

# The Role of gender in the students' Sustainability Consciousness: Evidence from the Egyptian Private Higher Education Sector

دور النوع الاجتماعي في وعي الطلاب بالاستدامة: أدلة من قطاع التعليم العالي الخاص في مصر

Ahmed Samir Roushdy \*  
[ahmed.roushty@eslca.edu.eg](mailto:ahmed.roushty@eslca.edu.eg)

Abdul Ruhman Ali \*\*  
[abduhrhman.juhmani21bg@eslca.edu.eg](mailto:abduhrhman.juhmani21bg@eslca.edu.eg)

## **Abstract:**

The current research investigated gender's impact on sustainability consciousness among Egyptian private university students. Using the Short Version of the Sustainability Consciousness Questionnaire (SCQ-S), 381 students (193 males, 188 females) were surveyed on their sustainability knowledge, attitudes, and behaviors. Results indicated that gender influenced sustainability knowledge but not attitudes or behaviors. This finding contributes to understanding gender dynamics in sustainability education and emphasizes the need for tailored approaches in diverse student populations. The research offers insights for educational institutions and policymakers in Egypt and similar emerging markets, suggesting gender-sensitive strategies for sustainability education. Recommendations for promoting gender equity in sustainability consciousness and areas for future research are also provided

**Keywords: Gender; Sustainability; University; Higher Education.**

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\* Professor of Marketing, Misr University for Science & Technology.

\*\* DBA Student – ESLSCA University.

## ملخص:

تناول هذا البحث قضية محورية في مجال التعليم المستدام، حيث يسعى إلى دراسة وتحليل العلاقة بين النوع الاجتماعي ومستوى الوعي بالاستدامة في سياق التعليم العالي المصري، مع التركيز بشكل خاص على طلاب الجامعات الخاصة. ويأتي هذا البحث في إطار الجهود العالمية المتزايدة لفهم العوامل المؤثرة في تشكيل الوعي البيئي والاستدامة لدى الأجيال الشابة.

تم اعتماد منهجية علمية دقيقة تستند إلى: استخدام النسخة المختصرة من استبيان الوعي بالاستدامة (SCQ-S)، وهي أداة معتمدة عالمياً لقياس الوعي بالاستدامة، شملت عينة الدراسة 381 طالباً وطالبة، موزعين بشكل متوازن تقريباً بين الجنسين (193 طالباً و188 طالبة)، تم قياس ثلاثة أبعاد رئيسية: المعرفة البيئية، والمواقف تجاه الاستدامة، والسلوكيات المستدامة.

كشفت الدراسة عن نتائج مهمة تتمثل في وجود تأثير ملحوظ للنوع الاجتماعي على مستوى المعرفة بقضايا الاستدامة، وعدم وجود فروق ذات دلالة إحصائية بين الذكور والإناث في المواقف والسلوكيات المتعلقة بالاستدامة، وتباين في مصادر وأنماط اكتساب المعرفة البيئية بين الجنسين. وتكمن أهمية هذه النتائج في: تقديم فهم أعمق لديناميكيات النوع الاجتماعي في مجال التعليم من أجل الاستدامة، وتوفير أساس علمي لتطوير برامج تعليمية تراعي الفروق بين الجنسين، والإسهام في تطوير السياسات التعليمية في مصر والدول النامية المماثلة.

**الكلمات المفتاحية:** النوع، الاستدامة، الجامعات، التعليم العالي.

## **Introduction:**

Sustainability has emerged as a critical global focus in recent decades, driven by increasing concerns about the planet's future. It emphasizes the protection of life, the environment, and resources for future generations, aiming to create harmony between economic, environmental, and social factors. The fourth industrial revolution, urban renaissance, and technological advancements of the 21st century have further elevated the importance of sustainability, giving rise to concepts like "sustainable development."

The objective of this research was investigating the influence of gender on students' sustainability consciousness within the private higher education sector in Egypt. This study is particularly relevant as understanding the factors that shape young people's attitudes and behaviors toward environmental, social, and economic sustainability becomes increasingly critical in our globalized world.

To address these challenges, enhancing individuals' sustainability consciousness has become critical. This involves raising awareness about environmental degradation, social impacts, and the consequences of unsustainable behaviors. The goal is to equip individuals with a broad perspective that enables them to recognize the seriousness of climate change and unsustainable patterns of production and consumption, fostering a sense of responsibility for changing their habits and methods.

Egypt, like many countries, has been increasingly focusing on sustainability. The government has recognized its importance in securing a better future for its citizens and safeguarding the country's natural resources. These efforts include promoting renewable energy, reducing waste and pollution, conserving biodiversity, enhancing social inclusion, and ensuring fair working conditions in both public and private sectors.

To achieve its sustainability goals, Egypt has proposed a long-term strategy called "Egypt Vision 2030." This comprehensive governmental agenda, published in February 2016, outlines the country's strategic plan to implement sustainability concepts across all sectors. Egypt's Vision 2030 embodies the three dimensions of sustainable development: economic growth, social inclusion, and environmental protection.

In the context of higher education, this research focuses on the private sector in Egypt, examining how gender might influence sustainability consciousness among students. By exploring potential gender differences in sustainability knowledge, attitudes, and behaviors, this study aims to provide valuable insights for educational institutions and policymakers. These findings could inform the development of more effective, gender-sensitive

approaches to sustainability education, ultimately contributing to the broader goals of sustainable development in Egypt and similar emerging markets.

### **Literature Review:**

The rapid advancement in technological expertise and capabilities, along with the expansion of a globally interconnected economy and the rapid increase in the world's population, has generated both remarkable opportunities and complicated challenges for humanity and the environment (Mohrman & Winby, 2018). In recent decades, there has been a remarkable generation of wealth, lifting significant portions of the global population out of poverty.

Aburto and Wagner assert that sustainability is now a priority issue that governments, businesses, and society in general must address in the short term (Barrera & Wagner, 2023), meanwhile, according to Berglund, from a global perspective, the subject of Education for Sustainability involves achieving sustainability, particularly environmental sustainability, while integrating advanced technology aimed at a sustainable future and simultaneously promoting social and economic development (Berglund, Gericke, Pauw, Olsson, & Chang, 2020).

Sustainable development is defined as growth and progress that satisfies the needs of the present without threatening the ability of future generations to meet their own needs (United Nations, 1987). The concept extends beyond environmental protection, enhancing living standards, or managing economic development—it emphasizes the interconnection between people and their environment (Sobol, 2008). It is about preserving our planet and leaving enough for future generations to continue with a healthy life and a clean environment.

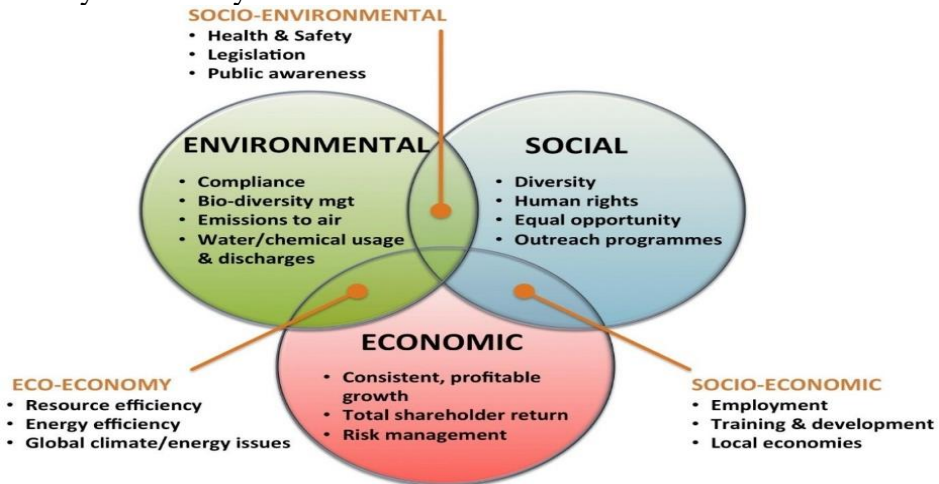
This research adopted this definition of sustainable development according to the following justifications. *First*, it emphasizes global development, presenting sustainability as a continuous process that demands ongoing improvement and perpetual progress. *Additionally*, it spotlights the significance of human needs, which, according to Maslow's hierarchy, include not only necessities like food, water, and safety but also psychological and self-fulfillment needs. *Finally*, it underscores the scarcity and limitation of resources, stressing that their preservation is essential to ensuring humanity's survival and continued existence on earth.

Fifteen strategic perspectives across three dimensions of sustainable development have been identified to guide education and learning for sustainability (UNESCO, 2015), they are as follows:

1. Socio-cultural perspectives: These include human rights, peace and human security, gender equality, cultural diversity and intercultural understanding, health, HIV/AIDS, and governance.
2. Environmental perspectives: These cover natural resources such as water, energy, agriculture, and biodiversity, as well as climate change, rural development, sustainable urbanization, and disaster prevention and mitigation.
3. Economic perspectives: These encompass poverty reduction, corporate responsibility and accountability, and the market economy.

### ***Pillars of sustainable development***

The source of the three pillars model has been variously attributed to the Brundtland Report (United Nations, 1987), Agenda 21 which is an inclusive roadmap of action to be taken universally, and locally by organizations of the United Nations, governments, institutions, and individuals in every area in which humans have impact on and affect the environment. It has also been included in the 2002 World Summit on Sustainable Development in Johannesburg. The following figure (3) represents sustainability, which is the area whereby each of the three circles that represent the environment, the economy and society intersect.



**Figure (1) - Balancing the pillars of sustainable development,**

**Source: sellingsustainabilitysolutions.com.**

The three pillars model provides a robust roadmap to ensure that development efforts are holistic and sustainable in the long run. The model is used in diversified sectors, including decision makers, business strategy, environmental associations, urban planning, and education and in International Treaties such as the United Nations Sustainable Development Goals (SDGs), the three pillars of sustainability are inter thread across different targets to promote sustainable growth at national and global levels (United Nations, 1987).

### ***Environmental Pillar:***

The Environmental responsibility pillar can significantly contribute to environmental sustainability by adopting several strategies:

1. Reducing carbon emissions: By lowering the amount of greenhouse gases they release; factories can help mitigate climate change. This can be achieved through energy efficiency measures, using cleaner production technologies and transitioning to low-carbon fuels.
2. Increasing recycling: Implementing recycling programs for materials used in production helps minimize waste sent to landfills. This also conserves resources and can reduce the need for raw materials.
3. Using renewable energy: By switching to renewable energy sources like solar, wind, or hydropower, factories can reduce reliance on fossil fuels, lowering their carbon footprint and promoting cleaner energy alternatives.
4. Reducing wasteful practices: Factories can optimize production processes to use fewer resources, minimize waste, and lower costs. This might involve better management of raw materials, reducing water and energy consumption, or implementing lean manufacturing techniques to cut down on inefficiency (United Nations, 2015).

### ***Social Pillar:***

The social responsibility pillar focuses on the well-being of people impacted by the business. This includes:

1. Employee welfare: Providing fair wages, safe working conditions, and opportunities for growth ensures the well-being of employees.
2. Consumer benefits: Ensuring that products are safe, high-quality, and ethically produced builds consumer trust and loyalty.
3. Community engagement: Supporting local communities through charitable initiatives, education, or environmental conservation programs demonstrates a company's commitment to social progress.

For instance, manufacturers may invest in local infrastructure or health programs to give back to the community (United Nations, 1987).

### ***Economic Pillar:***

The economic pillar ensures the financial sustainability of a business by maintaining:

1. Accurate and transparent accounting: This means following legal and ethical standards in financial reporting, which fosters trust with investors, customers, and regulators.
2. Regulatory compliance: Factories must follow laws and regulations related to labour practices, environmental standards, and financial disclosures. Meeting these requirements helps avoid legal penalties and supports long-term growth (Boussemart, Leleu, Shen, & Valdmanis, 2020).

Together, these pillars of environmental, social, and economic sustainability allow companies to balance profitability with long-term sustainability goals. By addressing all three areas, manufacturers can foster a holistic approach to responsible business practices.

The role of education in promoting sustainability, as proposed in the agenda of United Nations Educational Scientific and Cultural Organization (UNESCO, 2015), holds particular importance. Therefore, enhancing sustainability consciousness in higher education is becoming essential to encourage environmentally responsible behavior across all levels (Gombert-Courvoisier, Sennès, & Ribeyre, 2014).

These practices raise the visibility of sustainable initiatives within universities, offer solutions to sustainability challenges, built trust among students, administrators, and faculty, and enhance the environmental learning experiences of students (Pena-Cerezo, Artaraz-Minon, & Tejedor-Nunez, 2019):

1. Enhanced Visibility of Sustainable University Initiatives: By actively promoting and implementing sustainable practices, universities can highlight their commitment to environmental responsibility. This heightened visibility not only draws in potential students but also positions the institution as a leader in sustainability within the academic community and in the broader community.
2. Offer Solutions to Sustainability Challenges: These practices frequently incorporate innovative approaches to tackling critical

- sustainability issues, such as waste management, energy consumption, and resource conservation. By finding effective solutions, universities can serve as models for other organizations and contribute to broader environmental objectives.
3. **Building Trust:** Establishing a sustainability-focused culture helps in building trust among various stakeholders, students, faculty, and administrators. When everyone recognizes that the university is genuinely committed in sustainable practices, it strengthens collaboration and support for sustainability initiatives, creating a stronger and more cohesive community.
  4. **Enriching Students' Learning Experiences:** Sustainability practices can be integrated into both the curriculum and extracurricular activities, providing students with hands-on learning opportunities. This experiential learning not only deepens their understanding of sustainability issues but also equips them with the skills and knowledge necessary to make a positive impact in their future careers.

### **Sustainability Consciousness Dimensions:**

- ***Sustainability Knowingness:***

Sustainability knowingness has relevance to the degree of awareness and comprehension individuals take control of regarding sustainability and its characteristics. It's important to note that having greater knowledge about sustainability does not automatically guarantee a shift toward more environmentally conscious behaviors. Understanding sustainability is an important commencement, knowing that concrete changes in actions frequently require additional considerations, such as motivation, ethics, moral values, and social influences, to effectively translate knowledge into practice (Heeren, Zwickle, Koontz, Slagle, & McCreery, 2016), sustainability knowingness encompasses awareness of environmental challenges, social dimensions, and economic factors related to sustainability, in addition an understanding of how these elements are integrated. This comprehensive perspective helps individuals recognize the complex relationships among these aspects, fostering a more inclusive approach to sustainability that considers the environmental, social, and economic impacts of their activities.

The effective implementation of sustainability initiatives in the environment considerably relies on individuals' consciousness and their understanding of sustainability concepts. Achieving sustainability knowledge is a shared objective for countries, communities, organizations, and both



public and private educational institutions. This knowledge serves as a pivotal foundation, enabling communities to recognize the importance of sustainability and engage in practices that promote environmental protection and responsible resource management (Cogut, Webster, Marans, & Callewaert, 2019).

The importance of sustainability knowledge is particularly apparent among individuals involved in environment-related activities, especially those with a scientific background obtained through academic studies or empirical experience in environmental specializations. These participants typically demonstrate an extensive understanding of environmental issues and exhibit a stronger commitment to sustainability. They are more likely to propose initiatives focused at enhancing our environmental conditions, stand up for policies and legislation focused on environmental preservation, and actively promote their positive sustainability ideas to other participants. This expertise fosters a collaborative environment that encourages combined action toward sustainable practices (Bellou, Petreniti, & Skanavis, 2017).

Sustainability knowingsness includes knowledge about first, environmental issues which involves understanding concepts such as pollution of water resources, global warming, desertification, air pollution, and depletion of underground resources. It also includes knowledge about the importance of conservation, green energy, recycling, clean energy, waste management and sustainable land and water use. Second, social issues which includes knowledge about social equity, human rights, labor practices, community development, and the impact of economic practices on local communities. It also includes understanding the social dimensions of sustainability, such as social justice, poverty mitigation, and inclusivity. Third, Economic Issues which comprehend understanding the economic aspects of sustainability, such as the circular economy, sustainable business practices, responsible consumption and production, and the economic benefits of transitioning to a more sustainable pattern.

- ***Sustainability Attitudes:***

It's important to consider that, under regular circumstances, individuals often do not fully recognize their societal responsibilities regarding sustainability and environmental issues. Awareness levels vary significantly among individuals, leading to differences in their initiative and engagement when it comes to selecting environmentally friendly attitudes and behaviors. This inconsistency highlights the need for targeted attempts to enhance

understanding and encourage active participation in sustainability initiatives (Bellou, Petreniti , & Skanavis, 2017).

Sustainability attitudes encompass the beliefs, values, behaviors, and perspectives that individuals possess regarding the importance of sustainability in addressing environmental, social, and economic challenges. These attitudes significantly influence people's behaviors, way of living, preferences, priorities, and actions related to sustainability. Individuals who exhibit strong attitudes toward sustainability and environmental issues are more likely to engage in original, environmentally friendly behaviors and contribute positively to their communities. This connection underscores the importance of fostering positive sustainability attitudes to promote active participation in sustainable practices (Kozar & Connell, 2012).

Sustainability attitudes include three dimensions, first is environmental consciousness which represent people with a strong environmental consciousness believe in the essential value of nature and prioritize its protection. They recognize the importance of conserving natural resources, reducing pollution, and preserving biodiversity. They participate in activities such as recycling, energy conservation, and supporting environmentally friendly practices. They can also be significant representatives in reducing an organization's environmental attitude if they adopt environmental attitudes on a personal level, such as reducing the waste of electricity, water and the consumption of plastic and paper (Nisar, R. Khan, & Rehman Khan, 2021).

Second is Social Responsibility which represent Individuals with a social responsibility attitude call for sustainability to improve social conditions and promote equity. They believe in the significance of fair treatment, social justice, and inclusivity. They participate in activities that support community development, ethical work practices, and initiatives aimed to reducing inequality and poverty.

Third is Collaboration and Engagement which represent Individuals who underline the importance of collaboration and collective action in achieving sustainability goals. They believe that individuals, communities, businesses, organizations, society, and governments need to work together to address sustainability challenges effectively. They participate in community initiatives and engage in and support involvement that give a higher position to sustainable development.

- ***Sustainability Behavior:***

Sustainability behavior encompasses the actions, attitudes, and practices that individuals, organizations, and communities engage in to promote and achieve sustainability objectives. These behaviors are in harmony with the principles of environmental sustainability and social responsibility. Manipulating environmental issues necessitates an ethical dimension, where individuals adopt specific behaviors that reflect a commitment to the environment. This focus on responsible actions highlights the importance of cultivating distinguished behaviors that contribute positively to sustainability goals (Asadi, et al., 2019), the components of sustainability Behavior are actions which are the tangible steps taken by individuals and organizations, such as reducing waste, recycling, using energy-efficient appliances, conserving water, and adopting renewable energy sources.

The actions based on attitudes, which is the mindset or belief system regarding the importance of sustainability influences Behavior. Positive attitudes toward the environment and social responsibility encourage proactive participation in sustainable practices, and practices which includes the habitual Behaviors that contribute to sustainability, such as participating in community clean-up events, supporting local businesses authorities that prioritize sustainability, and advocating for policies that protect the environment.

The ethical dimension of sustainability behavior is critical. It involves recognizing the moral responsibility to care for the environment and future generations. Individuals may feel forced to adopt specific behaviors—such as reducing disposable plastics or participating in advocacy efforts for climate action—based on their values and ethical beliefs, explained that if individuals believe in achieving a balance between humanity and nature and believe that the benefits of sustainability activities and behaviors like recycling, afforestation, using green energy, exercising, and using public transportation are going to accrue soon, they are more probably going to engage in and encourage sustainable behavior at all levels (Paswan, Guzmán, & Lewin, 2017).

### **Research Problem:**

Sustainability consciousness has become crucial in addressing global environmental, resource, and social challenges. Higher education institutions play a vital role in shaping students' understanding and engagement with sustainability issues. While numerous studies have explored the relationship between sustainability education and student consciousness globally, there is a significant gap in empirical research examining these dimensions within the Egyptian private higher education sector.

Furthermore, the role of gender in shaping sustainability consciousness in this specific context remains unexplored. This study aims to address this gap by investigating the influence of gender on students' sustainability consciousness within Egyptian private universities. By doing so, this research seeks to provide valuable insights that can inform policy-making, curriculum development, and educational strategies in Egypt and similar emerging markets.

This study's findings have the potential to contribute significantly to the body of knowledge on sustainability education in the region and offer practical implications for enhancing gender-sensitive approaches to sustainability consciousness in higher education. Ultimately, this research aims to bridge the existing knowledge gap and provide empirical evidence to guide educational institutions and policymakers in fostering a more robust and equitable sustainability consciousness among students in Egyptian private universities.

### **Research Objective:**

The main objective of the current research was to investigate the impact of gender on students' sustainability consciousness in Egypt's private higher education sector. It examined gender-based differences in knowledge, attitudes, and behaviors related to sustainability, while also identifying key factors contributing to these variations. In addition the research aimed to achieve the following objectives”

1. Assessing Sustainability Consciousness: The study sought to evaluate students' levels of sustainability consciousness, focusing on knowledge, attitudes, and behaviors within Egypt's private higher education sector.

2. Gender Influence: It aimed to explore the extent to which gender influences sustainability consciousness, identifying differences between male and female students in terms of their knowledge, attitudes, and behaviors. The researcher built on findings from Gericke's study, which suggested the need for further exploration of gender differences in this area (Berglund, Gericke,

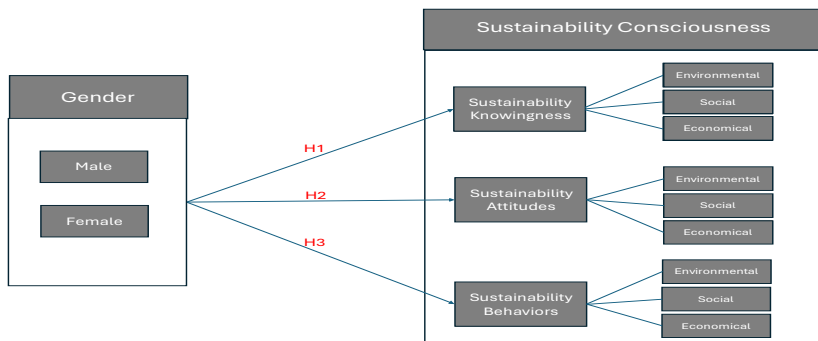
Pauw, Olsson, & Chang, 2020). This study specifically addresses how gender affects sustainability consciousness in Egypt's higher education students.

3. Key Contributing Factors: The research analyzed social, cultural, and economic factors that might contribute to gender differences in sustainability consciousness among students.

4. Recommendations for Policy Makers: Finally, the study provided recommendations for policymakers in higher education, focusing on ways to enhance sustainability education programs that address gender-specific needs and behaviors within private institutions.

### **Proposed Research Model and Hypotheses:**

Based on the literature review, research objective, and research problem, the proposed theoretical framework in Figure (1) illustrates the relationship between the independent variables (IV) and the dependent variables (DV) within the context of the three pillars model.



**Figure (1) Proposed theoretical framework**  
**Source: By the researcher, based on literature.**

### **Research Hypotheses**

**H1:** There are significant differences in students’ consciousness of Sustainability Knowingness in Egyptian private sector, based on personal characteristics (gender).

**H2:** There are significant differences in students’ consciousness of Sustainability Attitudes in Egyptian private sectors, based on personal characteristics (gender).

**H3:** There are significant differences in students’ consciousness of Sustainability Behavior in Egyptian private sector, based on personal characteristics (gender).

## **Research Methodology:**

- **Sampling Design Process:**

The current study target population consisted of all students in the private higher education sector in Egypt, according to the Central Agency for Public Mobilization and Statistics (CAPMAS,2024), the number of enrolled students in higher education reached 3.7 million during the academic year 2022-2023, compared to 3.5 million students during the academic year 2021-2022, with an increase of 5.7%.

The sampling unit of analysis is the individual students of the private higher education sector in Egypt, the research sample was determined using the convenience sample method (Saunders, Lewis, & Thornhill, 2019) due to the difficulty of determining the research community. Therefore, the Stephen Thompson equation was used to calculate the study sample and the study community exceeded 50,000 students. The result of calculated sample size =381 n. The study relied on the statistical program SPSS v25 to analyze the study data and obtain the estimated results in the study.

- **Research Design:**

The current study adopted a descriptive, cross-sectional research approach, leveraging a single-point cross-sectional design to effectively address the research questions, this methodological choice is particularly suitable for providing a comprehensive picture of the variables of interest at a specific point in time, allowing for a detailed examination of the phenomena under investigation.

- **Data collection:**

The primary data for this study was collected using a carefully designed online questionnaire, which structured into two distinct sections to capture a comprehensive set of data relevant to the research hypotheses.

The first section of the questionnaire focused on collecting demographic information from the participants. This section included questions on key characteristics such as gender, which is essential for the study's investigation of its impact on sustainability consciousness this demographic data is essential for analyzing how different gender groups perceive and interact with sustainability issues.

The second section of the questionnaire was composed of three distinguished scales, each designed to measure different aspects of sustainability consciousness:

1. Knowledge of Sustainability Consciousness: includes 9 items that aim to assess participants' knowledge of sustainability concepts and practices.
2. Attitudes towards Sustainability Consciousness: consists of 9 items and focuses on capturing participants' attitudes towards sustainability.
3. Behaviors towards Sustainability Consciousness: consisting of 9 items, is designed to measure participants' behaviors related to sustainability.

## **Data Analysis and Hypotheses Testing**

- ***Data Cleaning Procedures:***

In the data cleaning phase, a total of 385 students from private universities in Egypt participated in the survey. After validating all responses, 381 questionnaires were found to be valid, with a response rate of 98.9%. The researcher then proceeded with statistical analyses using this complete set of valid observations. The completeness and integrity of the dataset provided a solid basis for drawing meaningful insights and conclusions from the empirical evidence of the study.

- ***Distribution of the study sample according to (Gender):***

The demographic characteristics of the study items were represented in (gender), regarding the distribution of the study sample items, that males accounted for 50.7% of the total study sample, while females accounted for 49.3% according to the study sample responses, indicating that males' response was slightly higher than females' in answering the questionnaire questions.

- ***Reliability and validity:***

The study was concerned with verifying the reliability and validity of the scale, which can be shown in the following table no (1).

**Table (1) Reliability and validity result**

	items	Cronbach's Alpha	Validity
Environmental	3	0.720	0.849
Social	3	0.701	0.837
Economical	3	0.760	0.872
<b>Sustainability Knowingness (SK)</b>	<b>9</b>	<b>0.774</b>	<b>0.880</b>
Environmental	3	0.741	0.861
Social	3	0.731	0.855
Economical	3	0.738	0.859
<b>Sustainability Attitudes (SA)</b>	<b>9</b>	<b>0.810</b>	<b>0.900</b>
Environmental	3	0.745	0.863
Social	3	0.824	0.908
Economical	3	0.700	0.837
<b>Sustainability Behavior (SB)</b>	<b>9</b>	<b>0.805</b>	<b>0.897</b>
total	27	0.901	0.949

**Source: Output from SPSS v25.**

It is clear from Table (1) that the overall stability of the study tool of sustainability consciousness reached 0.901 with a reliability coefficient of 0.949, which means the ability to rely on these measures. A value of 0.901 is considered excellent, indicating that the items in the research sustainability consciousness questionnaire are highly consistent with each other. This means that participants' responses to the various items in the questionnaire are likely to be reliable and stable. A coefficient of 0.949 suggests exceptionally high reliability. This means research sustainability consciousness questionnaires can be trusted to produce consistent results across different administrations or samples, making it very dependable for assessing sustainability consciousness.

- **Internal consistency:**

The internal consistency validity of the dimensions was calculated using the Pearson correlation coefficient to measure the relationship between each dimension and the total score of the total dimensions related to the study.

The Pearson correlation coefficient ( $r$ ) is the most common way of measuring a linear correlation. It is a number between  $-1$  and  $1$  that measures the strength and direction of the relationship between two variables. When



one variable changes, the other variable changes in the same direction (Benesty, Chen, & Huang, 2009).

**Table (2) internal consistency results for the dimensions of SC**

Sustainability Knowingness (SK)		Sustainability Attitudes (SA)		Sustainability Behavior (SB)	
SKE	0.842**	SAE	0.735**	SBE	0.839**
SKS	0.840**	SAS	0.814**	SBS	0.871**
SKEC	0.766**	SAEC	0.819**	SBEC	0.663**

\*\* Correlation is significant at the 0.01 level (2-tailed).  
n=381

Source: Output from SPSS v25.

#### 4.1 Descriptive Analysis for Dimensions:

##### 4.6.1 Sustainability Knowingness dimensions:

**Table (3) Descriptive analysis for Sustainability Knowingness dimensions**

items	Std. Deviation	Mean	Rank
SKE1	0.196	3.380	3
SKE2	0.936	4.030	2
SKE3	0.780	4.160	1
Environmental	0.722	3.850	3
SKS1	0.888	4.010	2
SKS2	0.858	4.020	1
SKS3	0.924	3.960	3
Social	0.673	4.000	2
SKEC1	0.370	3.740	3
SKEC2	0.963	4.080	2
SKEC3	0.815	4.300	1
Economical	0.665	4.040	1
total	0.561	3.963	-

Source: Output from SPSS v25.

Table (3) shows a positive trend in the study sample's Sustainability Knowingness dimensions. Economic Sustainability Knowingness (SKEC) ranked highest, followed by Social Sustainability Knowingness (SKS) and Environmental Sustainability Knowingness (SKE). Participants showed strong awareness of economic aspects, with a mean of 4.04. Social aspects were also well understood, with a mean of 4.0. Environmental awareness, though slightly lower, was still significant, with a mean of 3.85. The study sample emphasized the importance of eradicating poverty, respecting human rights, and educating people on disaster preparedness for sustainable development.

#### 4.6.2 Sustainability Attitudes Dimensions:

Table (4) shows that the general trend of the study sample for the dimensions of Sustainability Attitudes is positive, as the standard deviation reached 0.555 and the arithmetic mean reached 4.14, which corresponds to (agree) according to the five-point Likert scale.

**Table (4) Descriptive analysis for Sustainability Attitudes dimensions**

items	Std. Deviation	Mean	Rank
SAE1	0.789	4.37	3
SAE2	0.749	4.48	1
SAE3	0.798	4.39	2
Environmental	0.635	4.41	1
SAS1	0.91	3.99	2
SAS2	0.922	3.96	3
SAS3	0.863	4.05	1
Social	0.693	4.00	3
SAEC1	0.944	4.01	1
SAEC2	0.958	4.00	2
SAEC3	0.966	4.01	1
Economical	0.776	4.01	2
total	0.555	4.14	-

**Source: Output from SPSS v25.**

The dimensions of Sustainability Attitudes were ranked according to the arithmetic mean as follows (Environmental dimension came in first place, Economical in second place, and social in third place).

Participants showed strong support for environmental sustainability, emphasizing the need for stricter laws to protect the environment. They also agreed on the importance of companies reducing packaging and providing equal working conditions globally. However, social sustainability received slightly lower emphasis, with participants agreeing on the importance of gender equality in education and employment.

#### 4.6.3 Sustainability Behavior Dimensions:

Table (5) shows that the general trend of the study sample for the dimensions of Sustainability Behavior is positive, as the standard deviation reached 0.62 and the arithmetic mean reached 4.0, which corresponds to (agree) according to the five-point Likert scale.

**Table (5) Descriptive analysis for Sustainability Behavior dimensions**

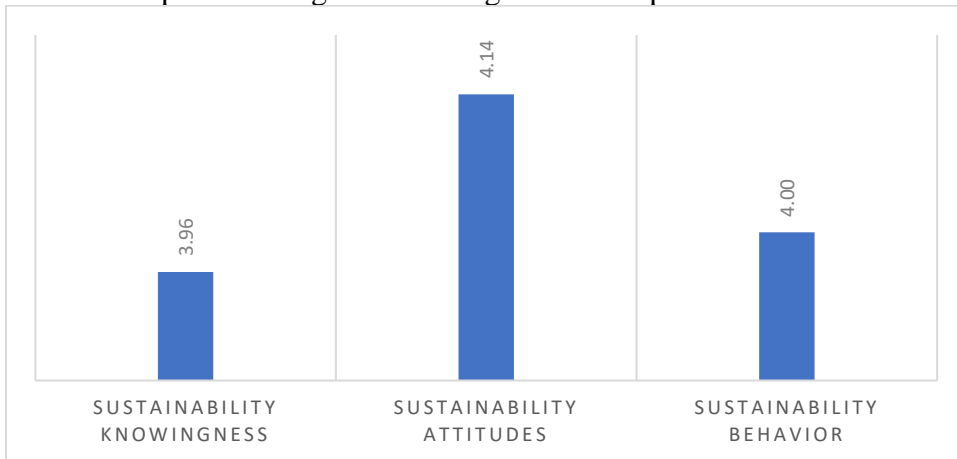
items	Std. Deviation	Mean	Rank
SBE1	0.81	4.15	1
SBE2	0.97	4.01	3
SBE3	0.92	4.09	2
Environmental	0.74	4.08	1
SBS1	0.62	3.98	1
SBS2	0.99	3.98	1
SBS3	0.55	3.86	2
Social	0.88	3.94	3
SBEC1	0.72	3.99	2
SBEC2	0.99	3.87	3
SBEC3	0.83	4.11	1
Economical	0.71	3.99	2
total	0.62	4.00	-

**Source: Output from SPSS v25.**

The study ranked Sustainability Behavior dimensions based on arithmetic mean: Environmental (1st), Economical (2nd), and Social (3rd). Students showed strong engagement in environmental practices like recycling and resource conservation. Economic behavior focused on avoiding products from unethical companies. Social behavior ranked lower, indicating less engagement in behaviors supporting social sustainability. Promoting respectful online interactions and gender equality are key aspects of social

sustainability. Factors influencing lower engagement in social sustainability may include limited exposure to concepts or perceived relevance.

Figure (2) shows the order of the Sustainability dimensions according to the results of the study sample, where Sustainability Attitudes came in first place with an arithmetic mean of 4.14, which corresponds to I agree according to the Likert scale, and in second place came the Sustainability Behavior dimension with an arithmetic mean of 4, and in third and last place came the Sustainability Knowingness dimension with an arithmetic mean of 3.96, which corresponds to I agree according to the five-point Likert scale.



**Figure (2) Order of Sustainability dimensions**

**Source: Output from SPSS v25**

The study ranked Sustainability Behavior dimensions: Environmental (1st), Economical (2nd), and Social (3rd). Students were highly engaged in environmental practices like recycling. Economic behavior focused on avoiding products from unethical companies. Social behavior ranked lower, indicating less engagement. Promoting respectful online interactions and gender equality are key aspects of social sustainability. Factors influencing lower engagement in social sustainability may include limited exposure or perceived relevance.

## 4.2 Testing the Research hypotheses:

To test the main hypothesis of the study, the research seeks to measure the effect of gender (independent variable) on students' consciousness of sustainability (dependent variable) using a questionnaire. This means that we want to determine if there is a statistically significant difference in the level of students' consciousness of sustainability between males and females.

### 4.7.1 Determining the appropriate statistical test:

The study compares the means of males and females on sustainability consciousness using the t-test for two independent samples. However, as the data does not follow a normal distribution, the Mann-Whitney U test is more appropriate in this case.

**Table (6) Tests of Normality**

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SKE	0.139	381	0.000	0.949	381	0.000
SKS	0.154	381	0.000	0.930	381	0.000
SKEC	0.138	381	0.000	0.924	381	0.000
SAE	0.195	381	0.000	0.826	381	0.000
SAS	0.143	381	0.000	0.938	381	0.000
SAEC	0.154	381	0.000	0.916	381	0.000
SBE	0.162	381	0.000	0.905	381	0.000
SBS	0.209	381	0.000	0.900	381	0.000
SBEC	0.170	381	0.000	0.913	381	0.000

**Source: Output from SPSS v25.**

### 4.7.2 Test Hypotheses H<sub>1</sub>:

To measure the extent of significant differences, the Mann-Whitney Test was used to measure **H<sub>1</sub>**: There are significant differences in students' consciousness of **Sustainability Knowingness** in Egyptian private universities, according to personal characteristics (gender).

The results of Table (7) indicated that the mean rank of males for the Environmental dimension was 203.44 and the mean rank of females was 178.23. While the mean rank of males for the social dimension was 203.37 and the mean rank of females was 178.3. As for the Economical dimension, the mean rank of males was 199.49 and that of females was 182.29.

**Table (7) Ranks for Sustainability Knowingness dimensions**

	<b>Gend er</b>	<b>N</b>	<b>Mean Rank</b>	<b>Sum of Ranks</b>	<b>Mann- Whitn ey U</b>	<b>Asym p. Sig. (2- tailed)</b>
Environmental	Male	193	203.44	39263.5	15741.5	0.024
	Femal e	188	178.23	33507.5		
	Total	381				
Social	Male	193	203.37	39251	15754	0.024
	Femal e	188	178.3	33520		
	Total	381				
Economi cal	Male	193	199.49	38501	16504	0.123
	Femal e	188	182.29	34270		
	Total	381				
Sustainability Knowingness					15530	0.015

**Source: Output from SPSS v25.**

Mann-Whitney U test indicate the extent to which there are statistically significant differences between males and females in their views on sustainability, divided into three dimensions: environmental, social, and economical.

The results of indicate that the Mann-Whitney U value for the Environmental dimension reached 15741 with a significant value of 0.024. Likewise, the Mann-Whitney U value for the social dimension reached 15754 with a significant value of 0.024 at a statistical significance level of 0.05.

The significance value for the Environmental and Social dimensions in these two dimensions was less than 0.05, which means that there is a statistically significant difference between males and females. In other words, males and females have significantly different views on the environmental and social dimensions of sustainability. In the context of Environmental and Social dimensions, this implies that there is a meaningful difference or effect in these areas based on the test performed.

As for the Economic dimension, the p value was greater than 0.05, which means that there is no statistically significant difference between males and

females. In other words, there are no significant differences between males and females in their views on the economical dimension of sustainability.

The results suggest that men and women view sustainability differently. Men and women tend to focus on different aspects of sustainability, such as the environment and society. These findings are important because they help us better understand how people think about sustainability and how we can design more effective programs to promote consciousness and sustainability.

The Mann-Whitney test value for the total dimensions of Sustainability Knowingness reached 15530 with a significant value of 0.015, which is less than the statistical significance level of 0.05. This indicates the acceptance of the ( $H_1$ ) hypothesis, which states that "*There are significant differences in students' consciousness of Sustainability Knowingness in Egyptian private universities, based on personal characteristics (gender)*".

#### 4.7.3 Test Hypotheses H<sub>2</sub>:

To measure the extent of significant differences, the Mann-Whitney Test was used to test H<sub>2</sub>: There are significant differences in students' Consciousness of **sustainability attitudes** in Egyptian private universities based on personal characteristics (gender).

The results of Table (8) indicate that the mean rank of males for the Environmental dimension was 187.31 and the mean rank of females was 194.79. While the mean rank of males for the social dimension was 200.84 and the mean rank of females was 180.9. As for the Economical dimension, the mean rank of males was 205.47 and that of females was 176.14.

**Table (8) Ranks for Sustainability Attitudes dimensions**

	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)
Environmental	Male	193	187.31	36151	17430	0.495
	Female	188	194.79	36620		
	Total	381				
Social	Male	193	200.84	38761.5	16243.5	0.074
	Female	188	180.9	34009.5		
	Total	381				
Economical	Male	193	205.47	39656	15349	0.009
	Female	188	176.14	33115		
	Total	381				
Sustainability Attitudes					16358	0.096

**Source: Output from SPSS v25.**

The results of Table (8) indicate that the Mann-Whitney value for the Environmental dimension reached 17430 with a significant value of 0.495. Likewise, the Mann-Whitney value for the social dimension reached 16243.5 with a significant value of 0.074 at a statistical significance level of 0.05.

The significance value for the Environmental and Social dimensions in these two dimensions was greater than 0.05, which means there is no statistically significant difference between males and females. But The Mann-Whitney value for the Economic dimension reached 15349, and the p-value was less than 0.05, which means that there is a statistically significant difference between males and females. In other words, there are significant differences between males and females in their views on the economic dimension of sustainability.

The result indicate to the value of the Mann-Whitney test for the total dimensions of Sustainability Attitudes reached 16358 with a significant value of 0.096, which is greater than the statistical significance level of 0.05, which



indicates reject the null hypothesis and accepted the alternative second hypothesis ( $H_2$ ) that states " *There are no significant differences in students' consciousness of Sustainability Attitudes in Egyptian private universities, based on personal characteristics (gender)*".

#### 4.7.4 Test Hypotheses $H_3$ :

The results of Table (9) indicate that the mean rank of males for the Environmental dimension was 202.58 and the mean rank of females was 179.11. While the mean rank of males for the social dimension was 196.18 and the mean rank of females was 185.68. As for the Economical dimension, the mean rank of males was 193.26 and that of females was 188.68.

**Table (9) Ranks for Sustainability Behavior dimensions**

	Gender	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Asymp. Sig. (2-tailed)
Environmental	Male	193	202.58	39098	15907	0.035
	Female	188	179.11	33673		
	Total	381				
Social	Male	193	196.18	37863	17142	0.345
	Female	188	185.68	34908		
	Total	381				
Economical	Male	193	193.26	37298.5	17706.5	0.681
	Female	188	188.68	35472.5		
	Total	381				
Sustainability Behavior					16781	0.205

**Source: Output from SPSS v25.**

The results indicate that the Mann-Whitney value for the social dimension reached 17142 with a significant value of 0.345. Likewise, the Mann-Whitney value for the Economical dimension reached 17706.5 with a significant value of 0.681 at a statistical significance level of 0.05, the

significance value for the Social and Economical dimensions in these two dimensions was greater than 0.05, which means there is no statistically significant difference between males and females. But The Mann-Whitney value for the Environmental dimension reached 15907, and the p-value was 0.035 less than 0.05, which means that there is a statistically significant difference between males and females. In other words, there are significant differences between males and females in their views on the Environmental dimension of sustainability.

The results indicate that the value of the Mann-Whitney test for the total dimensions of Sustainability Behavior reached 16781 with a significant value of 0.205, which is greater than the statistical significance level of 0.05. This indicates a rejection of the null hypothesis and acceptance of the alternative hypothesis (H3) that states, "*There are no significant differences in students' consciousness of Sustainability Behavior in Egyptian private universities according to personal characteristics (gender).*"

## **Conclusion, Recommendations, & Suggestions for Future Researches:**

### **• Conclusion**

This research examined the effects of gender on the sustainability consciousness of Egyptian private university students with a specific focus on three dimensions: knowingness, attitudes, and behavior. The study made a number of important discoveries:

1. Sustainability Knowingness: Male and female students were found to possess different levels of knowledge of sustainability and particularly, the children were interpreted to focus on environmental and social sustainability aspects. Males showed a greater knowledge of sustainability than females.

2. Sustainability Attitudes: Gender differences were not significant in terms of total attitudes towards sustainability. Gender differences were however, evident in the economic dimension of sustainability attitudes where males had stronger attitudes than females.

3. Sustainability Behavior: The findings of this study failed to show gender differences in the total sustainability overlap. Male respondents were found to have more environmentally sustainable behavior than the average female. However, males behaved in a much more environmentally sustainable manner than did females.

These findings suggest that while gender plays a role in certain aspects of sustainability consciousness, its influence is not uniform across all dimensions.

• **Discussion:**

The results of this study both align with and diverge from previous research in the field:

1. Gender differences in sustainability knowingness: Our finding that males demonstrated higher levels of sustainability knowingness, particularly in environmental and social dimensions, contrasts with some previous studies. For example, Olsson and Gericke (2017) found that females generally scored higher in sustainability knowledge. This discrepancy might be attributed to cultural differences or educational practices specific to the Egyptian context.

2. Lack of significant gender differences in overall sustainability attitudes: This result aligns with findings from Dagiliūtė et al. (2018), who reported no significant gender differences in sustainability attitudes among Lithuanian students. However, it contrasts with studies like Zelezny et al. (2000), which found women to have stronger pro-environmental attitudes. The significant difference in economic sustainability attitudes favoring males is an interesting finding that warrants further investigation.

3. No significant gender differences in overall sustainability behavior: This finding partially aligns with Vicente-Molina et al. (2018), who found that gender was not a consistent predictor of pro-environmental behavior across different countries. However, our finding of significant gender differences in environmental behavior, with males showing more environmentally conscious behaviors, contrasts with studies like Eisler et al. (2003), which generally found females to engage in more pro-environmental behaviors.

These mixed results highlight the complex nature of sustainability consciousness and the potential influence of cultural and educational contexts on gender differences in this area.

• **Recommendations:**

Based on the findings of this study, we propose the following recommendations:

1. Tailored sustainability education: Develop gender-sensitive educational programs that address the specific strengths and weaknesses in sustainability knowingness, attitudes, and behaviors among male and female students.

2. Promote interdisciplinary learning: Integrate sustainability concepts across various disciplines to enhance students' understanding of the interconnections between environmental, social, and economic aspects of sustainability.

3. Enhance practical engagement: Implement more hands-on sustainability projects and activities to bridge the gap between knowledge, attitudes, and behaviors, particularly in areas where gender differences were observed.

4. Address economic sustainability: Given the gender differences in economic sustainability attitudes, incorporate more content on economic aspects of sustainability in curricula, ensuring equal engagement from both male and female students.

5. Foster collaborative learning: Encourage mixed-gender group projects and discussions on sustainability topics to promote knowledge sharing and diverse perspectives.

6. Continuous assessment: Regularly evaluate students' sustainability consciousness to track progress and adjust educational strategies accordingly.

7. Faculty development: Provide training for educators on gender-sensitive approaches to teaching sustainability and addressing unconscious biases.

- **Suggestions for Future Research:**

To further advance our understanding of sustainability consciousness and the role of gender, we propose the following areas for future research:

1. Longitudinal studies: Conduct long-term studies to track changes in sustainability consciousness over time and assess the effectiveness of educational interventions.

2. Cross-cultural comparisons: Expand the research to include students from different cultural backgrounds and educational systems to identify universal and context-specific factors influencing sustainability consciousness.

3. Qualitative research: Conduct in-depth interviews and focus groups to gain deeper insights into the reasons behind gender differences in sustainability consciousness.

4. Intersectionality: Explore how gender intersects with other factors such as socioeconomic background, academic discipline, and personal values in shaping sustainability consciousness.

5. Behavioral interventions: Design and evaluate targeted interventions aimed at improving sustainability behaviors, particularly in areas where gender differences were observed.

6. Role of media and technology: Investigate how different forms of media and technology influence sustainability consciousness among male and female students.

7. Sustainability leadership: Examine gender differences in sustainability leadership and how these might impact overall sustainability consciousness within educational institutions.

8. Private vs. public institutions: Compare sustainability consciousness between students in private and public universities to identify potential differences in educational approaches and outcomes.

By pursuing these research directions, we can gain a more comprehensive understanding of the complex relationship between gender and sustainability consciousness, ultimately informing more effective educational strategies and policies for promoting sustainable development.

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