

## **Sustainability Issues Awareness: A Case Study in Dammam University**

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**Abstract.** The study was designed to gather basic information about sustainability awareness in the spatial domain of the College of Architecture & Planning, Dammam University. It is conducted, by the author, through a survey questionnaire to investigate the perception and application of sustainability principles and measures as an approach for achieving sustainability in the educational domain. It was a questionnaire for determining the limit of simple sustainability issues application in the scope of work of the institution of respondents and in their daily life. The questionnaire was sent by e-mails and the responses were collected through e-mails as well. The data provide an investigative look at the views of the respondents in respect to sustainability benefits and major environmental problems.

The results of the study show that the respondents have high standard of knowledge of sustainability, as 94% of the participants heard about it, and 74% try to spread the knowledge of sustainability by talking to family and friends. The respondents show good knowledge of environmental problems, as 79% recognize the threats of global warming, and 60% understand many parts of the Arab world are threatened by the rise of the sea water level. Furthermore, 64% of the respondents consider pollution the most serious problem, while 25% consider the scarcity of water is more serious.

The study gives a critical indication that the application of simple sustainability measures in the respondents' field of work has very limited importance.

The respondents show very good attention to recycling and good concern about water and energy savings. The figures reflect the fact that water is much more important to the participants. While electricity saving comes in the second place as the government gives incentives to the price of electricity and the oil used for energy production, therefore the respondents do not feel the problem of energy as serious as water scarcity problem.

### **Sustainable Development Definition**

The term *Sustainability* is abstract which means able to being maintained, its derivative, sustain means to keep in existence, to bear up against. It is often depicted by three overlapping circles representing the environmental, economic, and social dimensions [1]. Current and future generations satisfy their needs for survival and well-being depending to a large extent on the natural environment. Sustainability aims to build and keep the environmental, social and economic circumstances that let humans to be in productivity harmony with nature [2]. Sustainable development requires meeting and extending the basic needs and opportunity to satisfy the ambitions of the societies for a better life, by increasing productive potential and ensuring equity among the

people. It also promotes values that encourage consumption criterions within the limits of the ecological potential. Furthermore, sustainable development can be tracked when demographic developments are in accordance with the shifting productive possible of the ecosystem. It must not threaten the natural system that supports life such as water, soil, atmosphere, and living beings [3].

The Report of the Brundtland Commission, *Our Common Future*, was published by Oxford University Press in 1987. The Commission draws several universal concepts in its definition of sustainable development, which is the most often cited definition of the concept to date: "Sustainable development is development that meets the needs of the present without compromising the ability of future

generations to meet their own needs" [4]. It contains two key concepts: the concept of the essential needs of the poor nations, to which priority should be given; and the concept of restrictions imposed by the state of technology and social organization on the environment's capability to meet present and future needs.

Brundtland Report argues:

- The "environment" is the place where we live; and "development" is our action to improve our portion in that place. The two are intimate.

- The Brundtland Commission focuses on the environment being something beyond physicality, to include social and political atmospheres. It also insists that development is not just about how poor countries can upgrade their situation, but what the entire world can do to improve our common situation.

The central idea of the Brundtland definition of "sustainable development" is the intergenerational equity. The "needs" are basic can be fulfilled by economic growth, and citizen participation encourages equity. Therefore, Brundtland Commission integrates the element of humanity in development which distinguishes it from other definitions [5].

### **Sustainability Awareness**

Sustainability concept has been raised and advocated to alleviate the many and serious environmental problems related to human behaviors that threatened the globe which started to suffer from serious impacts such as resource depletion, greenhouse gases emissions, ozone depletion, desertification, sea water level rise, etc.

Narrating the word "sustainable" is not sufficient to solve the environmental problems of the globe. Legislation, regulations, and policies must drive towards sustainability and to achieve progress, changes at the community and individual behaviors should happen. The corner stone to achieve sustainability principles is to bring awareness to the people who can make the difference [6]. The interaction between local governments, planners and the citizenship participation in the planning and application stages is the critical element in the sustainability program. There is a necessity to discover how the citizens view sustainability and how they are willing to participate in the application [7].

Individuals have an influence over the reliability of the ecological systems. Interdisciplinary scientific information required to encourage

sustainable lifestyles will aid the public only when the knowledge are correlated to legislators and stakeholders at all levels [6]. The process of information distribution from scientist to citizen and vice versa needs to be developed. Kinzig et al. 2000 [8], argues that five research topics are in need of increased attention: development and flexibility of coupled social and ecological systems, ecosystem services, managing uncertainty; complexity; and change, environmental dimensions of human welfare; health; and security, and communicating scientific information.

There is a crucial need for new professionals capable of inspiring energetic study and driving the community to be aware of sustainability potential. Educational establishments should encourage educational methods to the practice of sustainable development. It is vital that education focus upon encouraging learners to "think outside the traditional box". A new model needs to highlight a Sustainability-Oriented Education, to develop the skill of people to think across disciplines and boundaries. Five E's Unlimited has established important skill in designing and applying different modules related to environmental and sustainability education programs. These modules include [6]:

- Include environmental and sustainability subject matter into education programs.

- Extent across institutional borders and adapting environmental education and communication approaches to the group's self-defined goals, or the circumstances of an environmental issue.

- Develop new programs to integrate the economic, ecologic, and social well-being issues of sustainability at the high school or university level.

- Conduct faculty development programs in environmental and sustainability literacy education.

- Design life-long learning public awareness programs to help people to obtain a better understanding of sustainable lifestyles.

- Support the use of environmental education and communication tools to strengthen community efforts at reaching their environmental objectives.

- Increase the validity of environmental policies and programs.

All instructors are responsible of direct students to be aware environmental citizens.

The base of the environmental education was first set in the 1970s, when goals were set in Tbilisi Conference to provide chances for students to adapt behavior of sustainable living [1]. And after the Stockholm Conference, which was held in 1972, the concept of sustainable development came to attention

with the publication of the report of the Brundtland 1987 [9]. Then, the Talloires Declaration (1990) and the Halifax Declaration were spread by academic communities to address the need for environmentally literate and responsible university graduates but the outcomes were disappointing that the Swansea Declaration pleaded universities to adopt major attitudinal and policy changes for sustainable future, then the Education for Sustainability was suggested in 1997 by Thessaloniki Declaration. Thessaloniki message was that education must be at the core of the plans of international, regional and national levels and is the foundation for all other pillars of sustainability, the organization, innovation, and the economy. These declarations and the Tbilisi Conference goals urged the academic institutions to take actions, but there were very few universities in North America that were aware of these declarations till 1999. To educate students taking decisions reflecting understanding of sustainability, teaching process must bridge the gap between the real world and the class rooms [1]. In this regard, The University of British Columbia's campus sustainability office, through the "Social, ecological, and economic development studies" (SEEDS) program, tried to apply this teaching process by giving a team of students in a bio-environmental engineering design course an environmental problem to solve. The project was effective in teaching the students about social, economic and environmental sustainability issues. The instructors changed their teaching approaches and subject matter based on the requirements of the teaching process and corrective actions were undertaken to address team project-based assessment in the future. The teaching approach can be modified to other educational settings [10].

In recent years, UNESCO declared the Decade of Education for Sustainable Development in the period from 2005-2014, which stresses the importance of education in order to achieve sustainable development and the integration of sustainable development in the education system at all levels. Nowadays, educators face responsibility to serve the community through the promotion of transformation necessary to put us on the path of sustainable development. The time has come to make sure that the concepts of Education for Sustainability is introduced into the framework of current and future educational policies. Moreover, achieving a sustainable future will only happen if we provide an educational system that transmits citizens and professionals who understand the interrelationship between environmental and economic systems, and

social development. Higher education plays a profound role in making this vision for the future sustainability real. It prepares professionals who develop, lead and manage education and are able to influence the institutions of society in addition to train future teachers. Higher education plays a crucial role in the dissemination of knowledge, skills and values of the society. Agenda 21, a document issued by the United Nations in 1992 Conference on Environment and Development, states that education is critical for promoting sustainable development. Understanding the principle of sustainability and interdependence between the environment, economy, and social systems can help us to learn to make the necessary changes to create an effective management of natural environment [9].

Saudi Arabia stands at the cross-roads. Since 2005, the country has launched a motivated policy to vary the economy, commenced political reforms, and achieved stability in the economy and human development trends through conservative use of increasing revenues from oil exports. However, there are challenges to build on these successes and confirm sustainability of development in the long term to achieve diversified sustainable economy, which depends less on oil exports and involves the issues of global climate change and environmental awareness [11].

With the large estimated population in Saudi Arabia (29.195,895 million in 2012 and are expected to reach 37.610,985 million in 2025) [12], it may not be easy to apply a new concept to a country that has developed from living in tents in the 1930's to having sustainable schemes and policies. In developing countries, like Saudi Arabia, which have been experiencing a rapid growth of urbanism, sustainable concept is vital due to the absence of resources. A recent paper reports on an investigative survey on understanding the possibility of the implementation of sustainable housing in Saudi Arabia. The author finds that more than half of respondents were not aware of sustainable housing, and recommended to educate the public by using local media to inform people of the benefits of sustainable implementation to both new and existing housing stock. Public perception of sustainability in Saudi Arabia considers it more costly than traditional practice. Some are still not aware of it. Although concerns are expressed about the initial cost of green projects, the financial benefits are so outstanding that they make it cheaper (regarding much energy and money savings) in the long run. Saudi Arabia faces many environmental challenges. The climate is harsh and dry extreme desert conditions. Scarcity of water is another

challenge. Due to the increasing demand for water, and the very limited water resources, fresh surface water and groundwater, alternative sources such as wastewater recycling and desalination have been adopted since the 1960's. Saudi Arabia accounts for 4.5 hectares of ecological footprint per person, it is almost twice the world average, and is ranked in the Top 20 most environmentally challenged countries in the world [7].

Alhefnawy and Shaawat carried out a public awareness survey on the environmental threat and responsive policies in the Arab world. The targets of the survey were professionals in the building and construction industries. Results of the study reflect the reality of the process of building and construction in the Arab countries in general, and especially Egypt and Saudi Arabia. Where there are professions and skills that can apply and adopt elements of the principles of sustainability. Despite this, the practical reality is still far from adopting these elements in the field of building and construction. Moreover, the study showed that the most important obstacles that prevent achievement of the elements of sustainability in construction are lack of training and education; the clients have lack in those elements, lack of professional contractors, lack of laws that govern and guide sustainable buildings, and lack of professional design teams. Education programs in the Arab countries are still far from establishing the bases of community sustainability, and what confirms that the main source of information of sustainability for the respondents was through their personal research. The respondents' recommendations to guide the profession of building and construction to the bases of sustainability included care for the development and education programs, provide economic incentives to those who embrace the implementation of those bases, and provide reference guide and strict laws governing building practice, with the adoption of an international environmental assessment system developed to fit with local realities of the Arab countries [13].

### Method

The questionnaire forms were distributed in December 2011 among a number of 4<sup>th</sup> and 5<sup>th</sup> year students, alumni, professors, and engineers working in or interacting with the College of Architecture & Planning, Dammam University, KSA. A mass e-mail request for questionnaire responses was sent with a website link and an e-mail version of the questionnaire to one hundred eight e-mail addresses. The e-mail was the data collection method in the study as well. Responses were collected over the

course of two-month period. Some of the received responses have few skipped questions.

This section presents the results of a field study conducted, by the author, through a survey questionnaire to investigate the perception and application of sustainability principles and measures as an approach for achieving sustainability in the educational domain. The questionnaire sample was selected from the list of more than 150 email addresses. The sample calculator [14] was used to establish a representative sample size to be used to obtain validated conclusion. A confidence level of 95%, when combined with a population of 150 emails yielded a suitable sample size of 108 participants with a confidence interval of 4.59 and percentage of 30%. The questionnaire was sent to the sample emails. Out of 108 questionnaires were sent, only 35 were completed and returned, providing a response rate of 32%. Babbie 1992 [15] indicates that a percentage of 50% is enough to scan the responses. On the other hand, some other authors such as Mcneil and Chapman 2005 [16]; Fellows and Liu 1997 [17]; Gillham 2000 [18]; Saunders et al., 2003 [19]; and Tashakkori and Teddlie 1998 [20] consider that a percentage between 30 and 40 is satisfactory as only few people normally respond to questionnaires.

### Purpose of the study

The questionnaire was designed to gather basic information about sustainability awareness in the spatial domain of the College of Architecture & Planning, Dammam University. It was also a question for determining the limit of simple sustainability issues application in the scope of work of the institutions of the respondents and in their daily life as well. The data provide an investigative look at the views of the respondents in respect to sustainability benefits and major environmental problems.

### Results and discussion

Although respondents are mainly from Saudi Arabia (62%), some other nationalities responded such as Egyptians (20%), Cameroonians and Palestinians (6% each), Yemenis; and Jordanians (3% each). Making up 40% of the respondents, students and engineers/alumni are the most represented groups as both achieved the same percentage. Professors represent (17%), and technicians represent only (3%).

Regarding sustainable development awareness among the participants, the respondents show very high standard of knowledge of sustainability definition, as 94% of the participants heard about it.

80% of the respondents know what sustainability means in their field of work, while 6% do not know and 14% are not sure, Figure 1. 74% of the respondents know the basic principles of sustainability (environment, economy, and society). The perception of the concept of sustainability varies among the different professions responded. The professors achieve 100% (7 out of 7). While its ratio among students is 64% (7 out of 11) the ratio raises up between engineers to 77% (13 out of 17) Figure 2. Furthermore, 89% of the respondents appreciate the environmental benefits of applying sustainability

measures. Professors record 100%, while students and engineers record 91% and 88% respectively, Figure 3. The respondents have the willingness to raise the awareness of sustainability in their community. 74% of them take the action and try to spread this knowledge in their families and social gathering events. The previous figures between professors and students are expected as many courses are offered in the College of Architecture and Planning on sustainable development in different disciplines.



Figure 1. Sustainability awareness in the field of work of the respondents

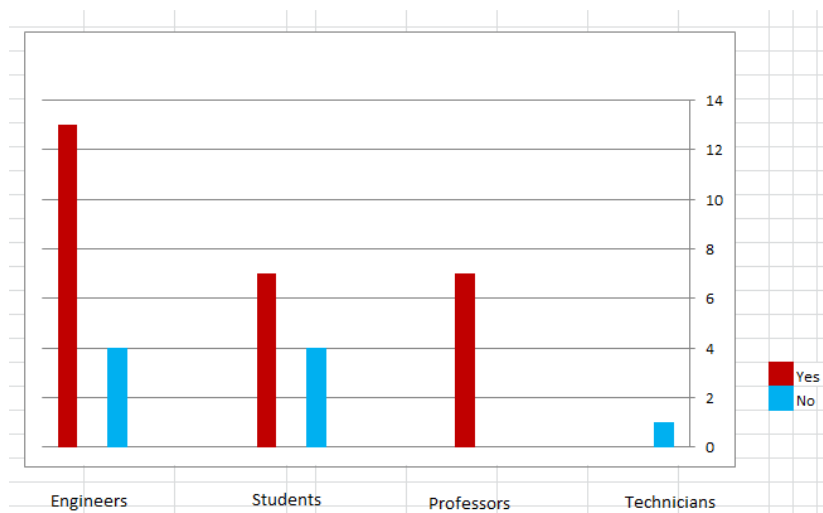


Figure 2. Awareness of sustainability principles versus professions

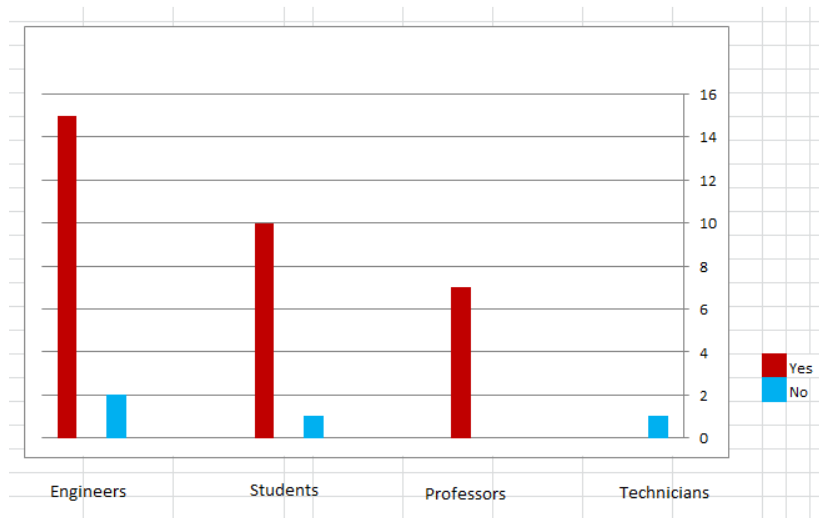


Figure 3. Awareness of the benefits of applying sustainability principles versus professions

In respect to awareness of environmental problems caused by unsustainable behavior, the respondents show very good knowledge, as 79% recognize the threats of global warming, and 60% understand that many parts of the Arab world are threatened by the rise of the sea water level in the future. The professors are much more aware of the sea water rise problem and they record 86%. The perception of engineers and students of this problem is very weak as 53% of the engineers and only 45% of the students are aware of the problem, Figure 4. The respondents ranked the major environmental problems in their opinions and 64% consider pollution is the most serious problem, while 25% consider scarcity of water is more serious and only 11% consider energy need as the most forthcoming environmental problem, Figure 5. Ranking the type of environmental problem varies within the different nationalities of the respondents. Saudi, Yemeni, and Cameroonian respondents consider pollution as the top environmental problem while Egyptian and Jordanian respondents give more attention to water need and scarcity. Energy need comes in the second concern of Saudis which can be easily understood due to the huge reserve and the extremely low price of oil in the Kingdom. Water need comes in the third concern of Saudi respondents, which raises a question mark, knowing the problem of water scarcity in Saudi Arabia, Figure 6.

About application of simple sustainability measures in the respondents' field of work, the answers express very limited importance of these measures. 53% answer that sustainability is not in the scope of work of their association. 26% confirm that

their work pays attention to sustainability measures, while 21% are not sure, Figure 7. The answers slightly vary among different professions, 29% of the professors think that their institution applies simple sustainability measures. The ratio decreases in the cases of students and engineers to 27% and 25% respectively. These poor figures give us a serious indication that there is still a huge gap between theory and practice of sustainability principles in our educational community which needs deep and strong shift in our policies and applications, Figure 8.

Sustainability in the daily life of the respondents is expressed by the application of the participants of simple measures. The respondents show great importance to recycling issues as 79% use recycling stations in their neighborhood or at work, 68% use water saving fixtures at home and this is encouraged by the ministry of water that provides free water saving fixtures to all residents, while 61% use energy saving applications. These two previous figures indicate that water is much more important to the participants and this comes from the culture of desert life. In Figures 9 and 10, the Saudi respondents who take actions to reduce both of water and energy use equal and represent only 53% of total Saudi participants. The figures also point out that application of sustainability measures in the daily life is very weak in the community. Other nationalities achieve higher rates of concerns regarding energy and water savings. Egyptians and Cameroonians achieve 88% and 100% respectively for both water and energy reduction measures taken which pushes the overall average of the all respondents up to 68% and 61% respectively.

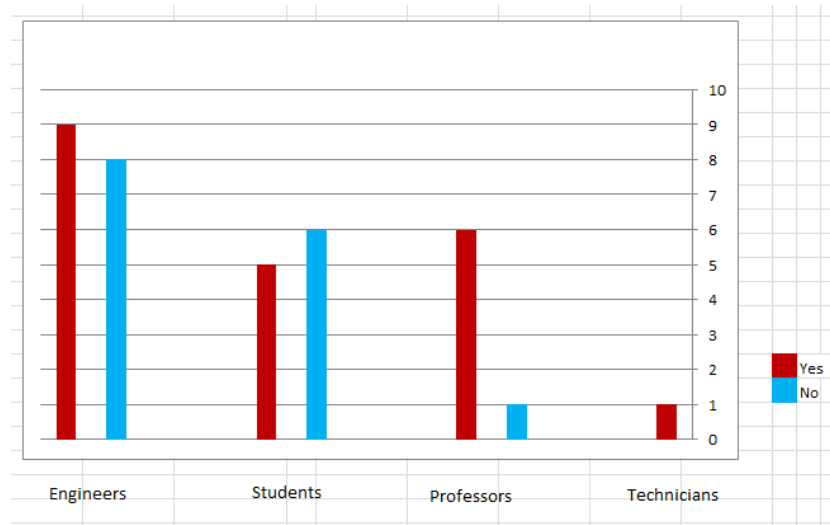


Figure 4. Awareness of the environmental problem of seawater rise in the Arab world versus professions

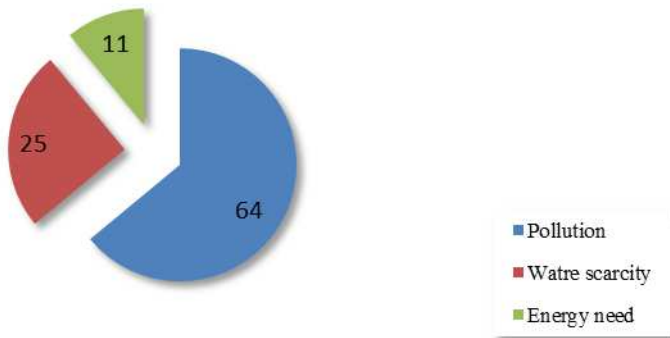


Figure 5. Major environmental problems ranked by the respondents

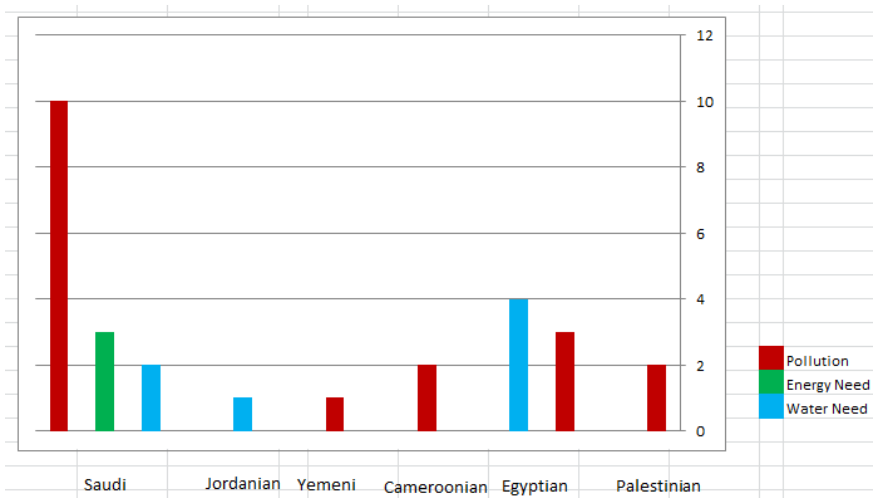


Figure 6. Awareness of the major environmental problems versus nationalities

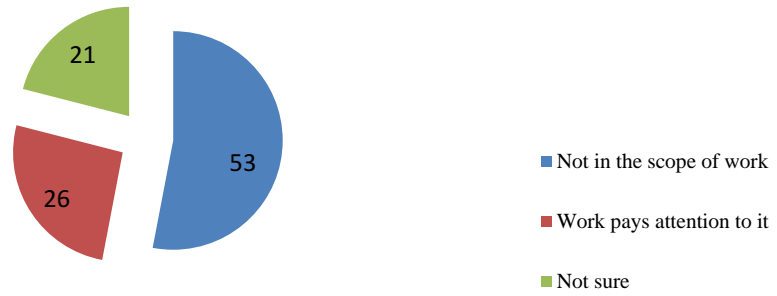


Figure 7. Application of sustainability in the field of work of the respondents

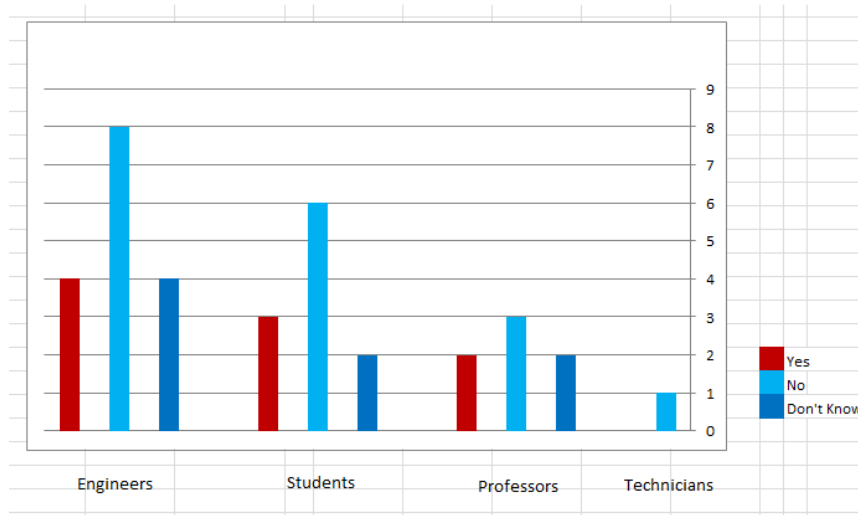


Figure 8. Application of sustainability in the field of work of respondents versus professions

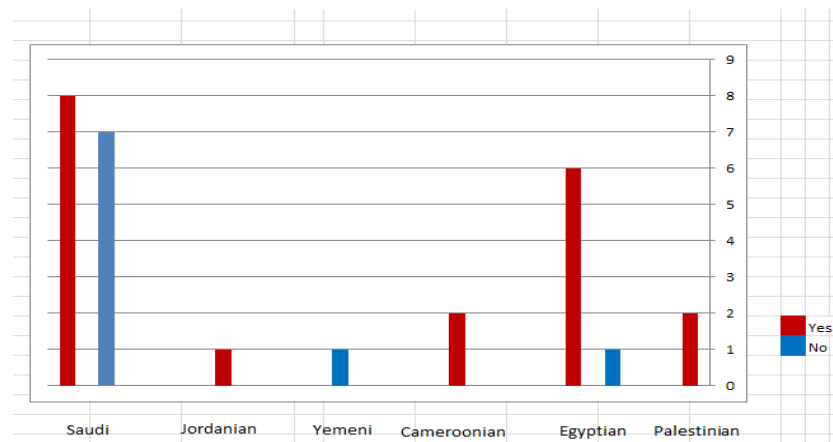


Figure 9. Respondents taking actions to reduce water use versus nationalities



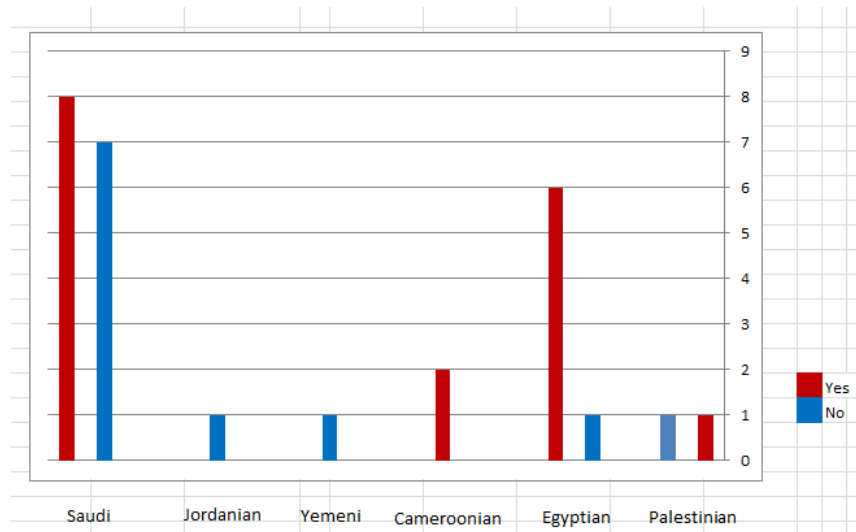


Figure 10. Respondents taking actions to reduce energy use versus nationalities

While the importance of electricity saving comes in the second place as the government gives incentives to the price of electricity and the oil used for energy production, therefore the residents do not feel the problem of energy as serious as water scarcity problem. Finally many of the participants (71%) pay attention to energy saving when buying electrical appliances; this could be because of the large amount of yearly paid electricity bills which reached 15000 SR in some respondents' answers.

#### Final comment

Sustainability awareness in the spatial domain of Dammam University is well recognized as 74% of the sample knows its basic principles. On the other hand, application of sustainability measures is very limited. 53% of the sample confirms that it is not in the scope of work of their institutions, and only 26% confirms that their institutions pay attention to it. Education and development programs should be strictly directed towards strengthening the understanding and implementation of sustainability principles in all sectors.

#### Conclusions

Sustainability awareness in Dammam University is well recognized amongst students, engineers/alumni, and professors. The basic principles are known and the participants appreciate the benefits of sustainability measures and try to spread them through their family and friends. The awareness of professors and engineers of the sustainability principles is much better than that of

the students, and that effectively pushes up the overall figure. The respondents have very good awareness regarding environmental problems related to unsustainable behaviors. They recognize the threats of global warming and flooding by sea water level rise. They are concerned about pollution, water need and energy need in the future. The type of environmental problems varies within the different nationalities of the respondents. Saudi, Yemeni, and Cameroonian respondents consider pollution as the top environmental problem, while Egyptian and Jordanian respondents give more attention to water scarcity.

Furthermore, the respondents show great attention to recycling issues at home/work, water-saving and energy-saving applications. Concerns on reduce of the amount of water and energy use are limited within Saudis, but the overall concern of the respondents is much better due to the high concern rate in some other nationalities such as Egyptians, Cameroonians and Palestinians.

Despite that attention, there are no tangible policies that direct individuals to pay attention to the application of sustainability issues. Application of simple sustainability measures in the respondents' firms/institution is very limited. The answers slightly vary among different professions and give us a serious indication of the huge gap between theory and practice of sustainability principles in our educational community which needs deep and strong shift in our thinking, policies making and application. Results of the study reflect the reality of the

unsustainable behavior of firms/institutions in the Arab countries in general.

While there are professions and skills that can apply the principles of sustainability, the practical reality is still far from adopting these elements in the scope of work of the institution. Educational programs in the Arab countries need more focusing on the application programs to establish the bases of community sustainability in practice. Human daily life and needs should be connected to a guide of sustainable life illustrates the practice should be implemented to achieve sustainability in the very local level as a goal to save the environment. Media

should contribute in spreading the knowledge regarding environmental problems such as global warming and related consequences such as seawater level rise. Schools, colleges and media should help the community to bridge the gap between theory and practice in sustainability, what confirms that is the high percentage of recognition of sustainability issues while the application figure is very limited. Policy makers should encourage recycling of materials, energy saving and water saving measures at home and institutions levels. Incentives and benefits should be awarded for the bodies adopting these measures.

### The Questionnaire Form

Dear participant,

This form is intended to collect some data regarding sustainability awareness in the educational domain of the College of Architecture & Planning, Dammam University. We appreciate your cooperation in answering the following:

1. What is your job title?  

Student	Alumni/Engineer	Professor	Technician	Other
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2. What is your nationality?
3. Did you hear about sustainable development?  

Yes	No
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4. Do you know what sustainable development means in your field of study/work?  

Yes	No
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5. What are the main pillars of sustainability?  

Environment	Economy	Society	All previous	Not sure
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6. Do you know the benefits of sustainable development on the environment?  

Yes	No
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7. Do you talk to your family/friends on sustainable development?  

Yes	No
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8. Do you have an idea about the threats of global warming on the environment?  

Yes	No
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9. Do you know that many parts of the Arab world will be affected by the sea water level rise?  

Yes	No
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10. In your opinion, what are the most serious environmental problems?  

Water scarcity	Energy need	Energy need	Pollution	other
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11. Do you apply any measures to reduce water use at work/home?  
 Yes                      No
12. Do you apply any measures to reduce energy use at work/home?  
 Yes                      No
13. Do you prefer buying environmentally friendly appliances over other types?  
 Yes                      No
14. Do you pay attention to energy star when buying electrical appliances?  
 Yes                      No
15. In average, how much do you monthly pay for electricity bills?
16. Do you use recycling stations (for paper, glass, plastics, cans) at work/home?  
 Yes                      No
17. Does your firm/institution apply any simple sustainability measures in the scope of their work?  
 Yes                      No                      Not sure

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## الوعي بقضايا الاستدامة: دراسة حالة في جامعة الدمام

محمد الحفناوي

استاذ مشارك، كلية العمارة والتخطيط، جامعة الدمام

(قدم للنشر في ١٤/٥/١٤٣٤هـ؛ وقبل للنشر في ٢/٧/١٤٣٤هـ)

الكلمات المفتاحية: الوعي؛ الاستدامة؛ جامعة الدمام

**ملخص البحث.** لقد صُممت هذه الدراسة لجمع المعلومات الأساسية حول الوعي بقضايا الاستدامة في المجال المكاني لكلية العمارة والتخطيط، جامعة الدمام. ويجري ذلك، حسب المؤلف، من خلال صحيفة استبيان للمسح الميداني للبحث في مدى ادراك تطبيق مبادئ تدابير الاستدامة كنهج لتحقيق الاستدامة في المجال التعليمي. وكان الاستبيان لتحديد مدى التطبيق الفعلي للقضايا البسيطة للاستدامة في نطاق عمل المؤسسة الخاصة بأفراد العينة، وفي حياتهم اليومية كذلك. تم إرسال الاستبيان عن طريق رسائل البريد الإلكتروني وتم جمع الردود من خلال رسائل البريد الإلكتروني أيضا. وتوفر البيانات نظرة فاحصة لوجهات نظر المشاركين فيما يتعلق بفوائد الاستدامة والمشاكل البيئية الرئيسية.

وتبين من نتائج تلك الدراسة أن لدى المشاركين مستوى عال من المعرفة الادراك للاستدامة، حيث سبق لنسبة ٩٤٪ من المشاركين التعرف علي نهج الاستدامة وتعريفه، و حاول ٧٤٪ منهم المشاركة في نشر المعرفة الخاصة بها من خلال التحدث إلى العائلة والأصدقاء. وأظهر المستطلعون معرفة جيدة بالمشاكل البيئية، حيث تعرف ٧٩٪ علي التهديدات المرتبطة بظاهرة الاحتباس الحراري، و فهم ٦٠٪ منهم أن أجزاء كثيرة من العالم العربي مهددة بارتفاع منسوب مياه البحر. وعلاوة على ذلك، اعتبر ٦٤٪ من المستطلعين التلوث أخطر المشاكل البيئية، بينما رأى ٢٥٪ أن ندرة المياه هي الأكثر خطورة.

تعطي الدراسة مؤشرا حاسما على أن تطبيق التدابير البسيطة للاستدامة في مجال عمل الباحثين له أهمية محدودة للغاية. و أظهر المستطلعون اهتماما جيدا جدا لإعادة التدوير واهتماما اخر جيدا لتوفير المياه وتوفير الطاقة. تعكس الأرقام حقيقة أن الماء هو الأكثر أهمية لجموع المشاركين. بينما يأتي توفير الكهرباء في المرتبة الثانية، و قد يكون سبب ذلك قيام الحكومة بإعطاء حوافز لخفض سعر الكهرباء والنفط المستخدم لإنتاج الطاقة، وبالتالي فإن أفراد العينة لا يشعرون بمشكلة الطاقة بنفس درجة الخطورة مثل مشكلة ندرة المياه.