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Exploration of sustainable attitudes and behaviors and the role of planned behavior amongst the AUC Community

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Exploration of sustainable attitudes and behaviors and the role of planned behavior amongst the AUC Community

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Acronyms

AUC	The American University in Cairo
COP 27	Conference of the Parties number 27
EEAA	Egyptian environmental affairs agency
GERD	Grand Ethiopian Renaissance Dam
GHE	Greenhouse Effect
GHG	Greenhouse Gases
Grads	Graduate students
HEIs	Higher educational institutes
I.T	Information technology
IPCC	The Intergovernmental Panel on Climate Change
SAQ	Sustainability Assessment Questionnaire
SDGs	Sustainable development goals
UG	Undergraduate
GR	Graduate
UNFCCC	United Nations Framework Convention on Climate Change

TPB	Theory of Planned Behavior
PEB	Pro environmental Behaviors
KAP	Knowledge, Attitude and Practice
HEIs	Higher Education Institutes

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Abstract

This thesis explores the use of a new Framework that was developed by combining both the Theory of Planned Behavior (TPB) and Knowledge, Attitudes, and Practices (KAP) theory to study the sustainability behaviors of students, faculty, and staff at the American University in Cairo (AUC). The research aims to provide insights into the factors influencing sustainable behaviors and how these factors differ across the three groups. The study used a combination of questions from the sustainability awareness questionnaire (SAQ) and Sulitest that was customized to the cultural context of the target group. The survey was administered to a sample of students, faculty, and staff at the AUC. The data collected was analyzed using SPSS to create both linear and multiple regression models to understand the impact of the independent variables on the dependent variables. The results of the study indicated that both extended TPB and the new framework were useful in understanding sustainable behaviors but that they provide different insights. The results also suggest that the factors that influence sustainable behaviors are complex, and that they vary across different groups. While perceived behavioral control and attitudes were found to be important factors for all groups, knowledge and awareness were more important for staff than for students or faculty. The study has several implications for sustainable behavior interventions; it suggests that using the newly proposed conceptual framework helped in better understanding the factors impacting behavior. Furthermore, it highlights the importance of addressing knowledge and awareness gaps, particularly for staff. Overall, it highlights the need to address the broader social and cultural context in which sustainable behaviors occur, and it contributes to the overall understanding of researchers of sustainable behaviors for designing effective interventions to promote sustainability in higher educational institutes.

Keywords: Climate Change, Theory of Planned Behavior, Sustainability, Campus, Behavioral Psychology

Chapter 1: Introduction

1.1 Background of the Problem

"There is one issue that will define the contours of this century more dramatically than all others, and that is the urgent threat of a changing climate"- Barack Obama, Former President of the United States of America, Remarks to the U.N. Climate Change Summit (Obama, 2014). Climate Change is a term that describes the change in weather patterns over decades, which leads to changes in temperatures, rainfall, wind patterns, snowfall, and other climate-related occurrences (Climate Change Knowledge Portal, 2021). The leading causes of climate change have been linked to two main culprits, natural causes and harmful human activities (Royal Society, 2020). The most recent report of the Intergovernmental Panel on Climate Change (IPCC) indicated that human impact has warmed and changed the land, ocean, and atmosphere. The drastic effects of climate change do not just affect the environment, but the overall survival of humankind is under threat (Intergovernmental Panel on Climate Change. Working Group 1., et al., 2021).

Furthermore, since scientists identified the leading cause of climate change as negative human behaviors, the next step is to learn more about these behaviors and promote mitigation actions, also referred to as pro-environmental behaviors. Pro-environmental behaviors (PEB) are actions taken to improve environmental conditions while reducing negative environmental impacts, including waste of natural resources and greenhouse gas (GHG) emissions (United Nations Environment Programme, 2019).

According to the Minister of Higher Education of Egypt, Mohamed Ayman Ashour, 45% of the Egyptian population comprises youth; in January 2023, 3.6 million students were enrolled in public, semiprivate, private, or technology universities. Moreover, the increased risk due to climate change encouraged many Higher education institutes (HEIs) worldwide to

pursue campus sustainability. Higher educational institutes playing a role in Climate change, especially with the increasing number of students every year, acts as an opportunity to study the behaviors of communities at higher educational institutes (HEIs) in Egypt (Egypt Today, 2023).

1.2 Research Gap

Despite the growing awareness of the negative impacts of climate change on the environment and human society, there is still a significant research gap in understanding and promoting pro-environmental behaviors. While studies have shown that pro-environmental behaviors can contribute to reducing greenhouse gas emissions and improving environmental conditions, there is a lack of research on the factors that motivate individuals to engage in such behaviors. Additionally, while there has been some research on the effectiveness of information campaigns and other interventions aimed at promoting pro-environmental behaviors, there is a need for more research on the long-term impact of such interventions and their effectiveness in different cultural contexts. Therefore, this study aims to fill this research gap by investigating the factors that motivate individuals to engage in pro-environmental behaviors and evaluating the effectiveness of different interventions in promoting such behaviors in a specific cultural context.

1.3 Purpose of the Study

This study aimed to investigate the sustainability and climate change behaviors of faculty, staff, and student, at the American University in Cairo (AUC). Collecting and analyzing data through this research can help develop a sustainable future tool to measure sustainability and climate change behaviors in other higher educational institutes on a national and international level. This research is of high significance as it provides insights for researchers and psychologists to better understand youth and educators, to adopt sustainable behaviors that can mitigate the adverse impacts of climate change. The findings of this study

will not only benefit the AUC community. However, they can also contribute to the efforts towards studying behaviors among other higher educational institutes in Egypt and globally.

1.4 Scope of the Study

This study focused on the AUC community, including current graduate and undergraduate students enrolled from Spring 2022 to Fall 2022, current faculty and staff, and graduate and undergraduate alumni who have graduated in the past five years from the data collection date. The survey used to collect data was created by combining and editing questions from two questionnaires: the Sustainability Assessment Questionnaire (SAQ) for Colleges and Universities and the Sustainability Literacy Test (Sulitest). The SAQ, launched by the Association of University Leaders for a Sustainable Future in 2009, was designed to gather impressions on seven critical dimensions of higher education, including student opportunities, research, outreach and service, scholarship, faculty and staff development and rewards, curriculum, planning, missions, and administration (Sustainability Assessment Questionnaire (SAQ) for Colleges and Universities, 2009). The Sulitest, a non-profit organization, was created in 2014 and aims to assess sustainability literacy and raise awareness. Two questionnaires were developed for this study, one for students (undergraduate students, graduate students, undergraduate alumni, and graduate alumni) and one for faculty and staff (full-time faculty member, part-time faculty member, full-time staff member, and part-time staff member). The survey collected demographic data, including age, gender, nationality, employment status, and relationship status, as well as data on awareness, attitudes toward sustainable behaviors, and attitudes toward the surrounding community. The questions were edited to fit the AUC's cultural context, research purpose, and social location. Although the study is limited to the AUC community, the community is diverse, consisting of national and international students, faculty, and staff from different backgrounds, majors, and mindsets. By

focusing on this community, the study can provide valuable insights into sustainability and climate change behaviors in a higher education context.

1.5 Literature Review

1.5.1 Human Behaviors, Climate Change, and Sustainability

According to the IPCC, the world will reach or exceed 1.5°C of warming within the next two decades, even with the country's current commitments for the 2030 vision (IPCC, 2021) In order to address such a critical global challenge, people need to work together toward reducing emissions and changing their harmful behaviors. Over the past ten years, between 2013 and 2023, the Egyptian population increased by 20.7 %, rising from 93,377,890 to 112,716,598 residents (Macro trends, 2023). The rapid increase in population in Egypt raises the level of pollution and leads to resource depletion. The lack of resources, including clean water and food puts the Egyptian population at a higher risk of poverty, hunger, diseases, and other adverse effects. Sustainable development goal number thirteen, "Climate Action," focuses on the following targets for achieving successful climate action:

- 13.1 Strengthen resilience and adaptive capacity to climate-related disasters.
- 13.2 Integrate climate change measures into policies and planning.
- 13.3 Build knowledge and capacity to meet climate change.
- 13.A Implement the U.N. framework convention on climate change.
- 13. B Promote mechanisms to raise capacity for planning and management.

In order to achieve the targets, it is crucial to identify which targets are achievable depending on the available resources and existing challenges (UNESCO, 2021). One of the most significant existing challenges to this day is the negative impact of human behaviors that also trigger natural crises. The negative climate change impacts the whole community, and it is necessary to start assessing the situation among smaller communities and then expand to larger ones raising awareness and fostering pro-environmental behaviors. Considering that

higher educational institutes have access to not only students from different age groups but also staff and faculty, it acts as a good starting point to study existing behaviors and factors impacting them.

1.5.2 Climate Change & Sustainability in Higher Education

Higher educational institutes (HEIs) play a vital role in the fight against climate change and in achieving the SDGs. Most campuses worldwide are now focusing on on-campus sustainability and what it indicates. For some universities, it indicates integrating sustainability into the university policy and curriculums. While other universities focus on creating sustainability initiatives to involve the students, staff, and faculty and help spread awareness in the process (Emanuel & Adams, 2011). HEIs have major potential for sustainability in education, awareness, and impactful initiatives, mainly due to their access to a large number of the youth community, especially in Egypt, where most youths enroll in HEIs after concluding their high school studies (Mir Mohammad et al., 2019). Despite the increase in the number of HEIs adopting new sustainability initiatives, curriculums, and policies, the main target of involving the main stakeholders is not being met. The students represent the primary stakeholders within a university, followed by the faculty and staff. According to a study conducted by (Abubakar et al., 2016), despite the high percentage of students aware of the existing initiatives and university policies, they still had no interest in participating in them. The key here is to create initiatives, integrate sustainability and climate change policies, and encourage students, staff, and faculty to participate in these initiatives and even lead them.

The emergence of the sustainable development goals (SDGs) in 2015 and COVID-19 quarantine measures in 2020 has helped improve the situation temporarily. However, with restrictions lessening and people returning to normal daily behaviors, greenhouse gasses (GHGs) are increasing, reaching new high records (State of the Global Climate, 2021). The

increase in GHG emissions leads to an increase in the greenhouse effect (GHE) which indicates the trapping of heat from the sun due to the accumulation of greenhouse gasses, including Carbon dioxide, Water Vapor, Methane, Ozone, Nitrous oxide, and Chlorofluorocarbons (Chilingar et al., 2009). The greenhouse effect leads to the rise of the earth's temperature, leading to the drastic effects of climate change, including changes in weather patterns and increasing the chances of extreme events, including fires, floods, and droughts.

Two very important terms that go hand in hand with climate change are Adaptation and Mitigation. Adaptation refers to the actions taken in order to adjust with the current consequences caused by climate change. On the other hand, mitigation are the actions taken in order to prevent the worsening of climate change consequences or impact. Some examples of adaptation measures include relocating vulnerable communities to secure housing away from areas susceptible to climate disasters and conservation of existing natural resources, and sustaining biodiversity. As for mitigation, examples include any sustainable practices including practicing energy conservation and using a bicycle instead of a car as a means of transportation (United Nations Educational, 2019).

According to Ashour, the number of students is expected to increase to 5.6 million by 2032 as the Egyptian population is expected to reach 160 million by 2050. In December of 2022 the minister stated that the existing number of universities will need to be increased from 45 to 128 by 2050 to accommodate the increasing population. Furthermore, with an increasing population and an increase in the number of students enrolled in higher educational institutes in Egypt, this presents an opportunity to start conducting campus-based studies to understand study sustainability and climate change behaviors by conducting campus-based assessments.

To assess the impact of human behaviors on climate change and sustainability, one must have a clear idea of sustainability and climate change, including the associated goals and how to achieve them. This review aims to shed light on different elements, including Climate

change, sustainability, and their relationship with human behaviors. It also focuses on the existing sustainability initiatives at AUC and provides an overview of some numbers and figures collected from the Office of Sustainability's official AUC page. It starts with an overview of climate change and sustainability in Egypt, focusing on the impact of human behaviors on climate change, and moves forward to highlight goal thirteen, which calls for climate action. It then sheds light on some literature on sustainability and climate change assessments and initiatives carried out at higher educational institutes worldwide. Additionally, it concludes with the current sustainability initiatives at AUC that the Office of Sustainability developed.

1.5.3 Overview of Climate Change and Sustainability in Egypt

Climate change is one of the most critical global challenges currently facing humanity. Most people automatically associate the word climate with weather and increased temperatures. However, the climate differs from the weather in terms of duration. Climate indicates long-term (years/decades) changes in weather behavior, while weather indicates rapid changes over a short period (hours/days). There have been many skeptical people regarding climate change over the years; however, with sweltering summers and freezing winters, more and more people support the need for action (IPCC, 2021).Due to limited resources, developing countries are expected to suffer the most from climate change. Egypt is one of the developing countries currently at high risk of water scarcity due to increased population, which increases demand. The increasing population not only increases the demand for clean water but also increases pollution, causing more environmental damage and increasing the negative consequences of climate change.

Furthermore, the increased population and pollution are not Egypt's only challenges. The Grand Ethiopian Renaissance Dam (GERD) is a project that was initiated by Ethiopia in

2011 to produce electricity to support Ethiopia's electricity demand. The dam has caused conflict over the years between Ethiopia and Egypt until today; however, with climate change effects increasing, there might be no Nile water left to fight over (Abdallah, 2021). On the other hand, Egypt, to tackle all the climate challenges it faces, the Egyptian environmental affairs agency (EEAA), a part of the Egyptian Ministry of Environment, established the National Council for Climate Change (NCCC) in May 2019. The council was established to have a specialized workforce working on climate action. The council's responsibilities were listed as follows:

- Responsible for updating the national strategy of Egypt for climate change and sustainable development.
- It is in charge of organizing and implementing research efforts on a national level on climate change and projects to reduce emissions and adapt to climate change risks.
- It will also vet projects submitted to the Green Climate Fund (GCF).
- Generate climate change and sustainability reports for the current status in Egypt.

Moreover, as a part of Egypt's efforts to combat climate change in October 2020, the Minister of Electricity and Renewable Energy, Mohamed shaker signed an agreement with the Minister of Electricity in Cyprus. The agreement plans to connect cables undersea cable linking the electricity grids of Egypt and Cyprus, assuming that it could aid the countries in meeting their commitments towards climate change by transiting to a greener economy.

1.5.4 COP27 and Climate Change

The most recent update regarding Egypt's effort to tackle climate change issues is that it hosted the 27th session of the Conference of the Parties (COP 27) to the United Nations Framework Convention on Climate Change (UNFCCC) in Sharm El-Sheikh from the 6th to the 18th of November 2022. The COP is the supreme decision-making body of the Convention.

Each year, the conference is held in one of the countries involved to review the progress of all represented parties and make the necessary decisions or changes to ensure proper implementation, including administrative and institutional changes (UNITED NATIONS CLIMATE CHANGE ANNUAL REPORT 2021, 2022). The conference included presidents, ministers, ambassadors, and people from all over the world. The conference was divided into zones that can only be accessed through registration or special invitations. The red zone was only for presidents and ministers, and its location was unknown to most attendees. The blue zone was restricted to country booths, ministers, ambassadors, representatives from specific organizations, and some attendees that were carefully chosen to enter. Lastly, the green zone was the more public zone which included booths of organizations and initiatives from different countries. It included more youth than the rest of the zones and activities but required pre-registration. The conference featured talks, collaborations, announcements of new initiatives, and more. Overall, the conference was well organized, secure and achieved its purpose. The conference resulted in five key takeaways, as stated on the United Nations Climate Change official website, as follows:

1. Establishing a dedicated fund for loss and damage
2. Maintaining a clear intention to keep 1.5°C within reach
3. Holding businesses and institutions to account
4. Mobilizing more financial support for developing countries
5. Making the pivot toward implementation

The first takeaway was establishing a loss and damage fund to help support areas affected by droughts, floods, and other climate disasters. The exact details on who will be contributing and how, are scheduled to be announced by the transitional committee assigned by the end of 2023 at COP28. The second takeaway focused on establishing the mitigation work programme, which focused on getting countries to commit to limiting greenhouse gas

emissions to pre-industrial times to keep the 1.5°C within reach. The programme was scheduled to launch right away till 2026, when it will be reviewed for extension. During the COP27 conference, the governments were also requested to go over their 2030 and climate management plans to limit emissions as much as possible till 2030. The third key takeaway was holding businesses and institutions in terms of how they impact the environment and getting them to pledge through the Global Climate Action Portal and prevent them from greenwashing. Greenwashing is the act of overselling and exaggerating the company's environmental credentials for marketing; some of the top contributors to rising pollution and plastic waste still do this. The fourth takeaway addressed the need for climate finance; the Sharm el-Sheikh Implementation Plan, the cover decision for COP27, indicates that investments of a minimum of USD 4-6 trillion a year are needed to launch a global transformation to a low-carbon economy. The financial system processes and structures will be transformed to deliver such funding, engaging banks, governments, institutional investors, and other financial actors. The main goal here is to motivate developed countries to allocate funds to developing countries most affected by the changing climate. Lastly, takeaway number five outlines that COP27's main target was to focus on implementation, stirring countries towards reducing their greenhouse gas emissions and mobilizing finance toward climate. The U.N. established a work programme on 'just transition' at COP27, which is expected to complement and build the work to scale up implementation and mitigation ambition urgently (UNITED NATIONS CLIMATE CHANGE ANNUAL REPORT 2021, 2022). Overall, Egypt did a great job organizing and hosting COP27. The whole world is working on mitigating and adapting to climate change effects. However, none of the solutions address the leading cause of all these consequences, primarily human activities and behaviors. The solutions developed at COP27 and developed on a country level may effectively adapt to the existing consequences.

However, if communities do not focus on solving the root cause, all this effort, finance, and time will be worthless.

University-based assessments are not new to Egypt, perception assessments were previously conducted in Egypt during the COVID-19 pandemic. Most studies aimed to measure students' perception of the sudden switch to e-learning methodologies. The studies carried out focused on measuring aspects such as Service quality (SERVQUAL) and student satisfaction towards the use of e-learning technologies which was done in research done by (El-Sayad et al., 2021) and (Ghada Ali & Samir Roushdy, 2017). However, the majority of research conducted on climate change and sustainability in Egypt lacked the component of studying the human behaviors which is the leading cause towards climate issues worldwide. Moreover, with the rising % of university students in Egypt is a gate, toward carrying out sustainability and climate change behavioral assessments on campus levels. Initiating such area of research in Egypt is vital to create instruments and techniques to assess university communities and start raising awareness among youth more efficiently.

1.5.5 Climate change, human behaviors, and the TPB

The negative environmental changes caused by human activities are called anthropogenic causes. According to the IPCC and the United Nations (U.N.), human activities have contributed to the worsening of the climate change situation globally. There has been an increase in extreme events such as forest fires, melting ice, and erupting volcanoes. In addition, the air quality levels have drastically decreased, especially in highly populated areas in developing countries. One of the main drivers of climate change is the increase in GHG emissions caused by human activities, including deforestation, burning fossil fuels (industries, transportation), and many more. Anthropogenic causes may be the main reason climate change is becoming irreversible. However, it is also the least understood cause. Human behaviors are

more complex than science and math as multiple factors impact them and require rigorous research. Many theories have been developed to understand human behaviors; what impacts, changes or drives them? One of the most used theories tested on pro-environmental behavior including public transport usage and recycling is the theory of planned behavior (TPB). It indicates that for an individual to carry out positive environmental behavior, the following elements must be achieved:

- Individuals must have a positive attitude towards climate-relevant behavior (as determined by their beliefs and values).
- Individuals must believe that the behavior is encouraged and highly supported by social norms; refer to their friends and surrounding community.
- Individuals must believe that they have control over the action.

The TPB indicates that the more aligned the three factors are, the more likely the individual will engage in positive environmental behaviors toward the climate (Gifford, 2011). Icek Ajzen developed the theory of planned behavior to predict human behavior (Ajzen, 1991); the three factors of attitude, subjective norm, and perceived behavioral control make up the behavioral intent, which then directly leads to the behavior. Ajzen developed the TPB as an extension of the theory of reasoned action (TRA), developed by Martin Fishbein in 1967. The TRA indicates that a person's behavior is determined by his intention, which is made up of the person's attitude and the subjective norm only (Ajzen, 1991). A diagram illustrating the TRA is shown in Figure 1, and a diagram illustrating the TPB is shown in Figure 2 below. In Figure 2, the theory of planned behavior shows that perceived behavioral control influences the intention and, separately, the actual behavior. Real behavioral control can differ from Perceived behavioral control as it is based on an individual's perception only and not the actual control, they have over the intention of acting.

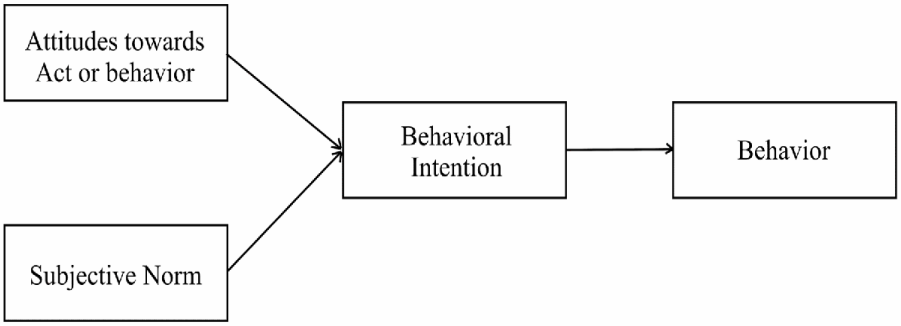

Figure 1 Theory of reasoned action (Fishbein & Ajzen, 1975)

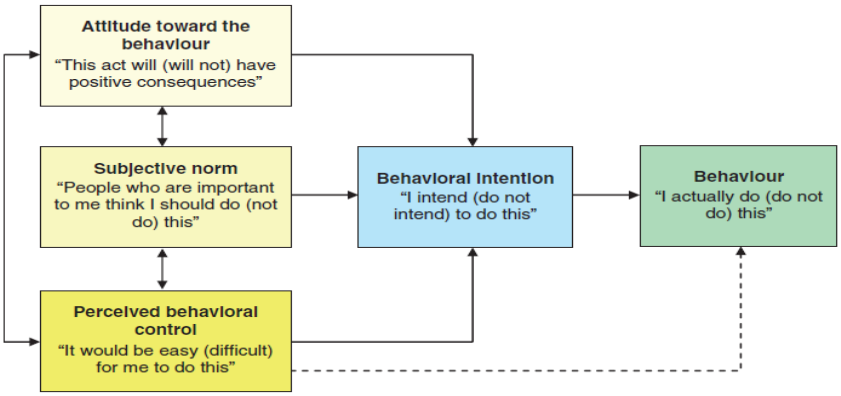

Figure 2 Theory of Planned Behavior (Ajzen, 1991)

The theory of planned behavior was utilized in different contexts, including studying behaviors and intentions in health, business, sustainability, etc. Some studies showed that using TPB is limiting as it does not factor in other variables that may impact human intention and behavior (Tapera et al., 2020).Therefore, some researchers decided to create modified conceptual frameworks of the TPB to factor in other variables that impact the intention and behavior. A study by (Tommasetti et al., 2018a) focused on identifying the variables that guide consumers toward choosing sustainable restaurants by extending the TPB. The proposed extended theory was labeled as the Extended Theory of Planned Behavior (ETPB); in addition to the five main variables stated in the TPB attitude, subjective norm and perceived behavioral control, behavioral intention, and behavior, the authors added curiosity and perceived usefulness. The

proposed conceptual framework was presented as a valuable tool for practitioners and scholars, suggesting interesting managerial and theoretical implications. The theory of planned behavior was also utilized for campus-based assessments in different countries, assessing students, staff, and faculty behaviors.

1.5.6 Sustainability assessments at HEI

The increased risk due to climate change encouraged many Higher education institutes worldwide to pursue campus sustainability. Campus sustainability can easily be defined differently from one university to another. However, a sustainable campus would indicate a campus where university policies, initiatives, buildings, and overall operations consider the three sustainability aspects (social, environmental, and economic) and are actively working towards achieving the SDGs. Some examples of universities with sustainability initiatives internationally include the University of Michigan in the United States, Lund University in Sweden, and the University of Toronto in Canada. Other universities in the Middle East have also taken a stand toward a more sustainable campus, including the University of Dammam in Saudi Arabia, the American University of Sharjah (AUS), and the American University in Cairo (AUC). Each of the universities has introduced sustainability differently depending on their resources.

The main similarity was sustainability awareness events, sustainable buildings, and integrating sustainability in the curriculum. However, these initiatives alone were not enough to create an impact, so some of the universities decided to carry out assessments to evaluate the existing sustainability awareness of the student population, to measure the impact these initiatives. A study conducted at the University of Dammam in Saudi indicated that even though students were aware of the initiatives, they were not interested in participating (Abubakar et al., 2016).

On the other hand, a study conducted at a university in Texas indicated that most students were not aware of many of the existing sustainability initiatives at the university and did not know what sustainable development is (Msengi et al., 2019). A third study conducted at a university in the Philippines indicated that students' awareness levels of climate change are elevated as they grow older (Barreda, 2018). All of these indicate that creating initiatives or editing curriculums alone is insufficient to involve them in the battle against climate change. It is vital to create initiatives that the students will participate in and respond to in order for the university to make a real impact toward achieving the SDGs.

Moreover, some studies carried out assessments using the TPB to study the behaviors and intentions of students on campus.

1.5.7 Existing initiatives at AUC

The Office of Sustainability was established as a part of the Office of the Vice President for Management and Operations in September 2011 at the AUC. The office is responsible for tackling environmental challenges within AUC, including pollution, resource scarcity, waste management, and climate change. The office created multiple initiatives within AUC in order to address the previously mentioned challenges, including:

- It is producing an annual Carbon Footprint Report.
- They have Energy reduction programs in place.
- Management and reduction of water consumption
- Waste management initiatives.
- Carpooling initiative.
- Raise campus awareness towards environmental concerns affecting AUC and the community.

The office is constantly working towards reducing operations costs and integrating social and environmental sustainability through operations, education, and research (The American University in Cairo, 2021). The latest carbon footprint report that was produced in April 2021 showed the carbon emissions at AUC over the past eight years indicated that from 2012 till 2020, AUC's carbon footprint decreased approximately by 19 % (AUCEgypt, 2021).The percentage increase and decrease of carbon dioxide gas emissions between 2012 and 2020 is shown in table 1 below.

Table 1 : Percentage increase/decrease of C02 emissions between 2012 and 2020

Emission Category	**Reduction/increase %**
Heating, ventilation, and air conditioning (HVAC)	-31%
Electricity (Non-HVAC)	-29%
Paper use	-40%
Water	-22%
Solid Waste Disposal	-42%
Fertilizers	-44%
Refrigerants	-51%
Transportation	+3%

The office of sustainability seems to be doing a great job with its initiatives in reducing AUC's carbon footprint. However, how effective are these initiatives if the AUC community is not utilizing them? Can AUC further reduce its footprint if students, faculty, and staff utilize the initiatives efficiently? The study data will be answering these questions based on the below methodologies.

1.6 Conceptual Framework

1.6.1 Original Conceptual Framework

The original conceptual framework that was tested in this research was based on the theory of planned behavior; the independent variables for the theory are presented in Figure 3 below in blue. The original theory of planned behavior (TPB) used for the study was adapted from (Ajzen, 1991). The TPB indicated that the attitude, perceived behavior control, and subjective norm of an individual make up the behavioral intention which then leads to the behavior (action). Each of these variables impact the type of behavior the individual will carry out, in this studies' context referring to positive behavior towards the environment or negative ones. Unfortunately, this theory was deemed incomplete or lacking some essential variables that also impact an individual's behavior such as demographic characteristics including age and gender, the individual's knowledge on sustainability and climate change and their awareness. The conceptual framework utilized in this study first tested the original theory of planned behavior in order to compare the results with the proposed framework based on the theory of planned behavior. Some variables involved in the proposed conceptual framework are defined differently by different researchers which us why the exact definitions utilized in this study are presented below.

Awareness: Awareness is the ability or state to perceive, feel, or be conscious of events, objects, or sensory patterns. In this level of consciousness, an observer can confirm sense data without necessarily implying understanding (Gafoor, 2012).

Knowledge: Knowledge is a familiarity or understanding of someone or something, such as facts (descriptive knowledge), skills (procedural knowledge), or objects (acquaintance knowledge). By most accounts, knowledge can be acquired in many diverse ways and from many sources, including but not limited to perception, reason, memory, testimony, scientific inquiry, education, and practice (Gilanie, 2022).

Attitude is the state of emotional and mental preparation, which is formed through experiences, that has a directive or dynamic influential power on an individual's behaviors towards all things and situations. Attitude is "a word used as a general tendency of an individual tendency to act in a certain condition" (Subekti, 2016).

Behavior: Behavior is something that a person does that can be observed, measured, and repeated. When we clearly define behavior, we specifically describe actions. Multiple factors usually influence behaviors, including demographic characteristics, knowledge, attitude, awareness, and perceived behavioral control. We do not refer to personal motivation, internal processes, or feelings (Bicard et al. 2012).

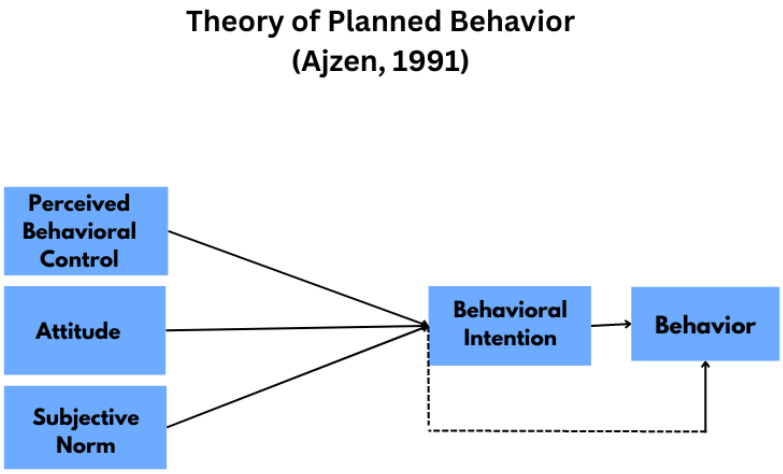

Figure 3 The original Theory of Planned Behavior (Ajzen, 1991)

1.6.2 Proposed Conceptual Framework (following the Theory of Planned Behavior)

The Proposed conceptual framework or the determinants of sustainable behaviors (for higher educational institutes) following the TPB shown in Figure 2 is based on the theory of planned behavior; however, other independent variables were added to the original theory due to the limitations of the theory of planned behavior. The independent variables involved in this framework included age, gender, status, knowledge, awareness, perceived behavioral control, attitude, and subjective norm. The status variable was created to divide the data into groups, one representing student and two representing faculty and staff. The arrows present the impact of the independent variables on both the behavioral intention and the behavior; the variables impact the behavioral intention directly and the behavior to an extent, as shown in Figure 4 below.

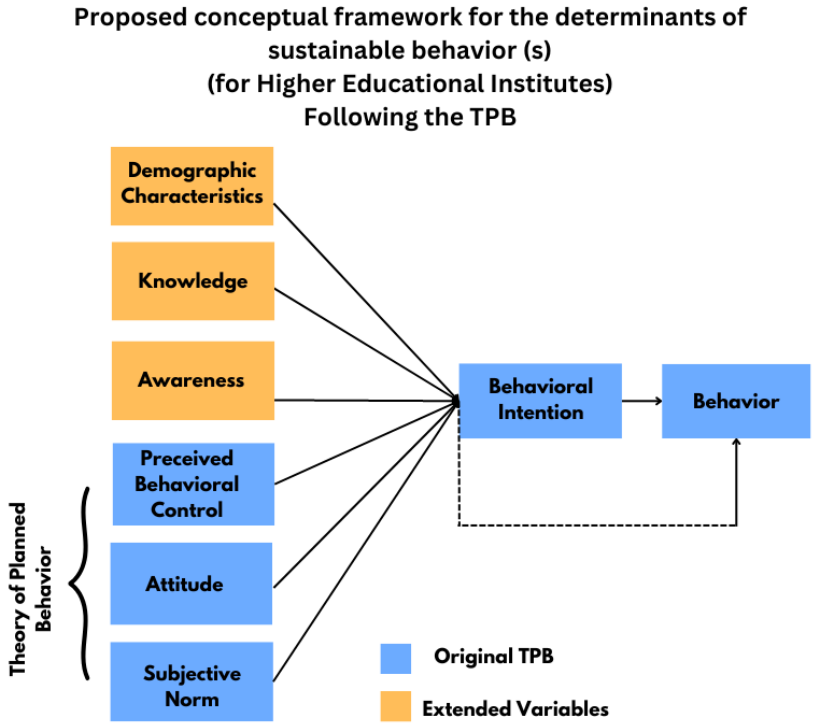

Figure 4 Proposed Conceptual Framework (Following the TPB)

1.6.3 Proposed Conceptual Framework (Following the KAP Model)

After testing the proposed conceptual framework based on the theory of planned behavior, it was time to test the proposed conceptual framework where the TPB and the KAP framework are combined in order to study the linkages between the variables and study the impact of the independent variables including knowledge, awareness, perceived behavioral control, demographic characteristics and subjective norm on attitude then study the impact on the behavior. The theory used is shown in figure 5 below.

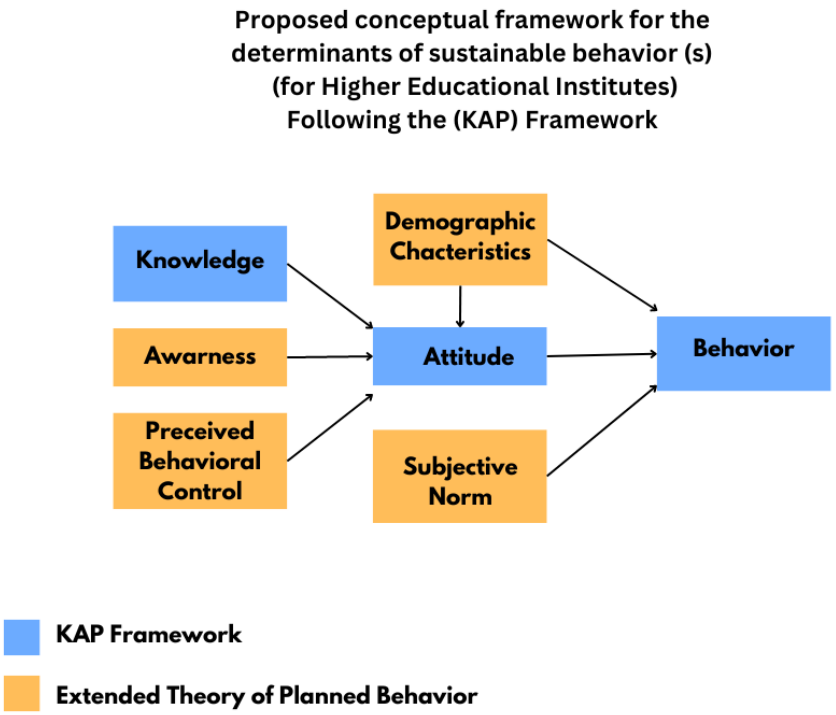

Figure 5 Proposed Conceptual Framework (Following the KAP Model)

1.7 Research Questions

1. Is the Community at AUC aware of what sustainability and climate change mean?
2. If they are, where did they learn about them, and do they have the correct information?
3. Do their majors of study/departments they work in affect their awareness?
4. Is the community aware of existing sustainability initiatives at AUC?
5. If they are, are they participating in the initiatives? If not, why?
6. What can be done to foster pro-environmental behaviors of the AUC Community?

1.8 Research Hypotheses

Of all the sustainable development goals, goal 13, "Climate Action" was addressed and focused on for this study. Due to the synergies between the SDGS, SDG 13 impacts the rest of the SDGS either directly or indirectly. After all, if climate change consequences increase changing life as we know it then the status of SDG 13 whether positive or negative impacts all

the other SDGs. This study seeks to assess the existing knowledge, level of awareness, attitude, subjective norm, and perceived behavioral control and their impact on the behaviors of students, alumni, faculty, and staff at the American University in Cairo (AUC). The developed questionnaire was sent by the university's Strategy Management and Institutional Effectiveness (SMIE) department to the AUC Community. SMIE offers multiple services, including accreditation, planning, assessment, research, and data analysis needs.

Here are the hypotheses for the study:

1. *H1: The environmental knowledge of students has a positive influence on their intention to adopt a pro-environmental behavior.*
2. *H2: The subjective norm of students has a positive influence on their intention to adopt a pro- environmental behavior.*
3. *H3: The perceived behavioral control of students has a positive influence on their intention to adopt pro-environmental behavior.*
4. *H4: The perceived behavioral control of Staff and Faculty has a positive influence on their intention to adopt a pro-environmental behavior.*
5. *H5: The environmental knowledge of the Staff and Faculty has a positive influence on their intention to adopt a pro-environmental behavior.*
6. *H6: The subjective norm of the Staff and Faculty has a positive influence on their intention to adopt a pro-environmental behavior.*
7. *H7: The intention of the AUC Community to adopt a pro-environmental behavior has a positive influence on their pro-environmental behavior.*

Chapter 2: Methodology

2.1 Sample

The AUC community comprises graduates and undergraduate students, undergraduate and graduate alumni, faculty, and staff. The target sample includes students, faculty, and staff from multiple departments across AUC; the questionnaires were sent via email to all enrolled students during the Fall 2022 semester and to current faculty and staff as well as alumni that graduated in the past five years from the time of survey administration 2012-2022. The demographic data of the sample is presented in table 2 below.

Table 2 Demographic data of respondents

Demographic Characteristic	**UG Student**	**GR Student**	**UG Alumni**	**GR Alumni**	**Staff**	**Faculty**
Number of Respondents (n)	78	75	33	40	93	72
	Total: 226				Total: 165	
Gender	**%**	**%**	**%**	**%**	**%**	**%**
Female	64.10	70.67	51.52	67.50	70.97	58.33
Male	33.33	29.33	48.48	30.00	29.03	37.50
Skipped/Prefer not to disclose	2.57	0	0	2.5	0	4.17
Age Group	17-25	23-56	23-28	28-54	26-59	31-75
Relationship status	**%**	**%**	**%**	**%**	**%**	**%**
Single	84.62	44	78.79	37.50	13.98	23.19
Currently Married	2.56	32.00	12.12	50	77.42	69.57
Divorced/separated	0	6.67	0	10	3.23	4.35
Widowed	0	1.33	0	0	1.08	1.45
In a relationship/Engaged	12.82	16	2.50	2.50	4.30	1.45
Nationality	**%**				**%**	
Egyptian	88.9				82.5	
Other Nationality	11.1				17.5	
Employment Status	**%**	**%**	**%**	**%**	**%**	**%**
Employed	14.29	82.67	96.97	90		

Unemployed	85.71	17.33	3.03	10		
Full Time (staff/faculty)					70.42	95.65
Part time (Staff / faculty)					29.58	4.35

2.2 Survey Development

The developed survey was adopted from two questionnaires formulated from previously tested surveys: the sustainability assessment questionnaire (SAQ) and Sulitest. The questions were modified to fit the AUC cultural context. Two questionnaires were developed for AUC students and alumni; the other was developed for faculty and staff. The instrument was tested for validation by sharing it with the target audience and getting their feedback to edit unclear or mis phrased questions. The surveys were formulated with 31 questions. Each question was adopted and edited to ask the participants about an aspect that represents one of the constructs, also called variables, that were tested using the theory of planned behavior (TPB) and the knowledge, attitude, and practice (KAP) framework. The constructs include knowledge, awareness, perceived behavioral control, attitude and subjective norm, behavior, and behavioral intention. Each independent variable was assigned a total score based on scores that were given for the answers to each question forming that construct. The questions making up each construct, the code for each construct, the maximum score for each question, and the whole construct are shown in Table 3 below. Behavioral intention comprises the total scores for the knowledge, awareness, subjective norm, attitude, and perceived behavioral control constructs. Age and gender were asked about in questions 1 and 2 of both surveys, while status was a new variable that was created to divide the data into two groups, Group 1, "Students," and Group 2, "Staff & Faculty." The exact questions and answers that were asked can be found in Annex 1 at the end of the thesis document. The questions in both surveys were almost identical except for question 6, which asked about relationship status in the student survey,

which asked about the affiliated department in the faculty and staff survey. As well as question 22 asked about including sustainable development in the AUC curriculum in the student's survey and asked if the participants are involved in training or sustainability-related activities in the faculty and staff survey. The role of the survey variable was created to measure if the survey impacted raising the participants' awareness by asking them if they have learned what climate change and sustainability are in questions 29 and 30. Question 31 was not included in the table below as it is an open-ended question that includes recommendations on how to get the AUC community to develop more sustainable behaviors.

Table 3 Constructs and questions associated with them, along with total points and abbreviation for each construct

Question Number	Total Score/points	Construct	Construct Code	Total points
Q10	5	Awareness	A.W.	20
Q16	5			
Q19	5			
Q20	5			
Q12	1	Knowledge	K.N.	6
Q13	1			
Q14	1			
Q15	1			
Q18	1			
Q21	1			
Q22	1	AUC's Performance	AUCP	6
Q28	5			
Q11	5	Attitude	AT	20
Q17	5			
Q23A	5			
Q23B	5			

Question Number	Total Score/points	Construct	Construct Code	Total points
Q24A	5	Behavior	B.H.	23
Q24B	5			
Q24C	5			
Q24D	5			
Q25	3			
Q26A	5	Subjective Norm	SN	15
Q26B	5			
Q26C	5			
Q27A	5	Perceived Behavioral Control	PBC	20
Q27B	5			
Q27C	5			
Q27D	5			
AT+SN +PBC	81	Behavioral Intention	BINT	81
Q29	1	Role of Survey	R.S.	2
Q30	1			

2.3 Data Collection

The Institutional review board (IRB) approval at AUC was obtained on the 7th of September 2022, and the data collection started on the 5th of December 2022. The surveys were sent out by the Strategy Management and Institutional Effectiveness (SMIE) department at AUC via email to all enrolled students during the Fall 2022 semester and alumni who graduated during the past ten years from the survey's date. It was also sent to all current faculty and staff members. The surveys were open for responses for one month, from the 5th of December 2022 till the 5th of January 2022. The minimum target number for the students, faculty, and staff surveys was set to 100 for each survey. After the survey was open for one month, the total number of respondents for the student survey was 224, while the faculty and staff survey collected 158 responses. The workforce for this study included Natalie Tamer (Sustainable Development master's student), Dr. Hassan Zaky (Professor in the Department of Psychology, AUC), and Dr. Kate Ellis (Assistant Professor in the Department of Psychology, AUC).

2.4 Ethical Treatment of Participants

The Institutional Review Board (IRB) at the AUC approved the instrument used. The SMIE collected the data, the survey was anonymous, and no personal data was collected from the participants. The data collected was stored on a password-protected device only accessible by the workforce members and will only be kept for three years from the IRB approval date. All the participants involved in this study received no motivation and participated out of their own willingness.

2.5 Data Processing & Analysis

The collected data was first coded into numeric data, and a survey codebook was developed. After the data was coded, it was analyzed using the Statistical Package for the Social Sciences (SPSS) program. New variables were created, forming the constructs, including awareness, knowledge, attitude, subjective norm, perceived behavioral control, behavior, behavioral intention, AUC's performance, and role of the survey. Multiple tests were then run against the data to study the reliability of the constructs and the relationship between the constructs and variables. The tests run include Cronbach alpha (the reliability test) and hierarchal multiple regression; all the data results were gathered into tables and are summarized below in the results section.

Chapter 3: Results

The reliability measure, or Cronbach Alpha, is between 0 and 1. The main purpose of this test is to test the reliability of the questions asked through the analysis of the answers provided by the sample. The higher the score, the more reliable it is, as indicated in **Table 4** below.

Table 4 : Cronbach's alpha score and level of reliability (Lai, 2020)

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

In **Table 5**, the level of reliability of each construct was displayed by analyzing all the data, which is labeled as "all groups," then analyzing separate groups, group 1, which shows the "students," and group 2, which shows "faculty & staff." This was done to test if the different answers between groups impacted the level of reliability. The results show that the awareness, behavior, and perceived behavior control constructs had the highest reliability in group 2 (staff and faculty). While the Attitude, Knowledge, and Subjective Norm constructs had the highest reliability among group 2 (students). Overall, the awareness and attitude constructs showed an acceptable or good level of reliability; while perceived behavioral control may pass as acceptable, knowledge and behavior are the two constructs deemed unacceptable due to low reliability scores less than .46 for knowledge and less than .32 for behavior. After noticing the low reliability scores for different constructs, the Cronbach alpha was run for the questions making up the constructs with the low reliabilities to see if removing some questions would impact the overall reliability of the construct. For the behavior construct it was indicated that

if question 25 asking about the involvement of staff, faculty and students in sustainability job/volunteer activities was removed the Cronbach alpha would increase from .185 to .285 in all groups and from .317 to .469 in faculty and staff (group 2). Also, it was found that if question 24D asking students about if they were following special diets was removed in students (group 1) the Cronbach alpha would increase from .189 to .254. Furthermore, for the knowledge construct it was found that if Q21 was removed for the students survey the Cronbach alpha would increase from .418 to .443 and for faculty and staff if Q14 was removed the Cronbach alpha would increase from .429 to .462. As for the other constructs, all the questions were integral to maintaining the current Cronbach alpha scores.

Table 5 Reliability Measure, Cronbach Alpha Results

Construct	All Groups	Students (Group 1)	Staff & Faculty (Group 2)
Knowledge	.449	.458	.438
Awareness	.809	.754	.877
Perceived Behavioral Control	.630	.590	.693
Attitude	.697	.711	.675
Subjective Norm	.525	.599	.409
Behavioral Intention	.544	.567	.514
Behavior	.185	.189	.317

After studying the level of reliability for each construct, the data were analyzed to test the original theory of planned behavior first, where the behavioral intention, which is made up of perceived behavioral control, subjective norm, and attitude, was the independent variable, and behavior was the dependent variable. The background characteristics (Age, gender, and status) were also added as an independent variable in the regression model, even though they were not stated in the original theory. That was done in order to ensure that the data was correctly conceptualized.

Table 6 shows a regression model for all groups and groups 1 and 2, where behavior is the dependent variable, and background characteristics and behavior intention are the independent variables. Age was only moderately significant in all groups but insignificant in groups 1 and 2. Gender was only significant in all groups but insignificant in groups 1 and 2. Status was insignificant in all groups. The behavioral intention was deemed highly significant in all groups and groups 1 and 2 when analyzed separately. The R squared value was from 3.2% in all groups, 19.7 in students (group 1), and 18% in faculty and staff (group 2). The adjusted R squared was 17.7% for all groups, 17.8% for students and 15.4 % for staff and faculty.

Table 6 : Shows a regression model for all groups, groups 1 and 2, Dependent variable: Behavior

Independent variable	**All groups (all data)**	**Group 1 (Students)**	**Group 2 (Staff & Faculty)**
Constant	5.022 [a]	4.453 [b]	4.392
Age	.035 [c]	.037	.031
Gender	.741 [b]	.778	.700
Status	-.424		
Behavioral Intention	.250 [a]	.250 [a]	.250 [a]
R Squared	.032	.197	.180
Adjusted R Squared	.177	.178	.154

Table 7 presents the independent variables in order of how they were entered into the regression model and behavior as the dependent variable. The background characteristics (age, gender, and status) were entered first (model 1), gradually adding knowledge (model 2), awareness (model 3), perceived behavioral control, attitude, and the subjective norm were gradually added in models 4, 5, and 6. Age showed slight significance in all the models except in model 4, and age was then deemed insignificant. Age was significant in all the models, and status was deemed insignificant in all the models. Knowledge was highly significant in model 2 and significant in models 3 and 4. However, knowledge was insignificant in models 5 and 6. Awareness was moderately significant only in one model where it existed with the background characteristics and knowledge. However, it was insignificant in the rest of the models. It was highly significant when perceived behavioral control was added with the background characteristics, knowledge, and awareness. Then when the attitude was added, it was significant, and when the subjective norm was added, it was only moderately significant. Lastly, attitude and subjective norm were highly significant in the presence of all the other variables. The r squared values showed a gradual increase as the independent variables were added to the regression model, with the % increasing gradually from 3.2, 6.2, 8.5, 12.9, and 16.7 and ending at 21.6% when all the independent variables in Table 7 were added in model 6. The adjusted R squared gradually increased from 2% in model 1, 4.6%, 6.5%, 10.6%, 14.1% to 18.8% in model 6.

Table 7: Hierarchical regression for determinants of behavior for all groups

Independent variable	**Model no.1**	**Model no.2**	**Model no.3**	**Model no.4**	**Model no.5**	**Model no.6**
Constant	14.038[a]	11.127[a]	10.367[a]	7.878[a]	5.372[a]	3.527[b]
Age	.039[c]	.035[c]	.034[c]	.033	.034[c]	.035[c]
Gender	.772[b]	.842[b]	.849[b]	.867[b]	.808[b]	.798[b]
Status	-.366	-.156	-.057	-.155	-.184	-.287
Knowledge		.173[a]	.138[b]	.118[b]	.081	.075
Awareness			.292[c]	.231	.126	.149
Perceived Behavioral Control				.217[a]	.165[b]	.123[c]
Attitude					.340[a]	.288[a]
Subjective Norm						.331[a]
R Squared	.032	.062	.085	.129	.167	.216
Adjusted R Squared	.020	.046	.065	.106	.141	.188

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 8 shows the summary for the hierarchal regression model done the same as Table 7 but for group 1 (students) only, which is why the status was not included. The background characteristics (age and gender) were entered first, gradually adding knowledge, awareness, perceived behavioral control, attitude, and the subjective norm. Age was only moderately significant in model 6 but was deemed insignificant in all other models. Gender, knowledge, and perceived behavioral control were insignificant in all the models, while awareness was only moderately significant in model 3. On the other hand, attitude and subjective norms were highly significant in all the models. The r squared values showed a gradual increase as the independent variables were added to the regression model, with the % increasing gradually from 2, 3.5, 5.8, 8.7, and 18.4 and ending with 25.8% when all the independent variables in Table 8 were added in model 6. The adjusted R squared values were as follows 0.6%, 3.2%, 2.9%, 5.1%,14.6% and 21.8%.

Table 8: Hierarchical regression for determinants of behavior for Group 1 (Students)

Independent variable	**Model no.1**	**Model no.2**	**Model no.3**	**Model no.4**	**Model no.5**	**Model no.6**
Constant	13.982[a]	12.110[a]	11.185[a]	9.175[a]	5.637[a]	3.363
Age	.036	.036	.036	.036	.031	.045[c]
Gender	.652	.722	.654	.822	.668	.471
Knowledge		.112	.065	.051	-.037	-.027
Awareness			.421[c]	.364	.182	.221
Perceived Behavioral Control				.149	.054	.013
Attitude					.581[a]	.479[a]
Subjective Norm						.389[a]
R Squared	.020	.035	.058	.087	.184	.258
Adjusted R Squared	.006	.032	.029	.051	.146	.218

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 9 shows the summary for the hierarchal regression model done the same as tables 7 and 8 but for group 2 (Faculty and staff) only, which is why the status was not included. The background characteristics (age and gender) were entered first, gradually adding knowledge, awareness, perceived behavioral control, attitude, and the subjective norm. Age, awareness, attitude, and subjective norm were insignificant in all models, while gender was moderately significant in model 1 and significant in models 2 and 3, it was insignificant in models 4,5 and 6. Knowledge was highly significant in model 2, 3 and 4. However, knowledge was only significant in models 5 and 6. Lastly, perceived behavioral control was highly significant in all models. The r squared values showed a gradual increase as the independent variables were added to the regression model, with the % increasing gradually from 4.9, 15.2, 15.4, 24.4, 24.6, and ending with 25% when all the independent variables in Table 3.3 were added in model 6. The adjusted R squared values gradually increased from model 1 till model 4 as follows 3%, 4.8%, 11.9%, 20.2% then decreased in models 5 and 6 to 19.6 % and 19.2%.

Table 9: Hierarchical regression for determinants of behavior for Group 2 (Faculty & Staff)

Independent variable	**Model no.1**	**Model no.2**	**Model no.3**	**Model no.4**	**Model no.5**	**Model no.6**
Constant	12.823[a]	9.853[a]	9.659[a]	5.515a	4.804[c]	4.247
Age	.045	.031	.030	.026	.027	.023
Gender	.890[c]	.924[b]	.943[b]	.692	.685	.730
Knowledge		.242[a]	.229[a]	.196[a]	.191[b]	.185[b]
Awareness			.104	.086	.064	.078
Perceived Behavioral Control				.357[a]	.347[a]	.325[a]
Attitude					.075	.067
Subjective Norm						.114
R Squared	.049	.152	.154	.244	.246	.250
Adjusted R	.030	.048	.119	.202	.196	.192

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 10 represents a multiple regression model where behavioral intention is the dependent variable, and awareness, knowledge, status, age, and gender are the independent variables. The results show the results done for all groups, group 1 (students only) and group 2 (faculty and staff). The behavioral intention dependent variable is made up of three independent variables, including perceived behavioral control, subjective norm, and attitude. Awareness was highly significant in all groups and in group 1 but was insignificant in group 2. Knowledge was significant in all groups and group 1 and was insignificant in group 2. On the other hand, status was insignificant in all groups and was not added in groups 1 and 2. Age and gender were insignificant in groups 1 and 2 and in all groups. The R squared value was highly significant in groups 1 and 2 and in all groups. The R squared value was 11.5 % in all groups, 13.4% in group 1, and 10.3% in group 2. The adjusted R squared for all groups was 17.9%, 18.9% for students and 15.4% for staff and faculty.

Table 10: Regression Model of Behavior for all groups, group 1 & group 2

Independent variable	**All groups (all data)**	**Group 1 (Students)**	**Group 2 (Staff & Faculty)**
Constant	3.960 [b]	4.257 [c]	3.472
Awareness	.074	-.012	.185 [b]
Knowledge	.148	.216	.046
Status	-.266		
Age	.033 [c]	.037	.023
Gender	.802 [b]	.728	.821 [c]
Behavioral intention	.224 [a]	.238 [a]	.200 [a]
R Squared	.204	.202	.234
Adjusted R	.179	.189	.154

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant.

Similar to the hierarchal regression model that was previously run when behavior was the dependent variable, another regression model was run where attitude was the dependent variable to study the impact of the other variables on attitude. Table 11 shows the results summary for the regression model run for all data. Age model 1 and insignificant in models 2 and 3. Gender was only moderately significant in model 2 and insignificant in models 1, 3, and 4. Status was only moderately significant in model 1 and insignificant in models 2, 3, and 4.

On the other hand, awareness, knowledge, and perceived behavioral control were highly significant in all models. The r squared % gradually increased from 3.6, 39.3, and 39.8%, and then after the perceived behavioral control was added to the model, the % went down to 19.1%. The adjusted r squared was as follows for models 1-4, 2.5%, 38.4%, 38.7% and 17%.

Table 11: Hierarchical regression for determinants of attitude for all data, Dependent Variable: Attitude

Independent variable	Model no.1	Model no.2	Model no.3	Model no.4
Constant	10.026[a]	4.073[a]	3.417[a]	7.366[a]
Age	.061[a]	.023	.021	-.004
Gender	.494	.524[c]	.482	.173
Status	-.935[c]	.033	.167	.088
Awareness		.417[a]	.354[a]	.108[a]
Knowledge			.390[a]	.309[a]
Perceived Behavioral Control				.154[a]
R Squared	.036	.393	.398	.191
Adjusted R	.025	.384	.387	.170

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant.

Table 12 shows the results summary for the hierarchical regression model run for group 1 (students), where the attitude was the dependent variable. Age was highly significant in model 1, significant in model 2, and only moderately significant in model 3, but insignificant in model 4. Gender was insignificant in all models. Awareness was highly significant in models 2, 3, and 4, while perceived behavioral control was highly significant in model 4. Lastly, knowledge was significant in models 3 and 4. The r squared % gradually increased from 4.7, 39.9, and 40.8%, then decreased to 26% in Model 4. The adjusted r squared values were 35%, 38.8%, 39.2 % and 23.1%.

Table 12 : Hierarchical regression for determinants of attitude for Group 1: Students, Dependent Variable: Attitude

Independent variable	**Model no.1**	**Model no.2**	**Model no.3**	**Model no.4**
Constant	8.882[a]	3.294[a]	2.679[b]	6.090[a]
Age	.077[a]	.045[b]	.043[c]	.008
Gender	.343	.534	.459	.264
Awareness		.428[a]	.365[a]	.152[a]
Knowledge			.428[b]	.314[b]
Perceived Behavioral Control				.162[a]
R Squared	.047	.399	.408	.260
Adjusted R	.035	.388	.392	.231

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 13 shows the results summary for the hierarchical regression model run for group 2 (Faculty and staff), where attitude was the dependent variable. Age, gender, and perceived behavioral control were insignificant in all models. Awareness was highly significant in models 2 and 3 and insignificant in model 4. Lastly, knowledge was moderately significant in models 3 and 4. The r squared value % gradually increased from 2.5, 39.8, and 39.9% in models 1, 2, and 3, but it decreased to 11.7% in model 4. The adjusted r squared values 0.7%, 38.2%, 37.7%, and 6.9%.

Table 13: Hierarchical regression for determinants of attitude for Group 2, Dependent Variable: Attitude

Independent variable	Model no.1	Model no.2	Model no.3	Model no.4
Constant	8.936[a]	5.735[a]	5.401[a]	9.504[a]
Age	.040	-.007	-.008	-.020
Gender	.613	.476	.453	.090
Awareness		.406[a]	.343[a]	.062
Knowledge			.358[c]	.301[c]
Perceived Behavioral Control				.127
R Squared	.025	.398	.399	.117
Adjusted R	.007	.382	.377	.069

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 14 shows the results summary for the hierarchical regression model run for the Proposed model specification but with behavior as the dependent variable. Status was insignificant in all models, while age was moderately significant in models 1 and 2 and significant in model 3. Gender was significant in all models, while attitude and subjective norm were highly significant in all models. The r squared % increased gradually from 3.2 % and 12.5% in models 1 and 2 to 18.9% in model 3. The adjusted r squared gradually increased from 2% in model 1, 11.1% to 17.1% in model 3.

Table 14: Hierarchical regression for determinants of behavior for all groups, Dependent Variable: Behavior

Independent variable	Model no.1	Model no.2	Model no.3
Constant	14.038[a]	7.825[a]	5.381[a]
Age	.039[c]	.038[c]	.039[b]
Gender	.772[b]	.721[b]	.737[b]
Status	-.366	-.263	-.434
Attitude		.485[a]	.408[a]
Subjective Norm			.361[a]
R Squared	.032	.125	.189
Adjusted R	.020	.111	.171

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 15 summarizes the hierarchal regression model results for the Proposed model specification but with behavior as the dependent variable for group 1 (students). Gender was insignificant in all models, while age was only moderately significant in model 3 and otherwise insignificant in models 1 and 2. Attitude and subjective norm were highly significant in all models. The r squared value gradually increased from 2 and 17.5% to 25.2% when all the variables in Table 5.5 were added. The adjusted r squared values were 0.6%, 15.7 % and 2.9%.

Table 15: Hierarchical regression for determinants of behavior Group 1 (Students), Dependent Variable: Behavior

Independent variable	Model no.1	Model no.2	Model no.3
Constant	13.982[a]	6.038[a]	3.532[c]
Age	.036	.029	.045[c]
Gender	.652	.592	.521
Attitude		.642[a]	.514[a]
Subjective Norm			.388[a]
R Squared	.020	.175[a]	.252[a]
Adjusted R	.006	.157	.029

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

Table 16 summarizes the hierarchal regression model results for the Proposed model specification but with behavior as the dependent variable for group 2 (Faculty and staff). Age was insignificant in all models, while gender and subjective norm were moderately significant in all models. Lastly, the attitude was moderately significant in model 2 and insignificant in model 3. The r squared % gradually increased from 4.9 and 7.7% in models 1 and 2 to 10.5% in model 3. The adjusted R squared values were 3%, 4.8% and 6.7%.

Table 16: Hierarchical regression for determinants of behavior Group 2 (Faculty & Staff), Dependent Variable: Behavior

Independent variable	Model no.1	Model no.2	Model no.3
Constant	12.823[a]	9.555[a]	7.436[a]
Age	.045	.048	.033
Gender	.890[c]	.867[c]	.891[c]
Attitude		.252[c]	.231
Subjective Norm			.295[c]
R Squared	.049	.077	.105
Adjusted R	.030	.048	.067

[a]: p-value < 0.01, Highly significant, [b]: 0.01 <p-value < 0.05, Significant, [c]: 0.05 <p-value<0.10, moderately significant

3.1 Results Summary

The Results were divided into sections showing the reliability of the constructs, then testing all three previously mentioned theories. The overall findings of the theories are indicated below:

- **Behavioral intention** showed a highly significant positive impact on behavior, indicating that if the behavioral intention increases, the higher the probability that the individual will do a certain behavior.
- **Attitude** has a positive, highly significant impact on behavior, indicating that the better the attitude, the higher the chance of doing a pro-environmental behavior.
- **Awareness and knowledge** did not have a direct significant impact on behavior.
- However, **awareness, knowledge, and perceived behavioral control** were found to have a highly significant positive impact on attitude. Which indicates that they impact behavior positively by impacting attitude.
- **Subjective norm** was found to have a highly significant positive impact on behavior.
- **Behavioral intention** showed a highly significant positive impact on behavior, indicating that if the behavioral intention increases, the higher the probability that the individual will do a certain behavior.
- **Attitude** has a positive, highly significant impact on behavior, indicating that the better the attitude, the higher the chance of doing a pro-environmental behavior.
- **Awareness and knowledge** did not have a direct significant impact on behavior.

- However, **awareness, knowledge, and perceived behavioral control** were found to have a highly significant positive impact on attitude. Which indicates that they impact behavior positively by impacting attitude.
- **Subjective norm** was found to have a highly significant positive impact on behavior.

Chapter 4: Discussion and Conclusion

4.1 Discussion

The findings of this study provide useful insights into the factors influencing sustainable behavior and behavioral intention. The TPB-based theory emphasizes the importance of attitude and subjective norms in predicting behavior. In contrast, the KAP-based theory highlights the significant role of perceived behavioral control, knowledge, and awareness. The results highlighted two other important variables other than behavior which are behavioral intention and attitude. Behavioral intention was found to be a critical predictor of behavior, with highly significant results observed across all groups (Students, faculty, and staff) which indicates that there is strong evidence to support hypothesis H7. Perceived behavioral control and subjective norm had a highly significant positive impact on behavioral intention and behavior, indicating strong evidence to support Hypotheses H2, H3, H4 and H6.

On the other hand, knowledge had an indirect positive impact on behavioral intention and behavior through its positive highly significant impact on attitude. Which indicates strong evidence to support H1 and H5. When attitude was put as the focus to study the factors impacting it perceived behavioral control, subjective norm and knowledge had a high significant impact, which indicates that they have a highly significant indirect impact on behavior. Furthermore, if any of the independent variables impacting attitude increases the chances of the individual carrying out the behavior increases. On the other hand, age and gender were tested across the three models and had a variable impact on behavior depending on the study group and the model tested. Surprisingly, status does not have a significant effect on behavior or behavioral intention, which shows that there was no significant difference between the results among students, faculty and staff. This study emphasizes the importance of considering multiple theoretical frameworks to gain a comprehensive understanding of sustainable behaviors rather than relying solely on the TPB, which has shown limitations in

previous research studies and has been modified in extended versions with additional variables (Lihua, 2022; Tommasetti et al., 2018b).

By creating an integrated model using the TPB and KAP framework, this study provides a more comprehensive understanding of sustainability and climate change behaviors at higher educational institutions. It is vital to state that the methodology used, and theories tested in this study were not previously tested together, which indicates a novel approach. This approach addresses the limitations of both theories, as the KAP framework solely focuses on knowledge and attitude to predict behavior (Rav-Marathe et al., 2016), while the TPB focuses on subjective norms, perceived behavioral control, and intention formed prior to behavior (Opoku et al., 2021). Utilizing each theory alone has shown significant limitations in considering essential variables that impact a person's behaviors. Additionally, demographic characteristics, including age, gender, and status, were considered in the analysis, as demographic data is essential for understanding the target population and studying related trends (Hammer, 2011).

The data for this study was collected using a survey developed by adopting questions from the Sustainability Awareness Questionnaire (SAQ) and Sulitest, which were tailored to fit the cultural context. These data collection tools provided user-friendly, educational, and standardized insights that may help generate sustainability interventions and policies.

The results that were included in the analysis such as the low reliable constructs were to understand the connection and impact of the diverse independent variables on the dependent variables specifically attitude and behavior. The low reliability of the knowledge construct may have been due to the students, staff and faculty skipping the knowledge questions due to fear of getting the wrong answer or due to them being unaware of what the answers are especially for questions 21 and 14. Furthermore, the low reliability for the behavior construct may have

been due to some questions not matching the cultural context such as people following special diets which is less commonly practiced in Egypt compared to the United states and Europe, as well as the lack of involvement in sustainability activities/jobs question which is not a common practice in Egypt. However, the knowledge and behavior construct specifically need to be reformulated to be a more reliable tool, and the behavioral intention, subjective norm, attitude and perceived behavioral control constructs would need to be deconstructed and revised to have a more reliable Cronbach alpha of .8 to strengthen the instrument's ability to collect enough reliable data for predicting behavior. Moreover, utilizing constructs with such a low reliability level may have been the reason for the low r squared values of each model and their respective independent variables. There were also values were the r squared and adjusted r squared would decrease when variables were being added to the model and this may have been due to a high level of correlation between the newly added independent variable and the dependent variable (attitude/behavior). Furthermore, the relationship status, departments and nationality were not included in the analysis as there was not enough information to indicate their level of significance towards attitude and behavior. Lastly, the survey was specifically sent out to alumni that graduated in the past 5 years to study the impacts of the climate change global trend on the undergraduate and graduate alumni and see if they have a higher level of knowledge and awareness compared to the current AUC graduates and undergraduate students. However, the response rate of the alumni was 32.59% of the overall student sample compared to 67.41% of the enrolled students, there was no ground for a fair comparison. The proposed integrated theory had r squared values that went up to 39.2% when predicting attitude, which indicates that the proposed theory based on the KAP framework was more useful in explaining attitude than the other tested theories. Therefore, creating a good starting point for future research on other variables can help better predict attitude to cover the remaining 60.8%.

On the other hand, it is important to acknowledge the limitations of this study. The low reliability of the behavior and knowledge constructs indicates the questions allocated for each construct need to be revised and edited or replaced to strengthen the reliability of this instrument for future research. Additionally, the study focused on one university in Egypt, the AUC is a private university American university in Egypt, and it is not easily accessed by any student as it requires high tuition fees and only capable students or students who are able to enroll via scholarship are admitted. This indicates that the AUC is not representative of all higher educational institutions in the country, even though AUC is a leading English-language, U.S.-accredited institution of higher education. Its diverse community of students, faculty, alumni, trustees, and generous supporters represents more than 60 countries. Other higher educational institutions in Egypt have a diverse community and it is important that this research is implemented in multiple universities in Egypt in both private and public settings, to properly test the presented integrated theory. Furthermore, the chosen sample was a convenient one, a more randomized sample is essential to obtain a more representative sample for the generalization of the results. Furthermore, the sample size of the study was relatively small, considering that the data was collected anonymously via email and the studied sample had skipped answering multiple questions. Future research may consider alternative data collection methods, such as interviews in order to increase the response rate and sample size.

All in all, the findings obtained have important insights for predictors of attitude that was found as a variable that highly impacts behavior along behavioral intention. Identifying key factors influencing behavioral intention and attitude can help present interventions to the target audience raining their level of awareness, knowledge and potentially present other variable influencing attitude and behavior. The newly proposed framework can be further utilized to provide a useful approach for designing such interventions and tailoring them to specific populations and contexts.

4.2 Conclusion

In conclusion, this study has provided valuable insights into the factors influencing sustainability attitudes, intention and in return behaviors among university students, staff, and faculty. The factors affecting behavior include behavioral intention which is made up of subjective norm, attitude and perceived behavioral control and can be utilized as predictors of sustainability behavior, while age and gender may also play a role, their impacts over behavior vary across groups, and theories, a larger sample size may help clarify the exact extent of their impact on behavior. Furthermore, the important role that attitude and behavioral intention plays were highlighted in the proposed theory based on TPB and the proposed theory based on the KAP Framework, highlighting them as strong predictors of sustainability behavior, while perceived behavioral control, awareness, knowledge, and status exhibit varying significance levels across groups and models and would need more research to determine their significance.

4.2.1 Future research

Some of the suggested ideas for future research to address the limitations in this tdy include:

- Replicate this study by including other independent variables such as personal beliefs, personality type, income, and others.
- Replicate the study and targeting other higher educational institutes in Egypt both public and private to increase the inclusivity, sample size and randomization of results.
- Utilize other data collection tools such as interviews to obtain higher response rates and avoid gaps (skipping questions) in the results.
- Studying impacts of specific educational programs at universities towards promoting sustainability behaviors and attitudes.
- Replicate the study doing regression diagnostics to check for multicollinearity.

In Conclusion, this study does not only propose a new research approach towards understanding the factors impacting sustainability behaviors but also contributes to the existing knowledge by shedding light on the factors influencing sustainability attitude intentions which impact behaviors among university stakeholders including staff, faculty and students. Despite the limitations, the findings provide a foundation for future research and the development of targeted interventions to foster sustainable behavior in university settings. The interventions must focus on the components of behavioral intention, which include subjective norms, attitude, and perceived behavioral control.

4.2.2 Programmatic Implications

The suggested programmatic implications based on the above analysis and discussion are as follows:

- AUC administration can mandate that existing student activities for undergraduate and graduate students include a sustainability-based component (Trying to influence students through creating a more sustainable subjective norm).
- Create activities for staff and faculty where they learn more about essential day-to-day sustainability behaviors through their respective department leads.
- Offer monthly open-access workshops on climate change and sustainability for the AUC community addressing the causes, consequences, and actions of mitigation and adaptation.
- Provide fellowships to support students to do more research on climate change and sustainability.
- Collaborate with other universities and organizations to create a big annual event towards climate action organized and moderated by the AUC community members.

- Ensure that all students across all departments have a core course addressing sustainability, climate change and their individual contributions to it (may be a part of an existing relevant course).

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ANNEX 1

The Survey Questions

1. Please indicate your age:

2. Please specify your gender:

- Male
- Female
- Non-binary
- Prefer not to disclose

3. Please specify your primary nationality:

Other (please specify):

4. Are you an AUC:

- Undergraduate Student
- Graduate Student
- Alumnus/Alumna
- A full-time faculty member
- A part-time faculty member
- A full-time staff member
- A part-time staff member

5. Are you currently:

- Employed full-time

- Employed part-time
- Unemployed

6. What is your relationship status? / Which AUC department/area are you affiliated with? (drop down)

- Single
- Currently Married
- Divorced/Separated
- Widowed
- In a relationship/Engaged

7. How far from the New Cairo campus do you live?

- I live on-campus
- I live close to campus (5-30 min drive)
- I live 35 min - 1 hour away from campus
- I live more than an hour away from campus

8. How do you mainly go to campus?

- I walk
- I ride a bicycle
- I ride a motorcycle
- I use the AUC buses or public buses
- I carpool

- I use a private car (personal car, Uber, etc.)

9. How do you mostly spend the weekdays?

- I work from an office
- I work from home
- I go to classes/study
- I attend to my home responsibilities

"Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

-- Brundtland Commission (United Nations), 1987

"An academic institution committed to sustainability should help students understand the roots of today's injustices and motivate them to seek justice and humaneness in full integration with understanding the roots of environmental degradation and modeling environmentally sustainable practices."

-- John B. Cobb Jr., Sustainability and the Liberal Arts Conference, 1998

"Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas."

-- United Nations

10. Before reading the definitions on the previous page, how aware were you of 'sustainable development'?

- Very Aware
- Aware
- Moderately Aware
- Slightly Aware
- Not Aware

11. How important do you think sustainable development is?

- Very Important
- Important
- Moderately Important
- Slightly Important
- Not Important

12. Do you know how many Sustainable Development Goals exist?

- 3
- 8
- 17
- 5

13. In your opinion, which of the following does the modern concept of sustainable development focus on?

- Economic development
- Social development

- Environmental protection
- All of the above

14. Social sustainability refers to:

- The enterprise supports jobs & delivers income to communities in the short term
- The enterprise supports jobs & delivers income to communities in the long term
- Benefits are fairly & equitably shared, and the quality of life of communities & human rights are respected
- Stewardship of resources & managing & conserving the environment

15. Economic sustainability refers to:

- The sustenance of resources to create long-term sustainable values
- Safeguarding (human & material) resources
- Practices that supports steady growth in total national GDP
- Making smart business decisions without negative social or environmental impacts
- All of the above

16. Before reading the definitions on the previous pages, how aware were you of 'climate change'?

- Very Aware
- Aware
- Moderately Aware
- Slightly Aware

- Not Aware

17. How important do you think climate change is?

- Very Important
- Important
- Moderately Important
- Slightly Important
- Not Important

18. To face climate change, policies can target mitigation (trying to reduce the cause) and adaptation (adapting to the impact). Which of the following is considered an adaptation?

- Energy conservation & efficiency
- Capture & use of landfill & digester gas
- Withdrawal of activities and populations from areas at risk (e.g. flooding)
- Sustainable transportation
- I'm not sure

19. How aware are you of 'carbon footprint'?

- Very Aware
- Aware
- Moderately Aware
- Slightly Aware
- Not Aware

20. How aware are you of 'water footprint'?

- Very Aware
- Aware
- Moderately Aware
- Slightly Aware
- Not Aware

21. Which of the following do you think contributes the most to climate change?

- Natural events
- Human activities
- Not sure

22. Is sustainability/sustainable development included in AUC curricula? / Did you attend any training or awareness sessions on sustainability/sustainable development at AUC? Yes/ No/ Not sure

- No
- In specific courses
- In courses where sustainable development isn't the main topic
- I don't know

23. How much do you agree with the following?

Strongly Agree Agree Moderately Agree Disagree Strongly Disagree

a. Holding awareness campaigns on climate change and sustainability would motivate me engage in relevant activities

b. Creating sustainability policies on campus would persuade more of the AUC community members to engage in sustainable habits

24. How often do you practice the following sustainable behaviors?

	Always	Often	Occasionally	Rarely	Never
a. Turning off the lights & other electronics when you leave a room					
b. Bringing your own reusable cup/lunchbox/cutlery to campus					
c. Sorting waste using recycling bins					
d. Following special diets (vegetarian/vegan) to reduce negative impacts on the environment					

25. Are you currently involved in sustainability/sustainable development (job, volunteer activities, etc.)?

- Yes, I'm deeply involved
- Yes, regularly
- Yes, occasionally
- No

26. How often do your friends do the following?

	Always	Often	Sometimes	Rarely	Never
a. Recycle waste					
b. Purchase reusable products (not single-use)					

c. Treat people equally

27. How easy are the following actions?

Very Easy Easy Moderately Easy Difficult Very Difficult

a. Using recycle bins on campus

b. Refilling water bottles using the on-campus dispensers

c. Participating in sustainability initiatives on campus

d. Utilizing more sustainable habits in general

28. How would you describe AUC's performance in sustainable/responsible practices (for example, green campus initiatives, energy consumption, ethics, and employee labor conditions of employees)?

- Excellent
- Good
- Moderate
- Poor

29. After completing the survey, do you feel more knowledgeable about sustainable development?

- Yes
- No

30. After completing the survey, do you feel more knowledgeable about climate change?

- Yes

- No

31. Please share suggestions to help AUC students develop more sustainable behaviors: (open ended)