which are light and long longevity), etc. Passive and active solar energy¹⁵ such as double-shelled walls and roofs (that the air between the double-shelled is used as insulating material), photo voltaic cells¹⁶ and intelligent shadow creators are now converted to the common concept of sustainable archi-

ecture all over the world.

Natural and artificial Ecological Factors

It is possible to define ecology as a relation and order between living creatures and their environment in a connected system. Each element establishing ecological system (which can be considered as an ordered system alone) must be studied with its background and environment. In case of awareness and knowledge about order of natural environment and its forming elements on the one hand and also artificial elements of the environment on the other hand and creation of logical relation between them in programming, design and construction of area of living, We definitely will achieve more desirable qualities, more regular environment, and more durable life in the environment. Picture (9) is shown eco-



Picture 9: Ecological factors effective on formation of traditional architecture. Source: Qaffari, 194, 1997

logical factors effective on formation of traditional architecture.

Actually, architect's art is to distinguish optimum procedure for bricklayer's design (including house and factory) and apply them.

Is technology can make any bricklayer proficient for any region; it will result in sustainability of architecture. For expansion and progress of architecture, architectures of various nationalities have been already applied in various countries whose unfamiliarity with the ground of project causes problems for globalization of designing.

However, rules of construction work are at least suitable reference for optimum designing. In this field management of project that can be done by, indigenous architects help to solve the problem. One of the problems disturbing universal society is the problem of pollution caused by waste¹⁷ that presentation of suggestive solutions can be technically useful. Each year in Europe more than 1.6 billions of tones of wastage is produced that 22 billions of it are considered as dangerous wastage. About 25% of this amount belongs to industries of production of constructional materials and civic development that this amount is attentive to us (architects). Europe union recommends designers of management of wastage and reduction of waste materials by 3 points:

1-Production of less wastage, which is resulted in strong designing.

2- Use of wastage of materials as a source for the production on new materials

3-Design for the use of wastage materials in usable parts of the construction.

However, recycle, in field of energy has some advantages

3-1-reservation of natural sources

3-2- Reservation of energy in direction to production

3-3-Reduction of pollution caused by production process

4-Possibility of production of materials by the energy of wastages

But a certain recycle will be done when the verb recycle is more advantageous than reproduction. For example in industries such as paper, we have a certain method all over the world, but in the majority of industries this technology is not available, But recycle is not always limited to materials, but also the bricklayer's structure and even a civic construction can be the basis of second design. In history, we have witnessed many cities, which after years of natural disasters, their foundation and beyond structure were designed again. The foundation of Sassanian fire temple was also a base of Islamic period mosques, Destruction should always be considered as the final

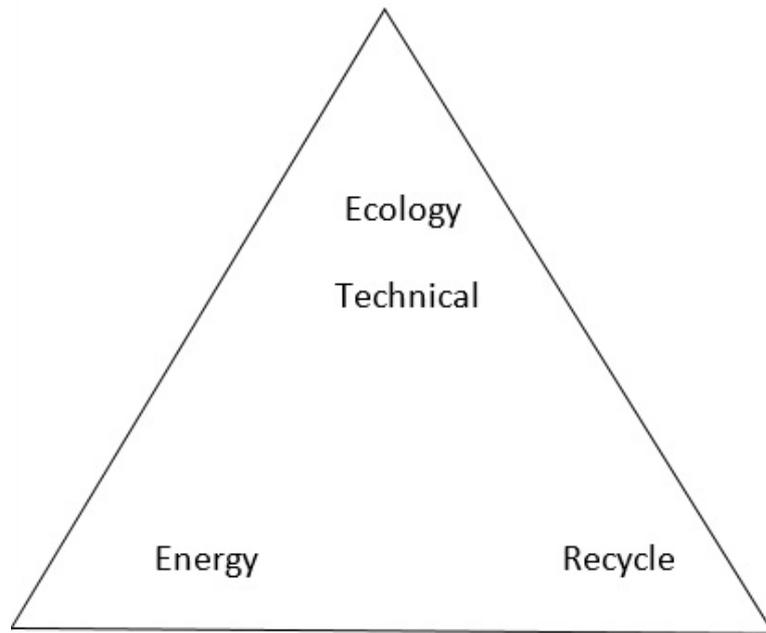
Effects	Reuse	Production Site	Transportation	Brick making	Extraction
-determination of local land sources - Increase of Knowledge about Recycle	- Earth occupation for recycling -Study of recycle of brick -Mill of brick waste and conversion to crude material of brick	Consumption of energy for furnace -Sound pollution -- Air pollution	-Use of Nonrenewable energy -Production of Co2 in direction of location	-- Air pollution - seepage in subterranean water -Possibility of production of improper bricks -Use of Nonrenewable energy	- Harvest of agricultural soil - Effect on ecology - Use of Nonrenewable energy - Occupation of earth for waste

Table 1: The process of recovery of primary material till recycle of a brick Source: Edwards, 1999,142

solution. Table (1) is shown the process of recovery of primary material till recycle of a brick.

When recycle is possible, planting freshness and accordance to environment should be considered. For example: in hot and dry territory, thickness of walls encourages us to use passive system, also the skylights and traditional ventilation present ideas of

beauty for designing. Therefore the methods of application of energy and materials have a direct relation with each other. Totally, the purposes of sustainable designing in framework of sustainable development, emphasizes on simultaneous reservation of natural environment and man-made environment. In accordance with ideologists' opinions, we can wholly intro-



Picture 10: Summation of factors effective on Technical sustainability. Source: author

duce the following 3 principles as trilogy principles of sustainable designing from technical viewpoint:

First principle: Giving priority to recycle of buildings, places, infrastructures, and available network of thoroughfares by their adaptation with new conditions and needs. Actually, in sustainable civic designing, it is specially emphasized on reservation and improvement of buildings and civic structures.

Second principle: Sustainable designing is concerned about reservation of natural resources, natural view of earth and wildlife. Therefore any kind of new constructional material has to be produced of sustainable resources such as wood which is the result of correct forestry.

Third principle: Sustainable civic designing in expansion of civic regions (such as construction of cities and new neighborhoods) is concerned about reduc-

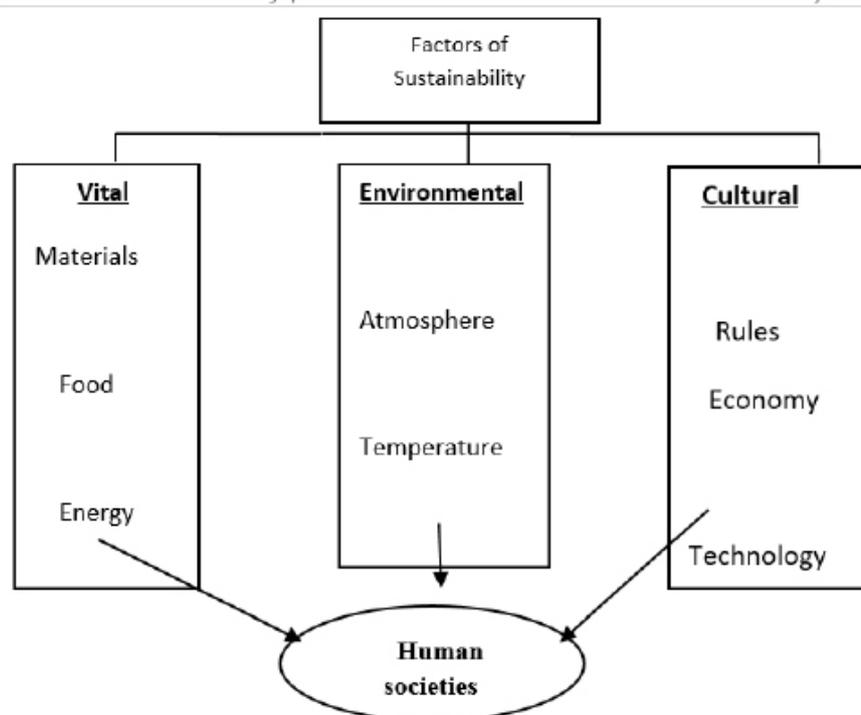
tion of the rate of consumption of energy (Golkar, 43-1379,52). This purpose is followed-through correct civic framework, proper constructional specimens, suitable spatial distribution of functions, and use of optimum compression. In other words, saving energy is possible through creation of nearer relationship between various kinds of usages and also through controlling the design of constructions about efficiency of energy consumption (Owens, 1991) picture (10) is shown summation of factors effective on Technical sustainability.

Common Ideas: From Rodrik J. Larensen's perspective, the meaning of sustainability is reservation of a situation in which life conditions are moderate and desirable. He also defines sustainability as ability of suffering unexpected and unpleasant problems. He considers indigenous buildings as the identity of civi-

lization of any society and considers it necessary to study these buildings to recognize the primary principles for making modern buildings sustainable.

To continue, he takes human ecology into consideration for compilation of sustainability principles. The word “ecology” emerges from two Greek words Oikos & Locos meaning “science of residence”. Today “ecology” refers to a knowledge concerning the conditions of human’s life in his relationship with his surrounding environment. But since last century to now, this word has got other interpretations. One

of them is the word “human ecology” that studies the dynamic relationship among human societies and physical, yard, and environmental indices of the living environment of these societies. Human ecology perspective makes necessary the study of indigenous buildings and archaic human living environments for finding principles of sustainability which are useful in that territory. Therefore, this perspective regards the study of successful specimen in a society as the mystery of permanence of the same land (Lawrence, 2006, 116). In the following diagram, the factors of establishment of a sustainable environment are sum-



Picture11: Human Ecology

Source: Lawrence, 2006, 114

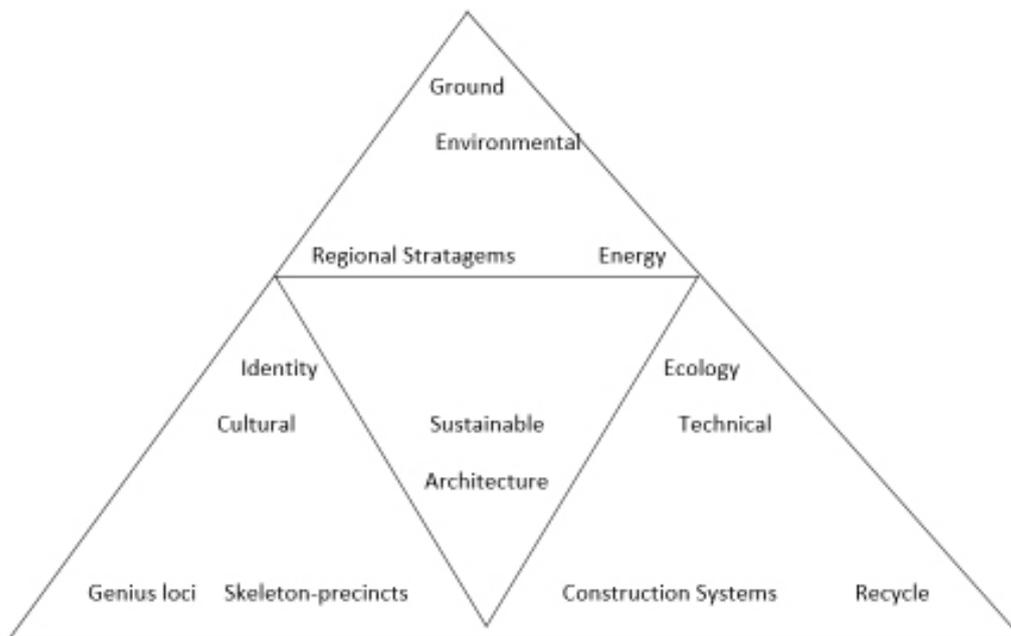
mated. Picture (11) is shown a diagram from human ecology.

Cristopher Alexander also tries to introduce a quality lacking time and place. This quality seems to be related to our discussion about sustainability. The quality which Alexander speaks about, has 6 specifications: 1- to be alive 2- to be consistent 3- to be comfortable 4- to be free 5- to be complete 6- not to be sensual.

These 6 specifications in his opinion cause permanence and immortality of a work (Alexander, 1386, 25-23)

Alexander’s idea about immortal quality is extremely relevant to the discussion about sustainability in this article. But it is not complete alone. It is like the discussion about human ecology that is Lawrence’s intention about sustainability in human societies that has attached less importance and is more concerned from environmental and living view.

Finally, filling the vacuum of any theory, we can consider Author’s pattern which is comprehensive of the factors relevant to sustainability from 3 viewpoints: Environmental, Cultural, and Value. Picture (12) is shown presentation of final pattern of sustainability.



Picture12: Presentation of final pattern of sustainability Source: author

For better interpretation of Author’s pattern and its main items, identity, level of adventure of the fac-

tors, domain of specialty and performance of them in the world of architecture are briefly Considered

Specification / View point	Level of Advent	Essence of Manifestation	Specialty domain of performance	Esthetic aspect
Environmental	Ground of work	Outer	View & psychology of environment	Environment safety
Cultural	Regional	Inner-Outer	Theoretical bases of Architecture	Reservation and application of symbols
Technical	The work itself	Inner	Technology of Architecture	Application of modern science

Table 2: Summation of introduced specifications of viewpoints of sustainability pattern Source: author

in table (2) and finally refers to the esthetic aspect of them:

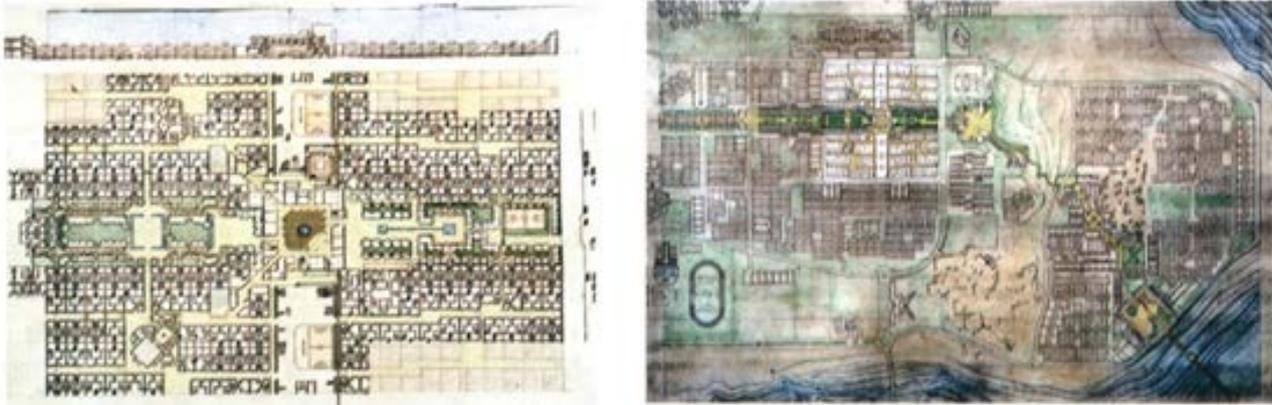
Case study; New Shoushtar Residential complex

Now we introduce case study of architectural design and urbanization which is relevant to the introduced pattern. In this study we consider that existence or

lack of each of the minor factors mentioned in the pattern of sustainability pattern how guarantee the permanence of sustainability of design (or its non-existence).New Shoushtar Township, beside the ancient town of shoushtar, was designed about 3 decades ago before the revolution and its construction lasted till several years after revolution. The

major performance of this township was to resettle the workers of Cultivating and Industry Company of Karoon and to design their required site and service performances. To design this township, it was tried

to observe the patterns of Shoushtar and Dezfoul. pictures (13) and (14) are shown Detailed design of New Shoushtar and 1st phase of the system and in underneath, there is table (3) that show major decora-



Picture 13 &14: Detailed design of New Shoushtar (right) & 1st phase of the system (lift). Source: Diba &Javaherian, 2006

Band romi	Zolfe aroos serzi bala	Darc'al
Hasht charculeh	Taffah	Khaar mahi
Parakandeh	Panjdaneh	Kelidi

Table3: 9 major decorative brick designs in ancient Shoushtar and some of its subsets Source: mashhoudi, 1997

tive brick designs in ancient Shoushtar and some of its subsets.

The thoroughfare of each neighborhood is called by special Iranian names or names of performance, for example thoroughfare of bathroom are named by the name of Iranian literature characters such as “Shirin or Farhad”. All the names are written on glazed tiles

in turquoise blue which are considered as one of the enduring parts of shoushtar. In traditional cities, it is emphasized on the areas between the buildings and they create an organic and attractive area with proper thoroughfares. Also in new shoushtar the locations, passageways, and roadways are separated and it is tried not to bring automobile into the passageway as much as possible. (Haeri, 2007). Pictures (15) and



Pictures 15 & 16: on of the centers of neighbourhods of the system (right) and the roofline of the system in 1986. Source: Diba & Javaherian, 1996,

pages 97-10

(16) are shown on of the centers of neighbourhood and the roofline of the system in 1986.

The pattern of buildings of old construction of Shoushtar and Dezful is an introverted architecture. The sites are formed around the central yard, and during the seasons of the year, are used in consideration to the regional conditions. In residential architecture, a yard and a small parterre provides a proper view and landscape for the residents and wind cools the air making draft. In new Shoushtar slender thoroughfares are build in the eastern-western direction without tree, so that the residential units will be located in northern-southern direction and receive

the desirable wind from north.

Creation of brick apertures in walls, edges of balconies, shelters and brick partitions in thoroughfares, makes it possible for the wind to pass and create draft. Residential houses are designed in 1&2- floor units, so that they will create shadow on the thoroughfares. Since the cooling system is predicted for the city in accordance with draft, the reservation of the apertures and openings of air passages is extremely important.

Now in the following table, we study and criticize bases of loyalty to various circumstances of sustainability (from Author’s perspective) introduced in

Environmental	Ground	Indigenous Motifs-floor topping
	Energy	Roofed passage ways-Brick holes for ventilation
	Regional Stratagem	
	Building a yard and a small garden for each building	
Cultural	Identity	Brick partitions and internal portals and various civic sites, brick decorations, glazed tiles
	Genius loci	Formation of residential units around market (linear form) –naming the thoroughfares by literary or performance characteristics
	Precincts	-
Technical	Ecology	Use of wind for ventilation- use of introverted pattern
	Construction Systems	Brick porter walls- roof of steel beams web- plaster sealant of the walls
	Recycle	-

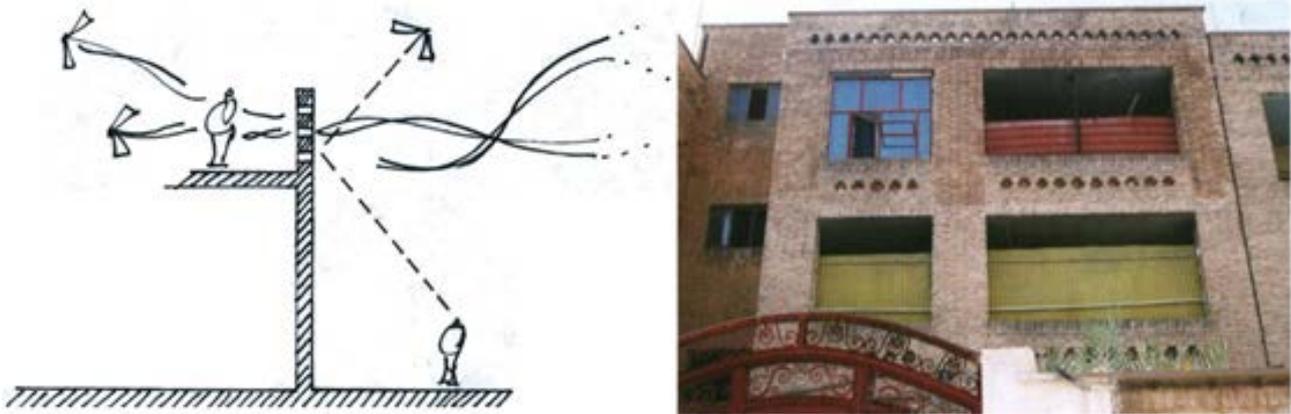
Table 4: Study of characteristics of New shoushtar residential block by sustainability patterns

the suggested pattern. Table (4) is shown study of characteristics of New shoushtar residential block by sustainability patterns.

Source: authorIn this table, lack of stratagems for area of precincts and recycle are obviously seen. In ancient Shoushtar brick partitions were used for creating ventilation as well as they were set in a way that obstructed the passengers’ view on the inner site of houses and the terrace. But this performance (which is considered as one of the mentioned factors of sustainability of building) has been used only as a decorative and has no essence that is in contradiction to habit of bigotry of Iranian people and the people had

to cover the holes themselves (that unfortunately was destructive for the view of the building). And now, because the holes were covered and the air became stagnant, the people had to use unit-air conditioners and because of lack of proper stratagems for installation of air conditioners, some of them destructed the façade of the building which had been awarded the present on behalf of Aghakhan. Pictures (17) and (18) are shown study of incorrect observation of indigenous patterns by the designer that caused the weakest organization by the residents.

On the other hand, it is necessary to mention that the designer was so successful to motivate sense of



Pictures 17& 18: Study of incorrect observation of indigenous patterns by the designer that caused the weakest organization by the residents.

Source: author

traditional location, that the resident thinks that this building is a historical work that has been enduring yet after many years.

Conclusion

In studying the factors of sustainability, we achieved the following suggested pattern that is a totality of all the points proposed in this article. In this pattern it is tried to take into consideration the issue of sustainability totally and without any premise about a special domain of realm of issues relevant to a work of architecture. Therefore, the most chief perspectives (environmental, cultural, and technical) were chosen for this pattern and related minor factors are described briefly:

- In environmental category, the items attentive to characteristics of ground and more significant, stratagems which a region provides for optimum conditions of human's life should be taken into consideration by designer, so that his architecture will cause less use of non-renewable energies.
- Sustainability from cultural viewpoint also considers a designing through which establishment of identity and sense of the location are thought, and skeletal territories which make the precincts of a work of architecture must be able to advent in the ground of human environment of the work.
- Technical index that has also a close kinship with environmental perspective, attracts our atten-

tion to ecology (natural & artificial) occurring in the ground of site and the issue that modern construction systems must have the least use of material and the most productivity, and modern perspective demands recycling.

Marginal Notes:

References

- 1-Bahreini, Seyyed Hassan & maknoun, Reza "Sustainable civic Development: since thought to action" Scientific Research quarterly of Ecology, University of Tehran Publications, No.
- 2-Christian Norberg Schulz,(1984), *Genius Loci: Towards a phenomenology of, Architecture*, Rizzoli
- 3-Christian Norberg Schulz,(2000), *Architecture: Presence, Language, Place*, Skira
- 4-Christopher , Alexander.(1979), *The Timeless Way of Building*, Oxford university press, New York
- 5-Dehkhoda, Aliakbar. *Dehkhoda Dictionary*, Volume 14, University of Tehran, Tehran, 1998, pages 84-211
- 6-Diba. Kamran & Javaherian, Faryar, "New City of Shoushtar" *Experiences of Creating New cities in Iran & the world*" 1st volume, Publishesh by New Cities Development Company, Tehran, 2006, pages 97-109
- 7-Edwards, Brian (1999) *Sustainable Architecture*, 2nd edition, Architectural Press, Britain.
- 8-Golkar, Kourosh, "Designing a Sustainable City in the border cities of Salt Desert", *Fine Arts Scientific- research publication*, Tehran university, No. 8, 2000, pages, 43-52.
- 9-Haeri, Sanaz, "New shoushtar since past to Now" *2-month architect*, No, 44, 2007, pages 26-28
- 10-Haghighat Naeini, Gholamreza & Ashrafi, Mahnaz, "The Study of Concepts & Values of Architecture & Urbanization in Old Context of Naein" *Congress of history of architecture and urbanization in Iran*, 4th volume, State Cultural Heritage Organization Publications (research in-

stitute), Tehran, 1996, pages 297-313

11-Hale, Jonathan A. (2000), "Building Ideas: An Introduction To Architectural Theory", John Wiley & Sons, Chichester, England, pp48-51.

12-Hosseinmardi, Hamid, "Great Architects and Sustainable Designing" Abadi Quarterly, No. 42, 2004, pages 110-113

13-Lawrence J, Roderick (2006), Learning From The Vernacular: Basic Principles for Sustaining human habitats, Oxford press, pp110-117.

14-Owens, S. (1991) Energy Conscious Planning, London: CPRE.

15-Qaffari, Ali, "Ecology in Ancient Central Cities of Iran", Congress of history of architecture and urbanization in Iran, 4th volume, State Cultural Heritage Organization Publications (research institute), Tehran, 1996, pages 169-191

16-Sajadi, S.J, "Islamic Knowledge Dictionary" 4th volume, Iran Authors & translators Company, Tehran, 1984, page 131.

17-Shamai, Samuel (1991), "Sense of place: An empirical measurement", geoforum volume 22, pp.347-358.

18-Soflaee, Farzaneh, "A research About Concepts and Experiences of Sustainable Architecture" Abadi Quarterly, No. 42, 2004, page 62.

19-Talaei, Esmail, " Effect of Architectural-Historical Identities and Values on Contemporary Architecture and Urbanization of Iran", Congress of history of architecture and urbanization in Iran, 5th volume, State Cultural Heritage Organization Publications (research institute), Tehran, 1997, pages 413-417

20-Williamson, Terry & Radford, Antony & Bennetts, Helen (2003) Understanding Sustainable Architecture, Spon Press, London, pp 13-27.