Measuring sustainability behavior at the University of Sharjah: A Gender Comparison

Anwar Hamdan [1[0000-0002-8552-2486]] Nada Murad [2[000-0002-8283-9592]], Marah Abdelrazeq [2[000-0002-5953-5005]], Sadeque Hamdan [1[0000-0002-5265-0836]], Imad Alsyouf [2[0000-0002-6200-8919]] and Maamar Bettayeb [3[0000-0002-7160-6443]]

[1] Sustainable Engineering Asset Management (SEAM) Research Group, University of Sharjah, Sharjah 27272, UAE
[2] Industrial Engineering and Engineering Management Department, University of Sharjah, Sharjah 27272, UAE
[3] Electrical and Computer Engineering Department, University of Sharjah, Sharjah 27272, UAE
anwar.hamdan@sharjah.ac.ae, U14123320@sharjah.ac.ae, U14123185@sharjah.ac.ae, shamdan@sharjah.ac.ae, ialsyouf@sharjah.ac.ae, maamar@sharjah.ac.ae

Abstract. Universities have an important role in sustainability. Many universities around the world have conducted campus sustainability studies to measure their sustainability performance. The aim of this study is to assess the sustainability performance and compare the level of behavior between males and females at the University of Sharjah. We developed and distributed a questionnaire to all the university populations to measure sustainability behavior. We used a Likert scale and hypothesis testing to analyze the questionnaire. By the end of the questionnaire duration, we received 646 responses, where 238 were males and 408 were females. To analyze the questionnaire, the sign test was applied to determine the level of sustainable behavior of the males' and females' respondents. The results of this test showed that both males' and females' behavior levels are high. This is a good sign that both males and females are practicing their daily activities in a sustainable manner. Furthermore, the Wilcoxon-Mann-Whitney test was applied to compare the males' and females' behavior levels. As a result, it was found that males have better sustainability behavior. It is recommended that the University of Sharjah organizes more events and activities to boost the behavior level of female respondents. In addition, the university may define some rules and regulations to monitor the sustainability behavior at the campus by providing rewards, incentives, and penalties in case of violation.

Keywords: Sustainability, Higher Education, Behavior, Gender.

1 Introduction

In the 21st century, humans continue their advanced research in technology and further innovations to reveal the secrets behind sustainability. According to Hacker, Rando, and Shafritz [1], sustainable development can be defined as the development that satisfies the needs of the current generations without affecting the needs of future generations. Sustainability has three main pillars which are economic, environmental, and social [2]. These pillars are considered to be the drivers for sustainability excellence. Universities can play an important role toward sustainable development through the three sustainability pillars, where according to Isa [3], operations and activities performed at universities can have negative or positive effects on the sustainability performance.

Many universities in the past were showing interest in sustainability in a way or another. Higher Education institutions have a very important and critical role in achieving excellent sustainability performance results. Therefore, it is extremely important to include sustainability in the curricula to help in achieving the expected sustainability performance outcomes. By doing this, academic programs will help in influencing people's behavior positively to achieve the goals and missions of sustainability. A number of universities' studies focused on and applied advanced techniques in the field of water and energy conservation to achieve economic and environmental excellence. Hacker et al. [1] stated that a successful sustainability program depends on involving students. As a result, it is critical to understand the factors, which motivate people to perform sustainable activities. Therefore, this research paper discusses sustainability from a different perspective, which is the behavior of students, staff and faculty members toward sustainability. According to Ribeiro et al. [4], monitoring sustainability-related issues is essential.

Sustainability assessment can be defined according to Pope et al. [5] as the process of evaluating the implications of an initiative on sustainability. According to Singh et al. [6], the goal of the assessment is to provide decision-makers with an evaluation related to the environment and society in order to improve sustainability outcomes. Sustainability behavior can be defined as how people respond and act regarding sustainability [7]. It is important to spot the light on people's behavior because it is considered to be the direct indicator that affects all the sustainable elements.

As the University of Sharjah consists of two campuses (male campus and female campus), It is assumed that male and female have equal sustainability behavior level. Therefore, the main aim of this study is to assess the sustainability performance and compare the level of behavior between male and female respondents at the University of Sharjah. This study will help in answering the following questions. 1) is the sustainability behavior level of males and females high? 2) is there a significant difference between the males' and females' sustainability behavior levels? 3) which category (males or females) has a higher sustainability behavior level?

To the best of the authors' knowledge and based on the literature review (see Section 2), the research related to this topic is very limited and most of the published works considered the assessment on either students or faculty. However, no work attempted to present the overall university sustainability behavior that is affected by all the individuals in the university.

This study will help us to identify the weaknesses of each campus and improve them in order to enhance sustainability on the university. Based on the results of this study, decision makers and top management at the university can develop the needed action plan to improve the sustainability level.

2 Literature Review

Recently, research works have been developed to measure the sustainability level in higher education institutions. For instance, Abubakar, Al-Shihri, and Ahmed [8] assessed the students' awareness in different sustainability components including curriculum and research, operations, and engagement by surveying 152 students from the Architecture and Planning college in the University of Dammam at Saudi Arabia. They found that students have a high level of awareness regarding the environment and courses were found to have a small focus on sustainability. However, this study was only limited to students from one college instead of considering other colleges and the other university populations. Marans and Callewaert [9] applied sustainability cultural indicators program to evaluate the effectiveness of sustainability initiative regarding the expansion of compositing in the university. Moreover, Mir and Khan [10] surveyed 437 students at three Indian universities to measure the sustainability knowledge, attitude and behavior of students. The study revealed that the students have low levels of knowledge and behavior towards sustainability but a high sustainability attitude level. However, this focused only on students and it did not consider other university populations such as the administrative staff and faculty members.

In addition, Katiliūtė, Stankevičiūtė, and Daunorienė [11] studied the role of administrative staff in designing sustainable university campus to identify the problem and provide solutions for the development of a sustainable campus. Dagiliūtė, Liobikienė, and Minelgaitė [12] compared between students sustainability attitude from two different universities were one of them is a green university and the other is a non-green. Based on the survey results, it was found that there are no significant differences between sustainability attitude in the two universities.

In most of studies used questionnaire and hypothesis testing, a Likert scale was utilized to quantify the results and construct the required data for the hypothesis testing. For instance, in quality management, Alsyouf et.al [13] assessed the impact of ISO 55000 implementation using by developing a Likert scale and using non-parametric hypothesis testing to analyze questionnaire results. In project management, Ruqaishi and Bashir [14] developed a questionnaire to investigate the causes of delay in construction projects in the oil and gas industry and utilized Likert scale in order to apply Kruskal-Wallis to test their hypothesis. In addition to that, Hamdan et. al [15], investigated the delay factors for electrical installation projects by developing a questionnaire and analyzing the results using Likert scale and Fuzzy TOPSIS. In Psychology, Koh [16] developed a Likert scale questionnaire to investigate if the entrepreneurial inclination is significantly associated with the six psychological characteristics. Two statistical analysis was used to analyze the results of the survey which are the t-test and the logit analysis.

Based on the above literature review, very limited studies aimed to measure sustainability in higher education institutions. The above studies aimed to measure sustainability only for one campus population, mainly students and no study considered the sustainability behavior of the different campus population (students, staff and faculty) together, which will be addressed in this study. Furthermore, in this study, gender comparison will be conducted on sustainability behavior.

3 Methodological Framework and Results

The methodology used in this study consists of two stages. First, the design of the survey and second, the analysis of the data, which are described in the sections below.

3.1 Design of the questionnaire

In order to identify the gap between the current and required sustainability behavior at the University of Sharjah, we conducted a survey among students, staff and faculty members. We designed an electronic questionnaire using Google Forms (https://www.google.com/forms/about/) that includes 23 questions about sustainability behavior, which are shown in Table 1. The questionnaire has been checked for reliability and validity by distributing it to a test group to collect feedback about the questionnaire design. Furthermore, the questionnaire content has been validity with experts.

Table 1. Questionnaire questions

Sn	Question
Please indicate how often you engage in each of the following behaviors, whenever possible. (Never, rarely, sometimes, often, all the time)	
1	Recycle
2	Encourage others to recycle
3	Turn off water while brushing teeth
4	Use a reusable cup or mug
5	Print double-sided
6	Walk to class from the university dorms (Faculty & students)
7	Take showers less than 5 minutes (in campus dorms)
8	Turn off lights when leaving a room
9	Use energy efficient appliances to conserve energy
10	Unplug electronics when not in use to conserve energy
11	Eat locally grown or organic foods
12	Take classes that have a focus in sustainability
13	Participate in activities on campus that promote sustainability
14	Use the stairs rather than the elevator
15	Wash laundry only when you have a full load
16	Switch off computer before leaving the room
17	Purchasing more recycled office materials

18	select materials such as paper, ink and binding materials which are environmentally friendly as possible
19	Use green cleaning products
20	Share your car with your colleagues
21	bring your food with you in a lunch ware or the water using ecofriendly water bottles
22	If you have your own car would you use the University bus instead
23	In conditioned areas, do you keep doors and windows closed

The purpose of the questionnaire was to understand the baseline sustainability behavior at the University of Sharjah and to create a data collection plan that will serve as a tool to reveal the actual indicators of behavior. The questionnaire covered questions about the three pillars of sustainability to measure the behavior of sustainability at the university. In the first section of the survey, we collect general information about the participants such as their gender, class, college, and place of living (on or off-campus).

In the next section, the behavior of the participants was measured in 23 questions about their daily activities and aimed to capture how people respond and act on a daily basis regarding sustainability. The questionnaire was distributed several times by email through the Information Technology Department and Office of the Chancellor in cooperation with the Sustainability Office to remind people to participate. The questionnaire duration was around three weeks starting from 12th of March 2018 till the 5th of April 2018. At the end of the questionnaire period, the number of participants was 646 where 36.84 % of the participants were males.

3.2 Analysis of Results

In this section, we analyze part of the obtained data. The result of a comprehensive data analysis will be published in another extended paper.

Data Analysis. We performed a hypothesis testing to determine the level of behavior (high or low) for males and females, separately. Then, we aim to know the sustainability behavior difference between the two genders at the University of Sharjah. To perform the analysis, we apply a Likert scale which takes the level of agreement of the participants on given statements on a scale from strongly disagree to strongly agree [17]. We assigned a score for each question using a scale from 1 to 5, where 1 is for Never and 5 is for Always. The total score was 115 points (23×5). The collected data were not normally distributed, as a result, we applied the sign test on the median of the data as a hypothesis testing tool.

Measuring the Level of Behavior. To measure the level of behavior, we selected half of the total score (which is 57.5) to be the baseline and we tested the hypothesis, S_1, of having the median of the data achieving more than this level (57.5), which means that the level of behavior is high using a level of significance of 5%.

$$S_1 = \begin{cases} H_0: \breve{\mu} = 57.5 \\ H_1: \breve{\mu} > 57.5 \end{cases} \quad (1)$$

where H_0 indicates that the median ($\breve{\mu}$) behavior level is less than or equal to half of the total score, i.e., low behavior and H_1 indicates a high behavior. Both males' and females' behavior level are high as shown in Table 2. In short, it is a good sign that both males and females are practicing their daily activities in a sustainable manner.

Table 2. Level of behavior based on gender

Gender	p-value	Decision	Behavior level
Females	7.64×10^{-26}	$7.64 \times 10^{-26} < 0.05$➔ reject H_0	High
Males	2.27×10^{-22}	$2.27 \times 10^{-22} < 0.05$➔ reject H_0	High

Comparing the behavior level based on gender. We conducted a hypothesis testing, S_2, using Wilcoxon-Mann-Whitney to identify if the difference in behavior between males and females is significant or not. It is used to compare two independent samples using either the mean or median [18], even with unequal sample size [19].

$$S_2 = \begin{cases} H_0: \breve{\mu}_M = \breve{\mu}_F \\ H_1: \breve{\mu}_M > \breve{\mu}_F \end{cases} \quad (2)$$

where H_0 indicates that the behavior level of males is less than or equal to the one of the females while H_1 indicates that males showed a better behavior than females. The hypothesis testing provided a p-value of 0.0477, which means that males' behavior is higher than females' one significantly at a significance level of 5%.

4 Discussion

By analyzing the results of the questionnaire, we found that both males and females level of sustainability behavior are high. This might be due to the fact that most respondents are from the college of engineering, sciences and medical studies, where sustainability concepts are integrated into their courses.

When comparing the males' and females' respondents, we found that males have a higher sustainability behavior level than females. Based on the results of this study, the university needs to set guidelines and to spread awareness by organizing more events and policies to promote sustainability, with a focus on the females' campus to improve their sustainability behavior level.

Additionally, even though sustainability behavior levels are high for both females and males, the university needs to set some behavior monitoring policies, as in some cases, respondents tend to answer questionnaires in a positive way that may not reflect the exact personal behavior in an attempt of showing good personal behavior even with an anonymous questionnaire.

5 Conclusions and Recommendations

In summary, universities are considered to be leaders in education and research. The University of Sharjah is a large comprehensive pioneer academic institution in the UAE and the Gulf Cooperation Council region (GCC). Universities have the potential to lead the way towards approaching sustainability. Starting from involving students as partners, University of Sharjah will observe the change and will attain a sustainable campus. Human's behavior is an important and critical factor that affects sustainability performance. Although changing behavior is not easy, it is very beneficial to achieve sustainability. This study aimed to assess sustainability behavior level based on gender at the University of Sharjah using statistical testing, to help improve the current situation and drive it towards sustainability. The study revealed that although both males' and females' sustainability behavior levels are high; males' sustainability behavior is higher than the females' at the University of Sharjah. As an action plan, the University of Sharjah needs to organize more events and activities to boost the behavior level of female respondents. In addition to that, the university needs to define some rules and regulations to monitor the sustainability behavior at the campus by providing rewards, incentives, and penalties in case of violation.

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