Migration Letters

Volume: 21, No: 2, pp. 471-487

ISSN: 1741-8984 (Print) ISSN: 1741-8992 (Online)

www.migrationletters.com

Awareness of Green Economy Concepts and Environmental Sustainability Practices in Light of the Saudi Green Initiative among University Students

Sahar Mohammed Yousef Ezzeldin[1]

Abstract

The current research is concerned with conducting a case study regarding the awareness of green economy concepts and environmental sustainability practices in light of the Green Saudi Initiative among university students. This was done through defining a list of the environmental sustainability practices dimensions and the green economy concepts suitable for university students, designing and applying the green economy concepts awareness scale and the environmental sustainability practices scale. The research also investigates the impact of gender (male-female) and specialization (practical colleges-theoretical colleges) variables on the awareness of green economy concepts and environmental sustainability practices. Results revealed that there were statistically significant differences between male and female students in the awareness of green economy concepts and in the environmental sustainability practices in favor of male students and there were significant differences between male and female students in the practical college of scientific nature and theoretical colleges in the awareness of green economy concepts in favor of the practical colleges. Results and recommendations were presented to support the development of the green economy concepts awareness and environmental sustainability practices at the university stage, especially in light of the Green Saudi Initiative to facilitate its implementation and success in a way that helps in preserving the environment and enhancing the environmental efforts in Saudi Arabia in light of the "2030" vision.

Keywords: *green economy concepts, environmental sustainability, the green initiative, university students.*

Introduction

The contemporary world has witnessed a considerable interest in environmental issues, which is also related to the new international order which cares about the green economy and attention to environmental sustainability practices have been raised because of the increased cost of energy production, the use of fossil fuels, and the emerging climate crisis. The green economy represents a new economic pattern that connects three dimensions: economy, society, and environment, and it requires widespread support from the community, government, and the private sector.

[1] Assistant Professor of Curricula and Methods of Teaching Science - Department of Educational Sciences, College of Education, Prince Sattam Bin Abdulaziz University, Saudi Arabia and the College of Education, Benha University, Egypt, s.ezzeldin@psau.edu.sa

The United Nations Environment Program (UNEP) has defined a green economy as an economy that is based on six main sectors: renewable energy, green construction, clean transportation, water management, waste management and recycling, and land management, which improve human well-being, achieve social justice and reduce environmental risks [1]. Within the context of university education, it refers to an economic model that requires the greening of all professions and focusing on goods and services that will need changes to improve energy efficiency and reduce resource depletion. University education has an important role to achieve such objectives [2]. A green economy supports actions that address massive environmental problems, the shrinking of limited natural resources, and the welfare of those at the bottom of the economic pyramid [3]. It is mitigating the effects of climate change by making significant reductions in greenhouse gases and carbon emissions as well as protecting the ecosystem, human health, and well-being [4].

On the international level, the green economy has gained great interest among global organizations and governments and is widely applied to address issues related to the problems of climate change and mitigate its severe impacts. South Korea and China have respectively implemented five-year development plans that allocate a large part of investments to green initiatives between 2009 to 2015. The European Union has also integrated green economy initiatives in Europe 2020 and the Resource Efficiency Roadmap [5]. This concept attracted various academic studies over the past decade, especially at the undergraduate level. For example, Bosco Ekka et al [6] presented a hierarchical view of the many ways in which youth can contribute to sustainable development, including the green economy. Previous studies investigated university students' views about climate change and their public and private roles in preserving the environment [7] and indicated the significance of increasing students' awareness of global warming impacts [8]. Zhao & Zou [9] identify the extent to which university institutions in China differ in their interest in green buildings. Sima et al. [10] identified university campus greening initiatives and their implications for university curricula and the behavior of students and faculty members in Romania. Besides, Nhamo& Mukonza [11] explore women's opportunities in developing the green economy and environmental sectors in South Africa. They noted that although opportunities are abundant for women in the green economy and environmental sectors, it is essential for policymakers to raise awareness of opportunities and employ the available potential for capacity building.

Green economy and environmental sustainability are interrelated concepts. Since, the three environmental, social, and economic sustainability dimensions are incorporated into the definition of the green economy. It is a part-to-whole relationship because the green economy aims to enhance the coherence between the economy on the one hand and environmental sustainability on the other, and the green economy is a means to achieve the dimensions of environmental sustainability while caring for human well-being, economic prosperity and the preservation of the environment [5].

The "green economy" has emerged as an influential political framework for environmental sustainability in both developed and developing countries that offers an attractive framework for delivering more resource efficiency, lower carbon, less environmental harm, and more socially inclusive societies. A green economy can be relevant at both the national and international levels in light of the emerging environmental sustainability goals [12]. Sustainable development aims to meet the needs of the present without compromising the ability of future generations to meet their own needs. Besides, making a decision that includes environmental sustainability should focus on the aspects that require a scientific basis and information on sustainability [13]. The concept of sustainability stems from various roots, including environmental carrying capacity, resource reserves, and technology criticism and each of these areas of research has its origins and goals [14].

One of the environmental sustainability goals is to direct efforts to encourage regulators to make decisions toward a livable and sustainable place [15]. Environmental sustainability

goals aim to ensure common goals and understandings among various stakeholders (such as policymakers, local populations, corporations, and partners) in developing a sustainable world, with a focus on achieving and activating environmental sustainability, enhancing technology, and refining and building capacity in developing countries [16]. The principles that support environmental sustainability are preserving biodiversity, improving energy efficiency and regenerative capacity, reuse and recycling, limitations of non-renewable resources and waste disposal, all product development approaches, and product management decisions entirely by considering the environmental impacts of the product throughout its production cycle [17].

Various studies are concerned with sustainable development and the green economy at the undergraduate level. They recommend the significance of developing the concepts of green economy, greening the campus, and the attitudes towards environmental sustainability issues and the need to include them in multidisciplinary curricula [18]. Sharma &Kelly [19] investigated the accounting and business administration university students' perceptions in New Zealand and their attitude toward environmental sustainability. Kieu et al. [20] are also concerned with identifying the challenges facing the application of education for environmental sustainability in teacher education institutions in Viet Nam. While as Putz et al. [21] evaluated the impact of field trips on developing students' knowledge of green transportation and their attitudes towards it. Besides, Albareda-Tiana et al. [22] explored the principles and practices of environmental sustainability in university curricula at the International University of Catalonia. In addition, Cottafava et al. [23] developed educational practices for environmental sustainability and the participation of university students in Italy in their activities to prepare graduates and active citizens in society. Brandt et al. [24] also provide a complete curriculum for the development of environmental sustainability and its importance in teacher preparation programs. Affolderbach [25] is also concerned with presenting exercises and projects designed to help students develop a green project in geography module at a British university that teaches green economy concepts. Al-Balushi et al [26] investigated green economy awareness among the higher education students in Oman in general and Sultan Qaboos University (SQU) in particular to assess their knowledge, attitudes and practice regarding the green economy. Soomro et al [27] sought to predict the inclination toward green entrepreneurship among the younger generation. The study employed a deductive approach by collecting cross-sectional data. Bachelor's and master's degree students in business management.

Saudi Arabia has expended considerable efforts to preserve the environment since the launch of the Kingdom's Vision 2030 in 2016, under the patronage of Prince Mohammed bin Salman. The Green Saudi Initiative will put these efforts into effect by unifying plans that seek environmental sustainability in the Kingdom through relying on renewable energy sources, reducing carbon emissions, and global warming [28].

The Green Saudi Initiative oversees all efforts made by Saudi Arabia to confront climate change, working concurrently with all government parties, ministries, the private sector, and foreign governments to enhance environmental efforts and achieve the desired goals. The Green Middle East Initiative was launched in conjunction with the announcement of the Green Saudi Initiative. It is an initiative that enhances the efforts of the Green Saudi Initiative at the international level, in coordination with the fraternal countries in the Gulf Cooperation Council, the Middle East, and North Africa [25]. In a discussion session within the Green Saudi Initiative Forum, the Kingdom stressed the need to mitigate gases that harm the environment and implement all solutions to protect the environment and manage water [26, 37]. The main objective of the Green Saudi Initiative is to raise the standard of quality of life and protect future generations in the Kingdom of Saudi Arabia. Concerning this primary objective, it is clear that the Green Saudi Initiative targets environmental protection, energy conversion, and sustainability programs to achieve three comprehensive goals aimed at building a sustainable future for all by reducing carbon emissions, afforestation of the Kingdom of Saudi Arabia, and protecting land and sea areas. Saudi

Arabia has activated 77 initiatives to help reach the three targets under the Saudi Green Initiative and achieve long-lasting positive change. The initiatives range from afforestation and biodiversity protection to emissions reduction and establishing new protected areas. Under SGI, Saudi Arabia is delivering against its aspirations to create a greener future for all and is putting action and investment behind the country's commitment to sustainable development. Increasing the volume of renewable energy sources in electricity and energy within energy and energy in the Kingdom by up to 50% and replacing more than one million barrels of oil per day through three main health power stations, the industrial sector, and the agricultural sector. [28].

Consequently, the practices of environmental sustainability and green economy are new and significant areas that must be taken care of in higher education by acquiring its concepts and enhancing its behaviors. These concepts are also of great significance at the international level, as a green economy is an economy based on social and environmentally friendly practices that reduce pollution and emissions that harm the environment during production and work on facing environmental challenges, stimulating economic growth, creating job opportunities, promoting entrepreneurship, and managing natural resources effectively. The green economy works with sustainable development to adapt to the conditions to conserve national resources. In addition, the Kingdom has made considerable efforts to preserve the environment since the launch of the Kingdom's Vision 2030 in 2016.

The Arab Educational, Cultural, and Scientific Organization emphasized the significance of green economy concepts awareness and environmental sustainability practices, as they support economic and social development that is important to protect the environment. Furthermore, the green economy is one of the areas proposed in the twenty-first century for economic and environmental reasons [15]. Thus, it is a significant research field to find out the reality and the extent of its availability among society members and strive for its development to achieve society's well-being [27]. Various studies indicated the significance of green economy concepts and environmental sustainability practices through building programs for developing them among university students [28, 36], indicating the need for higher education institutions to pay attention to environmental sustainability and to make society more sustainable by including them in their programs, taking into account their effects on society. Other prospective studies analyze the impact of higher education institutions on sustainability from a comprehensive perspective at the undergraduate level [18, 19,21, 23,24].

In response to the present environmental conditions, Saudi Arabia has taken the environment and its preservation upon itself and launched the Green Saudi Initiative, which will chart the direction of the Kingdom and the region in protecting the earth and nature, contributing significantly to achieving global goals [26, 37]. Some institutions of higher education in Saudi Arabia, including Prince Sattam bin Abdulaziz University, are interested in taking preliminary steps to implement the principles of sustainability, but there is still a need to develop and implement the principles of education for sustainable development, which requires the adoption of many educational curricula that raise awareness and enhance design among individuals and organizations Both to develop and implement advanced solutions. There is a need to explore the factors that also influence university students' awareness of sustainability and the green economy. Therefore, it is necessary to measure the reality of the availability of environmental sustainability and green economy practices among university students, as they are the drivers of progress and prosperity in Saudi Arabia.

The current research seeks to answer the following case study questions:

1. What is the reality of green economy concepts awareness among Prince Sattam bin Abdulaziz University students?

2. What is the reality of environmental sustainability practices awareness among Prince Sattam bin Abdulaziz University students?

3. Are there statistically significant differences at (α = 0.05) level in the green economy concepts awareness level due to gender (male/female) and specialization (practical scientific colleges/ theoretical colleges) variables?

4. Are there statistically significant differences at (α = 0.05) level in the environmental sustainability practices awareness level due to gender (male/female) and specialization (practical scientific colleges/ theoretical colleges) variables?

Research Sample

The pilot research sample comprised 50 male and female students, except for the basic research sample at the beginning of the second semester of the academic year 2021–2022 to verify the research tools' psychometric properties. The basic research sample was selected randomly from the Prince Sattam bin Abdulaziz university colleges for the academic year 2021–2022. Since Prince Sattam bin Abdulaziz University is one of the emerging colleges, and therefore it was limited to the colleges listed in Tables (1,2) due to the availability of large numbers of male and female students in it.

Table (1) describes the study sample for applying the Green Economy Principles Awareness Scale. Table (2) describes the study sample for applying the environmental sustainability practices awareness scale.

TABLE 1. Description of the study sample for applying the Green Economy Principles Awareness Scale

	Male Students N.	Female Students N.	Total
Colleges of practical scientific disciplines (Applied Medical Sciences College- College of Science)	53	65	118
Colleges of theoretical majors (College of Education - College of Arts)	77	76	153
Total	130	141	271

TABLE 2 Description of The Study Sample for Applying Environmental Sustainability Practices Awareness Scale

	Male Students N.	Female Students N.	Total
Colleges of practical scientific disciplines (Applied Medical Sciences College - College of Science)	58	62	120
Colleges of theoretical	75	89	164

disciplines (College of Education - College of Arts)			
Total	133	151	284

Data Collection Tools

Green Economy Principles Awareness Scale

The scale was developed according to the Green Saudi Initiative goals and foundations [26, 37] and after reviewing the related studies and measures [6, 7, 8, 9, 10]. Within the framework of the research objectives and questions, the scale in its initial form consisted of two sections. The first section includes the basic data of research variables (College-gender) and the second section represents the scale items related to awareness of green economy principles in light of the Green Saudi Initiative [27] and the definition of the United Nations Environment Program (UNEP) for the green economy[1]. The scale consisted of (28) items, which included seven basic dimensions centered on the principles of the green economy as follows: renewable energy, green building, clean transportation, water management, waste management and recycling, land management, and environmental risk reduction. The scale is a 3- point Likert rating type scale to obtain the research sample members' responses according to the following degrees of agreement: agree, not sure, and disagree; then estimating these statements quantitively according to the following: "agree-3", "not sure-2", and "disagree-1".

Table 3 Description of the Green Economy Principles Awareness Scale

N.	Dimension	Items Numbers	Numbers of Items
1	renewable energy	7-8-13-15	4
2	green building	16-17-18-19	4
3	clean transportation	6-12-28	3
4	water management	4-5-20-21	4
5	Waste management and recycling	22-23-24	3
6	land management	25-26-27	3
7	environmental risk reduction	1-2-3-9-10-11-14	7
Total	28		

The scale in its initial form was presented to 7 jury members specialists in environmental education, to verify its face validity and to ensure the appropriateness and clarity of each item to measure the students' awareness of the green economy principles. The necessary modifications have been conducted such as including deletion of three items, addition of 2 items, and modification for 5 items.

The validity of the scale was also verified through measuring the internal consistency of the scale using Pearson's Correlation Coefficient to identify the degree of correlation of each of the scale items with the total score of the dimension to which the item belongs.

Table 4 Correlation Coefficients of the Green Economy Principles Awareness Scale Dimensions and the Overall Scale

N.	Dimensions	Correlation Coefficient

1	Renewable energy	*0.73
2	Green building	*0.76
3	Clean transportation	*0.71
4	Water management	*0.69
5	Waste management and recycling	*0.75
6	Land management	*0.70
7	Environmental risk reduction	*0.74

According to the results presented in table 1, all the values of correlation coefficients of the scale dimensions to the overall score are significant at the (0.05) level, as the values of the correlation coefficients ranged from (0.69: 0.76), confirming that the scale has high internal consistency.

To confirm the scale reliability, Cronbach's Alpha was calculated as illustrated in table (5).

Table 5 Reliability Coefficients of the Green Economy Principles Awareness Scale

N.	Dimension	Cronbach's Alpha Coefficient
1	renewable energy	0.69
2	green building	0.71
3	clean transportation	0.68
4	water management	0.67
5	Waste management and recycling	0.69
6	land management	0.68
7	environmental risk reduction	0.70
The Overall Scale		0.72

Table 5 indicates that the reliability coefficients for the scale dimensions ranged from (0.71: 0.67) and for the overall scale was (0.72), confirming the scale achieved high reliability to be applied to the basic research.

Environmental Sustainability Practices Awareness Scale

The scale was developed according to the Green Saudi Initiative goals and foundations [26] and after reviewing the related studies and measures [18, 19, 20, 22, 23]. Within the framework of the research objectives and questions, the scale in its initial form consisted of two sections. The first section includes the basic data of research variables (college-gender) and the second section represents the scale items related to students' awareness of environmental sustainability practices in light of the Green Saudi Initiative [26, 37]. The scale consisted of (31) items distributed into four dimensions: the social, environmental, economic, and technological dimensions. The scale is a 3- point Likert rating type scale to obtain the research sample members' responses according to the following degrees of agreement: agree, not sure, and disagree; then estimating these statements quantitively according to the following: "agree-3", "not sure-2", and "disagree-1".

Table 6 Description of the Environmental Sustainability Practices Awareness Scale

N.	Dimension	Items Numbers	Numbers of Items

1	Social	1:9	9
2	Environmental	10:18	9
3	Economic	19:25	7
4	Technological	26:31	6
Total	31		

The scale in its initial form was presented to 7 jury members specialists, to verify its face validity and to ensure the appropriateness and clarity of each item to measure the students' awareness of environmental sustainability practices. The necessary modifications have been conducted, including deletion, addition, or modification.

The validity of the scale was also verified through measuring the internal consistency of the scale using Pearson's Correlation Coefficient to identify the degree of correlation of each of the scale items with the total score of the dimension to which the item belongs.

Table 7. Correlation Coefficients of the Environmental Sustainability Practices Awareness Scale Dimensions and the Overall Scale

N.	Dimension	Correlation Coefficient
1	Social	*0.81
2	Environmental	*0.78
3	Economic	*0.75
4	Technological	*0.77

According to the results presented in table 7, all the values of correlation coefficients of the scale dimensions to the overall score are significant at the (0.05) level, as the values of the correlation coefficients ranged from (0.75: 0.81), confirming that the scale has high internal consistency.

To confirm the scale reliability, Cronbach's Alpha was calculated as illustrated in table (8).

Table 8 Reliability Coefficients of the Environmental Sustainability Practices Awareness Scale

N.	Dimension	Cronbach's Alpha Coefficient
1	Social	0.75
2	Environmental	0.72
3	Economic	0.70
4	Technological	0.74
The Overall Scale	0.71	

Table 8 indicates that the reliability coefficients for the scale dimensions ranged from (0.70: 0.75) and for the overall scale was (0.71), confirming the scale achieved high reliability to be applied to the basic research.

Field Application

The data collection tools which are the green economy principles awareness scale and the environmental sustainability practices awareness scale was designed using google forms. they were sent to colleges to be distributed to male and female students electronically.

Statistical Treatment

To answer the research questions, the SPSS v. 15 was utilized, whereas descriptive statistics using arithmetic means and standard deviations were calculated. Besides, Two-way ANOVA was used whether there are statistically significant differences between the average scores of the study members in both the green economy principles awareness and the environmental sustainability practices awareness scales due to the study variables.

Results

To answer the first question " What is the reality of green economy concepts awareness among Prince Sattam bin Abdulaziz University students?", the means, standard deviations, and ranks of the students' responses to the scale dimensions were calculated as indicated in table 9.

Table 9. Arithmetic Means and Standard Deviations of the green economy principles awareness Scale dimensions

Dimension	Mean	Std. deviation	Order
Renewable energy	2.50	0.762	4
Green building	2.23	0.824	6
Clean transportation	2.64	0.611	3
Water management	2.68	0.570	2
Waste management and recycling	2.81	0.393	1
Land management	2.48	0.764	5
Environmental risk reduction	2.13	0.922	7

Table 9 indicates that the dimension of waste management and recycling occupies the first rank, in the second rank is the dimension of water management, in the third rank is the clean transportation dimension, in the fourth rank is the dimension of renewable energy, in the fifth dimension is the land management dimension, in the sixth rank is the green building dimension, and in the seventh and final rank is the dimension of environmental risk reduction.

To answer the second question " What is the reality of environmental sustainability practices awareness among Prince Sattam bin Abdulaziz University students?", the means, standard deviations, and ranks of the student's responses to the scale dimensions were calculated as indicated in table 10.

Table 10 Arithmetic Means and Standard Deviations of the Environmental Sustainability Practices Awareness Scale dimensions

Dimension	Mean	Std. deviation	Order
Social	2.71	0.497	3

Environmental	2.70	0.475	4
Economic	2.73	0.501	2
Technological	2.80	0.404	1

According to the results presented in Table 10, the technological dimension occupies the first rank, in the second rank is the economical dimension, in the third rank is the social dimension, and in the fourth and final dimension is the environmental dimension.

To answer the third question" " Are there statistically significant differences at ($\alpha = 0.05$) level in the green economy concepts awareness level due to gender (male/female) and specialization (practical scientific colleges/ theoretical colleges) variables?", t-test for two independent samples was utilized as illustrated in the following table (11).

Table 11. Calculating the significance of the differences between the mean scores in the green economy concepts awareness level due to gender and college variables

The green economy concepts awareness scale	Application	N.	Mean	Std. deviation	t-value	Significance Level	FD
Gender	male	130	71.70	7.52	5.181		
	female	141	67.36	6.28			
College	Colleges of Practical scientific disciplines	118	73.41	5.77	7.94	*0.05	269
	Colleges of theoretical disciplines	153	65.31	6.29			

* Significant at ($\alpha \leq 0.05$)

Table 11 illustrates that there are statistically significant differences between male and female students in the green economy concepts awareness scale in favor of male students, whereas the mean of the female students' scores was (67.36), while for male students was (71.70). Besides, there are statistically significant differences between students in practical Colleges of scientific disciplines and theoretical College's students in the green economy concepts awareness scale in favor of practical colleges students, whereas the mean score of students in theoretical Colleges was (65.31), while the mean scores of students in practical colleges of a scientific nature were (73.41).

To answer the fourth question "Are there statistically significant differences at ($\alpha = 0.05$) level in the environmental sustainability practices awareness level due to gender (male/female) and specialization (practical scientific colleges/ theoretical colleges) variables?", t-test for two independent samples was utilized as illustrated in the following table (12).

Table 12 Calculating the significance of the differences between the mean scores in the environmental sustainability practices awareness scale due to gender and college variables

The environmental sustainability practices awareness scale	Application	N.	Mean	Std. deviation	t-value	Significance Level	FD

Gender	male	133	89.20	6.37	25.13	*0.05	282
	female	151	71.44	4.21			
College	Colleges of Practical scientific disciplines	120	87.45	8.5	18.4		
	Colleges of theoretical disciplines	164	73.63	4.21			

* Significant at ($\alpha \leq 0.05$)

Table 12 illustrates that there are statistically significant differences between male and female students in the environmental sustainability practices awareness scale in favor of male students, whereas the mean score of female students was (71.44), while for male students was (89.20). Besides, there are statistically significant differences between students in practical colleges of scientific disciplines and theoretical colleges students in the environmental sustainability practices awareness scale in favor of practical colleges students, whereas the mean score of students in theoretical colleges was (73.63), while the mean scores of students in practical colleges of a scientific nature was (87.75).

Discussion

The concepts of green economy and environmental awareness are receiving increasing international attention, as countries explore new patterns of development that take into consideration economic, social, and environmental sustainability considerations. The ability to act on the green economy is key to achieving these concepts' goals. In this research, the awareness level of green economy and environmental sustainability practices in light of the Green Saudi Initiation among university students is investigated in general, and in light of gender and academic discipline variables in particular.

Results regarding the students' level of awareness of green economy concepts indicated that the waste management and recycling dimension was in the first rank. This can be attributed to the nature of various curricula in Saudi Arabia that includes this dimension as one of their goals of learning at various pre-university levels [29], which may have had a positive impact on students' awareness of the university level, even if it was not directly under the umbrella of the principles of the green economy. Besides, recycling is also one of the well-known and popular concepts that have been continuously addressed by the media in the Kingdom in the last three years [30]. In the second rank came the dimension of water management, as it is one of the dimensions that the Kingdom of Saudi Arabia attaches importance to in pre-university education, which may have a positive impact on university students. Furthermore, the National Water Company, represented by the National Program for Conservation of Water Consumption (Qatra), in cooperation with the Education Development Company, launched new awareness programs that target the awareness of young people to correct their behavior in the field of water conservation [31, 38].

Moreover, the clean transportation dimension came in the third rank, that Saudi Arabia has sought to achieve this aspect mainly among university students, and it represents the seventh goal of the sustainable development goals to ensure access to modern, reliable, and sustainable energy for all [32]. In the fourth rank came the dimension of renewable energy, and this can be explained by the fact that it is one of the dimensions that have a large space in science curricula at various levels of pre-university education, in a way that prepares

students' minds well to acquire concepts of clean energy from a scientific perspective. For example, science curricula at the elementary level include concepts that are related to clean and renewable energy and the types of this energy as well as its importance to the environment [33, 34]. While as, the dimension of land management occupied the fifth dimension and green construction because each of them is a relatively recent dimension that does not receive extensive attention among students, whether at the level of curricula in pre-university education or university education as well as media. Thus, it has become one of the concepts that are not clear and unfamiliar to them in general, and students' understanding of green building may be limited to what is directly related to the green color and not the connotation of the green color, which is related to various environmental principles in modern architecture that have not spread in Saudi Arabia until now. In the final rank, which is the dimension of reducing environmental risks. This result can be attributed because of university students' lack of awareness-raising initiatives about those real risks to the environment. Besides, in the pre-university stages, the focus is on these risks from a scientific perspective, which may be accompanied by a lack of awareness of the risks of university students in the real world and at the international level.

Examining the students' awareness level of environmental sustainability practices dimension revealed that the technological dimension occupied the first rank, and this may be attributed to the nature of various Saudi universities and Prince Sattam University in particular which are interested in achieving the vision of the Kingdom of Saudi Arabia "2030" concerning sustainable development in general and in particular the dimensions of digital transformation, electronic transactions, principles of electronic community participation, support for national policies for innovation and new strategies with a focus on information and communication technology. In the second rank was the economic dimension, as the Prince Sattam bin Abdulaziz University encourages scientific research, enhances intellectual and scientific production, and builds the human capital necessary to achieve sustainable development. This is evident in the activities of the Student Scientific Forum that is held annually, which is accompanied by bulletins and indicative videos, focusing on the aspects of sustainability in the economic dimension, as it includes entrepreneurship projects and the use of environmentally friendly products [34].

The social dimension came in the third rank, because university students may have shortcomings about the role of environmental sustainability in social terms and its role in caring for future generations. Finally, the environmental dimension came in fourth place, and this was not expected mostly, as the undergraduate students cannot understand the ecological role of sustainability. For example, students are not aware of how to make environmental sustainability a major requirement when choosing raw materials or components for new products and services, as well as by reducing the use of environmental pollutants and carbon emissions that lead to global warming, and considering that this has scientific dimensions that may be difficult to achieve in real life, or that it is one of the tasks of the state and not one of the tasks individuals and societies.

In addition, results revealed that there are statistically significant differences between male and female students in favor of male students in the awareness level of the green economy concepts. This result is consistent with various studies [7,8], indicating that male and female university students have a good awareness level of green economy concepts and that male students have greater awareness than female students. Male students have more awareness and knowledge of the dimensions of the green economy, Male students have more awareness and knowledge related to the dimensions of the green economy, as this concept is interested in creating jobs and providing unique investment opportunities that male students may be more interested in than female students. Furthermore, male students have a greater awareness that the green transformation of the construction sector is an important economic and social issue in terms of creating new jobs and industries, which is more related to the economic aspect in which males are more interested than females. water conservation and land conservation may be one of the dimensions that are associated with

males more than females, and this may also be due to their association with the aspects of preserving them as an economic dimension.

Results of the third question also found that there were statistically significant differences between Students in practical facilities of a scientific nature, and theoretical colleges in the scale of awareness of green economy concepts, in favor of practical colleges of a scientific nature. This result agrees with Sima et al.[10] study results demonstrated that colleges dealing with earth sciences (such as geography and environment) and technical sciences (such as environmental engineering) are more applying the principles of green economy, and this could be since the nature of green economy concepts is closely related to scientific concepts such as global warming, Carbon emissions, and acid rain, and such topics may be addressed in practical scientific colleges, on the other hand, theoretical colleges may not provide such scientific concepts to students.

Moreover, results pointed out that there are statistically significant differences between male and female students in favor of male students on the scale of awareness of environmental sustainability practices. This is consistent with the results of Sharma & Kelly [19], revealing that the principles of sustainable development related to the fields of business are of great importance. Looking mainly at the results of this study, it becomes clear that these differences between male and female students may be directly due to the aspects it contains related to the economic aspects and working on them. Environmental sustainability is also related to concepts related to industries and the production of products in a way that preserves the environment, production rates, and the provision of services, which male students may be interested in more than female students.

The results of the study's fourth question also found that there were statistically significant differences between male and female students in practical colleges of a scientific nature, and theoretical colleges in the scale of awareness of environmental sustainability practices, in favor of practical colleges of a scientific nature. This is in part in agreement with the study of Kieu et al. [20], which concluded that the College of Education still has a wide gap between the perception of sustainable development and the ability to teach for sustainable development among trained teachers due to the spread of pedagogy from top to bottom, large classes and poor facilities. The current study benefits greatly from the results of this study, as the sample included students from the College of Education within the theoretical colleges. Theoretical colleges in general may not be interested in sustainable development and are more interested in providing courses that are more related to purely academic aspects, which may explain the lower average of theoretical colleges than practical ones. On the other hand, scientific colleges may address concepts related to environmental sustainability such as depletion of environmental resources, desertification, and overgrazing. For example, the College of Applied Medical Sciences may be interested in environmental-related diseases that pose a serious and direct threat to human health, and this may explain the high average of students in practical scientific colleges in the level of environmental sustainability practices.

In general, the current study examined the awareness of Prince Sattam bin Abdulaziz University students about the green economy and environmental sustainability practices. The results revealed that male students' awareness of the green economy is high, and this is attributed to the fact that higher education students are the most enlightened, educated, and relatively young segments of Saudi society. However, the results are exposed to varying degrees of awareness, with students' college background and majors playing a major role in shaping the level of awareness. The current study is important because it deals with public awareness. Environment-related education plays a major role in facilitating awareness of green economy and environmental sustainability. Thus, this study indicated that students with a scientific background related to the environment are more aware of the green economy. A college major may promote environmental awareness among university students.

Teaching Notes

The transformation of the green economy can offset environmental, economic, and social risks and improve all sectors of the economy sustainably, especially at the university level. Such a shift is very relevant for an oil country like Saudi Arabia, which is therefore highly vulnerable to the effects of climate change. Accordingly, these countries must adopt more sustainable ways of achieving economic, social, and environmental improvement. In support of the green economy, the most important aspects identified in this study are measuring the growing awareness and understanding of environmental protection, cross-border cooperation and global interest in climate change, commercial interests in driving the development and transfer of green technologies, and poverty reduction. More efforts must be made by the Saudi government and policymakers to go beyond the mere signing of international agreements and treaties that support the transformation of the green economy into actual implementation.

Although the study focused on the particular case of Saudi Arabia, the results may not differ significantly from similar situations in other developing countries. As such, the recommendations in this study may apply to other developing countries seeking to develop green economy initiatives. Therefore, the current research recommended that opportunities (internal and external), as well as challenges (internal and external) that are likely to affect the transformation of the green economy in the Kingdom, must be evaluated. Despite the huge potential of the Kingdom in terms of formulating relevant policies, plans, and strategies as well as signing global agreements about transforming toward a green economy, there are still many goals that should take actual implementation steps.

In light of the results of the current study, the Green Saudi Initiative can be supported by mobilizing the efforts of the entire community by enhancing the views of the participants and speakers from the economy, government, and society leaders. Furthermore, this research supports a meaningful dialogue to reach effective solutions through opinions supported by scientific evidence presented by leading environmental experts in the world. It is also possible to announce the roadmap of the Green Saudi Initiative, because of the Kingdom's plan to achieve and pursue its ambitious goals. It also sheds light on the Kingdom's commitment to combating climate change by expanding the Kingdom's ambitions and climate goals.

It is also possible to direct university leaders in the Kingdom, in general, to pay attention to supporting the culture of the green economy, and this can be done by providing a unit in each college and branch of the university that is concerned with environmental affairs and clean energy, as well as making partnerships with community institutions in the field of supporting environmental sustainability and the green economy. The role of holding scientific seminars and forums that take care of preserving the environment and environmental resources should not be neglected. Besides, educational programs for the various groups and institutions of society to spread the concepts of the green economy should be provided. Existing learning outcomes can also be reviewed and developed to increase students' awareness of the green economy and environmental sustainability.

ACKNOWLEDGMENTS

We would like to express our sincere gratitude to the Deanship of Scientific Research at Prince Sattam Bin Abdulaziz University, Kingdom of Saudi Arabia.

FUNDING

This work was supported by the Deanship of Scientific Research at Prince Sattam Bin Abdulaziz University, Kingdom of Saudi Arabia. Research project No. 2021/02/17749

References

1. UNEP (United Nations Environment Programme). In: Green Economy Reports: Preview, UNEP, Nairobi, Kenya. 2010, 4–5. Available: https://www.unep.org/explore-topics/green-economy
2. Pop O, Dina GC, Martin C. Promoting the corporate social responsibility for a green economy and innovative jobs. Procedia-Social and Behavioral Sciences. 2011 Jan 1; 15:1020-3. https://doi.org/10.1016/j.sbspro.2011.03.232
3. Zacchia, G, Cipri, K, Cucuzzella, C, Calderari, G. Higher Education Interdisciplinarity: Addressing the Complexity of Sustainable Energies and the Green Economy. Sustainability. 2022. Feb. 14(4), 1998.
4. Huberty M, Gao H, Mandell J, Zysman J. Shaping the Green Growth Economy: a review of the public debate and the prospects for green growth. The Berkeley Roundtable on the International Economy. 2011.
5. Ali EB, Anufriev VP, Amfo B. Green economy implementation in Ghana as a road map for a sustainable development drive: A review. Scientific African. 2021 Jul 1(12); 1-10. https://doi.org/10.1016/j.sciaf.2021.e00756
6. Bosco Ekka, D. G, Prince Verma, D. A Review of The Contribution Of Youth To Sustainable Development And The Consequences Of This Contribution. Journal of Positive School Psychology. 2022. 3564-3574.
7. Wachholz S, Artz N, Chene D. Warming to the idea: university students' knowledge and attitudes about climate change. International Journal of Sustainability in higher education. 2014 Apr 1;15(2):128-41. http://dx.doi.org/10.1108/IJSHE-03-2012-0025
8. Dezdar S. Green information technology adoption: Influencing factors and extension of theory of planned behavior. Social Responsibility Journal. 2017 Jun 5. https://doi.org/10.1108/SRJ-05-2016-0064
9. Zhao W, Zou Y. Variation of greenness across China's universities: motivations and resources. International Journal of Sustainability in Higher Education. 2018 Jan 2. http://hdl.handle.net/11655/6048
10. Sima M, Grigorescu I, Bălteanu D. An overview of campus greening initiatives at universities in Romania. International journal of sustainability in higher education. 2019 May 8, 410-422. https://doi.org/10.1108/IJSHE-01-2019-0036
11. Nhamo G, Mukonza C. Opportunities for women in the green economy and environmental sectors. Sustainable Development. 2020 Jul; 28(4):823-32. https://doi.org/10.1002/sd.2033
12. Georgeson L, Maslin M, Poessinouw M. The global green economy: a review of concepts, definitions, measurement methodologies and their interactions. Geo: Geography and Environment. 2017 Jan; 4(1):e00036. https://doi.org/10.1002/geo2.36
13. Dong Y, Hauschild MZ. Indicators for environmental sustainability. Procedia Cirp. 2017 Jan 1; 61:697-702. https://doi.org/10.1016/j.procir.2016.11.173
14. Thangavel P, Sridevi G. Environmental Sustainability. Springer, India, Private; 2016.
15. UNESCO Education for Environmental Sustainability. United Nations Educational, Scientific and Cultural Organization; 2013.
16. Ögmundarson Ó, Herrgård MJ, Forster J, Hauschild MZ, Fantke P. Addressing environmental sustainability of biochemicals. Nature Sustainability. 2020 Mar; 3(3):167-74. https://doi.org/10.1038/s41893-019-0442-8
17. Morelli J. Environmental sustainability: A definition for environmental professionals. Journal of environmental sustainability. 2011;1(1):2. http://dx.doi.org/10.14448/jes.01.0002
18. Lu S, Zhang HS. A comparative study of education for sustainable development in one British university and one Chinese university. International Journal of Sustainability in Higher Education. 2014;15(1):48-62. http://dx.doi.org/10.1108/IJSHE-11-2012-0098
19. Sharma U, Kelly M. Students' perceptions of education for sustainable development in the accounting and business curriculum at a business school in New Zealand. Meditari

Accountancy Research. 2014 Nov 11;22(2):130-48. http://dx.doi.org/10.1108/MEDAR-12-2012-0042

20. Kieu TK, Singer J, Gannon TJ. Education for sustainable development in Vietnam: Lessons learned from teacher education. International Journal of Sustainability in Higher Education. 2016 Nov 7; 17(6), 853-874. http://dx.doi.org/10.1108/IJSHE-05-2015-0098
21. Putz LM, Treiblmaier H, Pfoser S. Field trips for sustainable transport education: Impact on knowledge, attitude and behavioral intention. The International Journal of Logistics Management. 2018 Aug 16;29(4):1424-50. http://dx.doi.org/10.1108/IJLM-05-2017-0138
22. Albareda-Tiana S, Vidal-Raméntol S, Pujol-Valls M, Fernández-Morilla M. Holistic approaches to develop sustainability and research competencies in pre-service teacher training. Sustainability. 2018 Oct 15;10(10):3698. http://dx.doi.org/10.1108/IJSHE-05-2017-0069
23. Cottafava D, Cavaglià G, Corazza L. Education of sustainable development goals through students' active engagement: A transformative learning experience. Sustainability Accounting, Management and Policy Journal. 2019 Jun 10; 10(3), 521-544. https://doi.org/10.1108/SAMPJ-05-2018-0152
24. Brandt JO, Bürgener L, Barth M, Redman A. Becoming a competent teacher in education for sustainable development: Learning outcomes and processes in teacher education. International Journal of Sustainability in Higher Education. 2019 Jun 26; 20(4), 1467-6370. DOI 10.1108/IJSHE-10-2018-0183
25. Affolderbach, J . Translating green economy concepts into practice: ideas pitches as learning tools for sustainability education, Journal of Geography in Higher Education. 2022 Nov. 46:(1), 43-60, DOI: 10.1080/03098265.2020.1849063
26. Al-Balushi, A, Ramadan, E, Zakaria, S, Dairi, H. Attitudes towards Green Economy Concerns among Higher Education Students in Oman. American Journal of Climate Change. 2022 Dec. 1, 331-341. DOI: 10.4236/ajcc.2022.114016.
27. Soomro, B, Ghumro, I, Shah, N. Green entrepreneurship inclination among the younger generation: An avenue towards a green economy. Sustainable Development. 2020. Oct. 28(4), 585-594.
28. government communication. Green Saudi Arabia. 2021. Available: https://cgc.gov.sa/sites/default/files/2021-10/%D8%A7%D9%84%D8%B3%D8%B9%D9%88%D8%AF%D9%8A%D8%A9%20%D8%A7%D9%84%D8%AE%D8%B6%D8%B1%D8%A7%D8%A1.pdf
29. Al-Riyadh Newspaper. The Crown Prince inaugurates the "Green Saudi Initiative forum", 2021. https://www.alriyadh.com/1914575
30. Green Saudi Initiative. His Highness the Crown Prince announces the Green Saudi Initiative and the Green Middle East Initiative. 21 October 2021. Available: https://www.saudigreeninitiative.org/wp-content/uploads/2021/05/27March_AR_HRH_Crown_Prince_Announces_the_Saudi_Green_Initiative_and_the_Middle_East_Green_Initiative.pdf
31. UNDESA (United Nations Department of Economic and Social Affairs), in: A guidebook to a green economy, Issue 2: Exploring green economy principles., UNDESA United Nations Division for Sustainable Development, New York, United States of America, 2012, p. 62. b.
32. Findler F, Schönherr N, Lozano R, Reider D, Martinuzzi A. The impacts of higher education institutions on sustainable development: A review and conceptualization. International Journal of Sustainability in Higher Education. 2019 Jan 2; 20(1), 23-38. https://doi.org/10.1108/IJSHE-07-2017-0114
33. Saudi Ministry of Education A. sustainable development. 30 March 2022. Available: https://moe.gov.sa/ar/aboutus/aboutministry/Pages/sustainabledevelopment.aspx
34. Asharq Al-Awsat Newspaper. Saudi Arabia approves an independent waste management system to achieve sustainability and protect the environment. 30 March 2022. Available: https://aawsat.com/home/article/3127596/

35. Saudi Press Agency. The National Water Conservation Program launches innovative programs to correct water consumption behaviors. 2 March 2020. Available: https://www.spa.gov.sa/viewstory.php?lang=ar&newsid=2041701

36. General Authority for Statistics. The Sustainable Development Goals in the Kingdom of Saudi Arabia: Statistical Report on the Current Situation. December 2018. Available: https://www.stats.gov.sa/sites/default/files/ltqryr_lhsyy_llwd_lrhn_lhdf_ltnmy_lmstdm_2.pdf

37. Ministry of Education in the Kingdom of Saudi Arabia b. Science Fifth Grade Curriculum. Chapter Six: Protecting Environmental Resources. 30 March 2022. Available: https://sahl.io/sa/lesson/325

38. Ministry of Education in the Kingdom of Saudi Arabia c. Science curriculum for the second intermediate grade. Unit Two: Matter and Energy. 30 March 2022. Available: https://www.chemistry1science.com/2021/05/2020-pdf-scien.html#3

39. University Vice Presidency for Educational and Academic Affairs at Prince Sattam bin Abdulaziz University. An invitation to university students to participate in the Student Scientific Forum. March 2022. Available: https://vreaa.psau.edu.sa/ar/advertise/2022-01-19

40. UNDESA (United Nations Department of Economic and Social Affairs), in: A guidebook to the green economy, Issue 1: History, definitions and a guide to recent publications, UNDESA, United Nations Division for Sustainable Development, New York, United States of America, 2012, p. 60. a.

41. Green Saudi Initiative. 5 November 2021. Available: https://www.saudigreeninitiative.org/ar/#purpose

42. Saudi Press Agency. The Crown Prince announces the “Green Saudi Arabia” and “Green Middle East” initiatives. 27 March 2021. Available: https://sabq.org/QyXcpk?t=1616868924