Cumhuriyet Üniversitesi Fen Fakültesi
Fen Bilimleri Dergisi (CFD), Cilt:36, No: 3 Ozel Sayı (2015)
ISSN: 1300-1949

Cumhuriyet University Faculty of Science
Science Journal (CSJ), Vol. 36, No: 3 Special Issue (2015)
ISSN: 1300-1949

Perspectives on Political Economy and Architecture (Necessity of Sustainability of Approaches in Architectural Design in Higher Education Institutions of Mazandaran Province)

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Received: 01.02.2015; Accepted: 05.05.2015

Abstract. The perspective about finishing the world's reserves of fossil fuel in the next few decades and globalization, followed by increased competition between countries has led to energy optimization that is introduced as a strategic policy by economists and statesmen of countries. The funds are spent on studies and research in the field of new energies to replace fossil fuels, in each year new ways to optimize the energy in the world are introduced. There are millions of students and training personnel in the country who spend every day in buildings that none of them apply any effort to have their energy consumption efficient. The design of these buildings is thinkable. Creating new spaces in university buildings by applying sustainable architecture approaches to add energy saving features is the main objective of this study. This study is descriptive – analytical and its objective is to investigate Necessity of Sustainability of Approaches in Architectural Design in Higher Education Institutions of Mazandaran Province. The target population of this research is the students of Higher Education Institutions of Mazandaran Province among them 384 samples are selected through simple random method. They are directly questioned. After field data collection through questionnaires relationships between variables of research has been tested using SPSS software. The results of one sample t-test indicated that from point of view of the population Necessity of Sustainability of Approaches in Architectural Design in Higher Education Institutions of Mazandaran Province the calculated mean 4.93 was significantly more than the expected item 3.5 and some factors such as (lack of new technologies, using inappropriate materials, unsuitable placement of the building, inefficient management of energy, poor quality of mechanical and electrical facilities, improper layout of the openings in the space, including the inappropriate size of the openings)have a key role as change needs in the design approach of higher education institutions.

Keywords: Higher education - Political economy – Energy- Stability - Higher Education Institutions - Architectural Design

1. INTRODUCTION

In the recent years, due to the complexity and rapid changes in the global society, energy factor plays an important role in the economy and politics of world, and close follow-up of energy status and making a proper solution are as of the main elements of any government to maintain the stability of political power. In addition, the problem of limited energy resources on the one hand and tremendous growth of energy consumption on the other hand, in addition to the dangers of rapid finishing of fossil fuels, is threatening the earth with irreversible ecological changes. Discussion of resource constraints, gripped all industrialized, developed and developing countries. Therefore in line with international policy in the context of sustainable development, energy efficiency has become one of the basic requirements of governments and communities.

Although Iran is rich in energy resources and it is one of the richest countries in the world in this regard, indiscriminate use of energy in different sectors, particularly during the past two

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Special Issue: The Second National Conference on Applied Research in Science and Technology

decades, as well as the removal of subsidies and the rising cost of energy carriers in the country enhanced the importance of providing sustainable design principles in order to save energy in buildings.

In this regard, the Ministry of Education has a major role in sustainable development in its entire departments. The main objective of this ministry is to educate wiser, more aware, with a more conscious, moral and responsible approach toward their community. The role of universities in order to achieve sustainable development objectives is more important and highlighted.

In today's universities the main objective is to educate students and prepare them for an active life and accepting social responsibility. The purpose of the University is not only acquiring knowledge but also using the knowledge to solve complex problems. This is where the role of universities in achieving sustainable development as the biggest problem and challenge of the 21st century, will be obvious. Relying on the principle of sustainable university requires the implementation of continuous improvement of environmental, social and economic performance of institutions of higher education in the country. It seems that in order to travel this long and critical way we need to avoid taking great steps and instead use short steps in this regard. Maybe one of the first and most essential steps is to create awareness and the correct attitude toward the concept of sustainability and its principles among academics, such as directors, faculty members, staff and students that will be achieved through being exposed to it in a sustainable university environment. Ultimately it creates more commitment in the academic community to reduce unsustainable practices. It must be acknowledged that sustainable development is still an innovation for the universities.

The emergence of political economy in the eighteenth century helped the people to understand the dramatic changes in the needs supply system - the changes in nature of needs and in the production method of goods to meet the needs and requirements – and to challenge them. The word economy is originated from a Greek word, meaning the family economy. The term is form a society that needs was come off considerably and it needed goods are provided inside the family. Political economy is the economic affairs of the state. The term "political" describes 2 features of the integrated security system needs. First, in this system the stranger individuals, not the relatives, are connected. So in this case we are to meet the needs through some people and not to rely on relatives, but to people who we may not even know them. The second is that in this situation the area of providing needs is political needs. In this case, a government official is in charge of their needs rather than the head of the family, namely the head of state. Political economy, in its earliest days, tried to guide the government officials on how to better manage economic affairs to provide the needs of citizens. The emergence of political economy debate about the responsibilities of the state (or government) created about the economy. The debate continues [*Kaporaso, J., Levin, D. P., 2008*] and during the recent years the term "political economy" as a concept rediscovered, has a special place in the expert analysis and discussion, it is extremely important to emphasize that “economy is inevitably political”. Iranian authorities in the hope that they can see the facts as they think "mainstream economics" is incapable of seeing them again started to use the term "political economy" and the relevant literature. Inalienable intersection of political and economic decisions in today's Iran is a powerful incentive has created to achieve a comprehensive theoretical framework of these two aspects of social life in Iran. And the motives led to renewed interest in the concept of "political economy". [*Alavitabar, A., 2009*] Different approaches to political economy uses the economy and policy terms in different methods. The most important thing in political economy is that determine the central concept and for example decide that is it politics or government? Different concepts of economics and politics are leading to different political economies. In this regard, three different definitions of politics, i.e. politics as government, politics as public service and politics as imperative distribution of values; and also 3 concepts for economy including economic calculation, providing material needs, and the economy as from of the political and social

approach are offered. [*Kaporaso, J., Levin, D. P., 2008*] Nowadays, society is faced with four basic needs that are related to each other in a complex manner. These needs include food, water, energy and the environment. [*Mohammadzade Novin, A*, *2003*] But if we remove the energy of human life, we will deal with being unable to continue to survive as being at the first in the planet. [*Kardil,A, 2006*] During ancient ages human was familiar with energies such as biomass, geothermal and so on and they had been used as a heat source for shelter. [*Hadafi, F, 2006*] But after the industrial revolution and the development of human technological capabilities and achievement of fossil fuel [*Espenani, A*, *2004*] with oil and coal excavation and unlimited access to petroleum products, gradually the use of fossil fuels replaced any other fuel. [*Hadafi, F, 2006*] Fuel energy that supplies more than eighty percent of the world's fossil over the last three years has been increasingly exploited. [*Williams, R.J, 1974*] But after the first oil crisis in 1973 due to the decrease of fossil fuels and its fast running out in the near future, humans consider alternative methods for energy production. [*Mostofi, M, 2006*] In addition, the increasing use of limited fossil fuels and nonrenewable energy sources will cause emissions of greenhouse gases, especially atmospheric concentration of carbon dioxide increased by 30% [*Toulouiean, E, 2006*]. It cause harm to ecological systems and made fundamental problems such as global warming, air and water pollution [*Ghaffari, F, 2010*]. Because the greenhouse gas emissions is directly associated with the consumption of fossil fuels. [*Farshchi, R, 2009*] Based on the results, one percent of increase in the intensity of energy use increases 92% of per capita emissions of carbon dioxide gas and environmental pollution. [*Behboudi, D.& Golazani, A, 2008*] Thus, the environmental changes that have been affected by human activities are not less important [*Smith, P.F, 2005*] and using the wrong patterns of behavior, they will destroy the environment for long periods, while the survival of future generations depends on it [*Seddigh Ziabari,S.H, 2010*]. Therefore, the perspective of running out the reserves of fossil flues in the next few decades and globalization, followed by increased competition between countries has lead to view the energy optimization as a strategic policy by economists and statesmen of countries. Therefore the funds are spent on studies and research in the field of new energies to replace fossil fuels and, each year new ways to optimize the energy and sustainable development are offered in the world. [*Hashemi,S.M,& Zare Darre, M.R 2012*] In Iran, the low energy prices in the past decade and the lack of educational tools, information and cultural changes lead to decrease of energy efficiency and reduce energy intensity index in the country. Therefore the state intervened and provided abilities for development of efficiency of energy as one of political goals in recent decades. [*MOhajeri,P, 2012*] As the Twenty-Year Outlook on the Country where it aims to turn Iran to a developed country and the first ranked country in the economy of Middle East in 2025, the Economic Development Plan is provided in 7 main areas and adjusting subsidies is one of the most important aspects of this plan. It is related to the entire population of Iran. The Adjusting Subsidies Act's bill was provided by the 9th president in winter 2009 and after a lot of challenges and modifications it was enacted in the public session of Parliament on January 5, 2010 and on January 13, 2010 it was approved by Guardian Council in 16 Articles and 16 Notes [*The Adjusted Subsidies Act*, *2010*]. On December 18, 2010 the president of Iran appeared in National TV and officially declared the starting of enforcement of mentioned Act. Based on this act 16 items of goods and services were removed from receiving subsides and the prices were released based on international rates. Through 5 years, the subsides of some commodities such as gasoline, diesel fuel, gas, oil, electricity, and water is removed and they are supplied with prices in the Persian Gulf region. Next, the Parliament enacted Law No. 12153 entitled Consumption Patterns Reform Act on February 23, 2011 including 12 chapters, 75 Articles and 20 Notes and on March 2, 2011 this Law was confirmed by Guardian Council. The regulation of Article (20) of the Act refers to the fact that all of the state and public institutes are obliged to comply with the regulations of Article (18) in the direction toward saving energy in buildings with refer to green building and sustainable development, with embedding the control systems for energy consumption in office buildings within 5 years after enacting the law. [*Amendment of Consumption Patterns Act*, *2011*] The term sustainable development first was used in 1968 by Brant Land in the environment literature [*Maknoun, R, 1996*] entitled "Our Common Future" that was the fundament of Earth Conference 1992 in Rio

de Janeiro [*Goncz, E & et al*, *2006*]. In the mentioned conference 3 major texts were approved: 1) Agenda 21, 2) the Rio Declaration on Environment and Development, 3) the principles of sustainable management of the forests of the planet [*Leghaie, H.,& Mohammadzade Titkanlou, H, 2009*]. The main definition of this report is as follows: Sustainable development is a type of development that meets the needs of current generations without threatening the ability to meet the needs of future generations. [*World Commission on Environment and Development (WCED, Our common future*, *1987*] One of the points is to preserve resources for future generations and the other one is to meet the basic needs of the world's poor population; on the other word, in this definition not only intergenerational justice but also the equity within a generation is concerned. [*Steiner, G., Posch, A*, *2006*] Therefore three dimensions of sustainable development with profound themes were as follows: 1) Environmental sustainability 2) economic sustainability 3) social sustainability (human) [*Golrizan, F.&, Jabbari, M, 2006*] are some of the ways that lead to sustainable development, including the use of renewable energy such as solar, geothermal, wind and so on [*Gandomkar, A, 2009*]. In this line one of the purposes of the Energy Conservation Organization is to make the culture for building construction based on the climate [*Saberi,A & et al*, *2006*] because buildings are considered as the most enduring and most abundant products of any society that significantly affect global resources and their increasing and continuous impacts will affect sustainable future. [*PourNaseri, SH.&, Mofidi Shemirani, M, 2006*] so that between 30 to 35 percent of the total energy is used in connection with the building. [*Fadaie Qotbi, M, 2003*] Therefore rational use of natural resources and proper management of the building helps to preserve natural resources and reduce energy consumption (energy conservation) and improves the quality based on the [*Baheri, N.&, Dehghani, M, 2010*] 3 principles of sustainable design, including saving resources, normal cycles of life and humanistic design [*Azemati, H.&, Bagheri, M, 2008*]. In other words sustainable architecture is one of the design methods to reduce consumption of non-renewable resources and renewable saving and argues that what we need to survive, we can get from the environment. The use of resources in an intelligent and compassionate manner with regard to the quality of life of future generations defines the world in this way [*Azarbayejani, M.&, Mofidi Shemirani, M, 2004*]. Therefore promoting a correct way in order to prevent environmental pollution and energy waste is a public duty and responsibility. [*Mohammadi MOghaddam, M, 2006*] Since the share of energy consumption in the building sector is one-third of the total energy consumption [*Raygan, R.&, Ziari, A, 2006*] and considering the high energy consumption in public buildings, especially due to the high consumption of energy in educational buildings [*Nouri, J., Partners, 2006*] and due to the educational nature of these spaces, they are a suitable subject for compatible design with the climate. [*NOuri, M.&, Ghasemzadeh, M, 2006*] Because the prospects of stability are the most important capital of country and human capital; Therefore, educating and accordingly, enabling people are the most important responsibilities. The mission of higher education in this respect is to extend the knowledge production, knowledge dissemination and education of human resources for various sections of society, and it has a special place in achieving sustainable development. [*Ali Beigi, A.H.&, Rezvan, Q.A*, *2010*] The original goals of higher education institutions and universities is to serve society by linking ideas and using it in societies [*Wright,T.S.A, 2003*] In today's universities the main objective is to educate students and prepare them for an active life and accepting social responsibility. The purpose of the University is not only acquiring knowledge but also using the knowledge to solve complex problems. [*Brubacher, J.,1982*] This is where the role of universities in achieving sustainable development as the biggest problem and challenge of the 21st century, will be obvious. [*Martin,J.L,Gerriteenb,P.&, Cuevas, R*, *2006*]. Despite numerous conferences and congresses in the 1980s and 1990s that was held on universities about sustainable development, but until 1990, the term did not have the scientific strength. Conference on Environmental Management at Lund University in Sweden was held in this year and it was the first event that paid attention to the issue of sustainability. [*Eduardo,L,2002*] Generally, the first important step to define the integration of sustainability in universities in 1990 was done with the signing of the Declaration of Talvirez. Twenty-two university chancellors gathered in France Talvirez and

determined the necessary activities that should be done to create a sustainable future. [*Clugston, R,1999*] Perhaps the best definition of sustainable university is provided in the report of sustainability indicators of Pennsylvania State University of America. Based the report, the Sustainable University is: the university that has a favorable long-term prospect for its life. Such university behaves in way that academic integrity and biodiversity of local and global ecosystems is dependent to them to be sustained. In this university the core values are respect for the natural and biological processes of life based on the restrictions in the Earth and civil liability. [*Shriberg, M,2002*] Eduardo has defined sustainable university as follows: a higher education institute that is active in local or international level as a whole or a part of whole, and its main policy is to use resources for performing its main objectives including education, research, academic services to society and its daily operations in such a manner that minimize the negative effects on environment, economics, society, and health [*Eduardo,L,2002*]. According to Sheiburg, sustainable universities are trying to integrate sustainability in its main functions include: education, research, service and operations [*Shriberg,M,2002*]. In the educational strategy two types of basic training are recognized including operational training and basic training. In the basic training the group will be introduced to promotion of the culture of savings and maintain common interests. In the other method members will be introduced to a set of trainings that includes the proper behaviors based on the architectural design of the building in time of operation of a sustainable building [*Daneshpour, S.A, 2009*]. But despite these definitions the courtyard condition of educational facilities in the world, especially in developing countries indicates the lack of attention to landscaping the areas and their role in promoting education and learning in students [*Stine, S,1997*]. Ford says in his book on the subject that: every day we send our children to school and university to learn, turn, and think to make effort in the future for their own and the society's success. But instead we send them into buildings that are more like prison than a place for training. Millions of students and teaching staff are in the country who spend every day in buildings that have poor ventilation, insufficient light and poor acoustics. Above all, none of these educational centers does effort to conserve their energy use and their design is not acceptable [*Ford, A*, *2002*]. So according to the fact that architecture and landscape can directly and indirectly gain the attention of students and direct it toward the environmental perception and behavior to understand the concepts of sustainability [*Azemati, H.&, Bagheri, M, 2008*], one of the strategies for the promotion of sustainable behavior that can be used in the process of architectural design is connecting the users to the natural environment through using natural light, vegetation and good vision and perspective [*Daneshpour, S.A,. Partners, 2009*]. But given the complexity and diversity of factors in architectural design the methods and approach of the designs shall vary based on the specifications of project. Activities of the project should be reviewed for all aspects including design and analysis of land and construction methods and the selection and use of appropriate building materials and construction technology. In this way the architecture objectives can be gained based on the subject of project [*Khatami, M.J., Fallah, M.H., 2008*].

2. MATERIALS AND METHODS

This article is taken from a study that was conducted during a university project and based on its nature, some objectives and subjects are predicted for it that makes the research a descriptive – analytical research from applied studies group.

Since in this research questionnaires and interviews were used to collect the data needed, it can be considered as a survey research.

The information required for this study is collected from both documents (library) and survey. The population of this study is all students who are studying at the University of Mazandaran. Using questionnaires and Cochran formula ($n = \frac{N t^2 S^2}{t^2 S^2 + N d^2}$) a number of 384 samples were randomly questioned in direct method. The variables of this study were including the inappropriate size of the openings, improper layout of the openings in the space, using

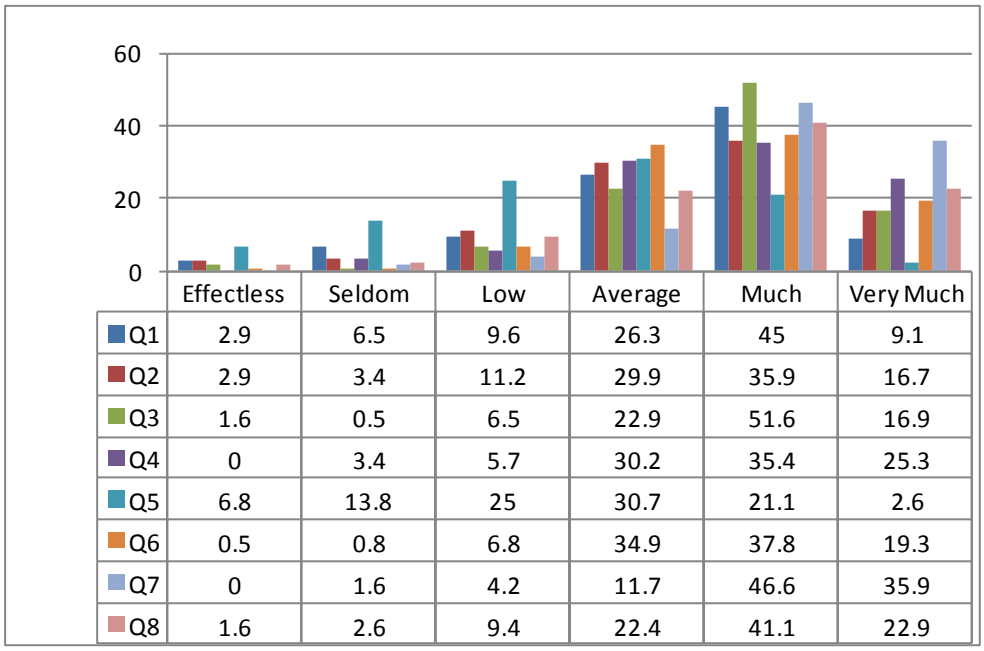
inappropriate materials, unsuitable placement of the building, the worn out building, poor quality of mechanical and electrical facilities, lack of new technologies, and inefficient management of energy together with personal characteristics including gender, level of education, age and field of study. In addition, the necessity of sustainable approaches based on the elimination of energy carriers in architectural design (plans, space, etc.) in the university was emphasized. And using SPSS software and one-sample T test these variables were tested.

3. ANALYSIS OF RESEARCH FINDINGS

The primary hypothesis of this study is the lack of appropriateness of the architectural design of higher education institutions in the Mazandaran Province based on elimination of energy carriers. To test this hypothesis, 8 questions about the assessment of the effectiveness of each of the following factors in the rise in energy consumption in the higher education institutions was performed.

1- including the inappropriate size of the openings.
2- improper layout of the openings in the space.
3- using inappropriate materials.
4- unsuitable placement of the building.
5- the worn out building.
6- poor quality of mechanical and electrical facilities.
7- lack of new technologies, 8- inefficient management of energy.

The collected data from 384 questionnaires that their data is shown in Figure 1, indicated that the greatest impact based on the idea of population (with 35.9 %) was related to their "assessment of the impact of non-use of innovative technologies" and the least impact is related to "Evaluation of age of buildings and worn out buildings" (with 6.8 %) frequency.



	Effectless	Seldom	Low	Average	Much	Very Much
Q1	2.9	6.5	9.6	26.3	45	9.1
Q2	2.9	3.4	11.2	29.9	35.9	16.7
Q3	1.6	0.5	6.5	22.9	51.6	16.9
Q4	0	3.4	5.7	30.2	35.4	25.3
Q5	6.8	13.8	25	30.7	21.1	2.6
Q6	0.5	0.8	6.8	34.9	37.8	19.3
Q7	0	1.6	4.2	11.7	46.6	35.9
Q8	1.6	2.6	9.4	22.4	41.1	22.9

Figure 1. The number and frequency of responses of population to variables of study.

The one sample T-test results showed that the observed mean in this study is 36.20 and it is more than the expected mean equal to 28. As a result, basic assumptions about the mismatch of architectural design of higher education institutions in the Mazandaran Province at one hundredth of error in H1 area are proved. This finding indicates that higher education institutions in the Mazandaran Province have the requirements for save energy consumption, but

what makes this institutes failed in this regard are following reasons: the lack of efficient management, the lack of modern technology and the non-observance of climatically rules and regulations.

Table 1&2. The one sample T-test.

	N	Mean	Std. Deviation	Std. Error Mean
Calculated mean of the hypothesis based on 8 questions	384	36.2057	5.52014	0.28170

	Test Value = 28					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Analysis of variance performed on 8 research questions	29.129	383	0.000	8.20573	7.6519	8.7596

Table 3. Analysis of each of the variables on respondents' views about the impact of rising energy consumption in the higher education institutes in Mazandaran Province.

The variables	Test Value	Mean	t	Significance Level
including the inappropriate size of the openings	3.5	4.33	14.014	0.000
improper layout of the openings in the space	3.5	4.43	15.622	0.000
using inappropriate materials	3.5	4.73	25.642	0.000
unsuitable placement of the building	3.5	4.73	23.943	0.000
the worn out building	3.5	3.53	0.539	
poor quality of mechanical and electrical facilities	3.5	4.66	24.662	0.000
lack of new technologies	3.5	5.11	35.921	0.000
inefficient management of energy	3.5	4.68	20.957	0.000

- However, the analysis of variance of figures in Table 1 shows the relative desirability of the current state of higher education institutions from the perspective of its students, but in order to have a closer analysis of the individual circumstances affecting the rate of increase in energy consumption, eight separate questions were asked from the population and they were analyzed. The results are indicated in Table 2. Analysis of variance was performed on respondents' assessment of the variables affecting the rate of increase in energy consumption in the Mazandaran Province's higher education institutes. It indicated that between the 8 current factors, 7 factors (lack of new technologies, using inappropriate materials, unsuitable placement of the building, inefficient management of energy, oor quality of mechanical and electrical facilities, improper layout of the openings in the space, including the inappropriate size of the openings) respectively with calculated mean of (5.11 - 4.73 - 4.73 - 4.68 - 4.66 - 4.43 - 4.33), that is significantly more than expected mean of 3.5 but the evaluation of respondents about (the worn out building) with calculated mean of (3.53) is almost equal to the expected amount 3.5, this means that the students of higher education institutes of Mazandaran Province believe that observing climate regulations and requirements, The use of new technologies and efficient management of energy is one of effective factors in reducing energy consumption.

4. DISCUSSION

The results of this study in on par with the results, Mr. Ford (2002), which argues Millions of students and teaching staff are in the country who spend every day in buildings that have poor ventilation, insufficient light and poor acoustics. Above all, none of these educational centers

does effort to conserve their energy use and their design is not acceptable. and Azam Salagi, Nabizade and Goodini (2009) that stated the green management in the universities for energy consumption is neglected up today and any effort for consumption efficiency and observing the patterns can be one step towards sustainable development, reduce energy consumption and materials to reduce emissions that are entered into the environment. Nouri & Ghasemzadeh (2006) in their study due to the educational nature of these spaces, they are a suitable subject for compatible design with the climate and investment for the construction of such buildings and Mofidi Shemirani (2006) believe that optimization and energy management in educational centers can be summarized in four main areas: effective investments in order to reduce consumption, raise awareness to the issue of energy, fuel and electricity consumption monitoring, optimization and management of welfare systems. He believes that conducting these methods will enable us to reduce energy consumption in the schools up to 15 to 25 percent and in the medium term, improving economic conditions coupled with stability in our environment can be resulted. These findings are match with our results in some areas. Therefore in line with making changes and modifying the current conditions about the design approaches of educational centers and based on the results of this study and the other studies mentioned above, as per the high potential of these buildings in reducing energy consumption and using modern energies, some recommendations are proposed hereby as follows:

- Plans designing with an emphasis on optimization
- The use of local and optimized materials
- Consistent and compatible with the climatic conditions of the region
- Natural ventilation to reduce and eliminate the cooling needs
- The use of new and renewable energies
- The use of new technologies

5. CONCLUSION

The bottom line is that sustainable architecture is a design to reduce consumption of non-renewable resources and optimize the use of renewable resources. It argues that what we need to survive can be taken from the environment. The use of resources in an intelligent and compassionate method with regard to the quality of life for future generations needs an increased training on sustainable architecture. There is hope that with using sustainable design for university spaces the dear students and professors pay more attention to the importance of energy and maintaining and saving it through using renewable energies and make more efforts to enable the future generation to use these divine gifts.

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