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Demand and Supply Gaps of Sustainable Development Goals through Innovative Sustainability Consciousness Model for Tanzania's Higher Education

Deus Ngaruko, Kezia H. Mkwizu, Mato J. Magobe, Harrieth G. Mtae, Augustine W. Kitulo

Abstract: Education institutions are undergoing evaluation but there is need for integration of Monitoring, Evaluation and Learning (MEL) in education models. Hence, this study's purpose is examining demand and supply of Sustainability Consciousness (SC) model in education institutions. Specific objectives are to analyse demand for sustainable development extra-curricular activities and supply of project-related to sustainable development in higher education institutions and; to analyse any modules that have sustainability concepts and university-related sustainability projects. Data were collected from 743 students, staff 119 and 25 face to face interviews in 6 universities including an open and distance learning institution located in Tanzania. The data was analyzed using descriptive statistics and NVivo. The findings show that most students have not had any extra-curricular activities focusing on sustainable development (73.41%). Additionally, most students have not had any university project(s) with the core focus on sustainable development (78.41%). The majority of staff are not teaching any modules that have sustainability concepts included in the content and/or assessments (62.20%) and are not involved in any university-related sustainability projects (73.10%). This shows that MEL is still not that integrated in universities. Findings imply that in order to achieve sustainable development goals including SC in Tanzania then it is vital to create a SC model highlighting programs that ensure students receive extra-curricular activities, and engagement in sustainability projects integrated with MEL. Integration of SC can strengthen demand and supply side of MEL capacities in universities.

Keywords: Sustainability, Higher Education, Monitoring Evaluation and Learning (MEL), Sustainable Development Goals (SDGs), Tanzania, Open and Distance Learning (ODL), Co-evolutionary Theory, Innovative Sustainability Consciousness Model, Extra-curricular Activities, Institutional Sustainability

Highlights

What is already known about this topic:

- Institutional aspect with SDG 16 and SDG 17 in studying sustainability can be treated as the fourth dimension in SD.
- SDG-related research is mainly from China, UK and the USA.

What this paper contributes:

- Demand for SD extra-curricular activities and supply of project-related to SD in HEIs.
- SC model highlighting programs that ensure students receive extra-curricular activities, and engagement in sustainability projects that are integrated with MEL.

Implications for theory, practice and/or policy:

- Practical implication is the need for SC model highlighting programs that ensure students receive extra-curricular activities, and engagement in sustainability projects that are integrated with MEL.
- Integrated SC model for education practitioners will strengthen demand and supply side of MEL capacities not just in universities but the model can be used in all government ministries and agencies.
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Introduction

Education institutions are undergoing evaluation of existing teaching and learning models including those involving MOOCs. Other institutions like University of Turin in Italy did an evaluation on the transition of traditional methods to online after the disruptions of the COVID-19 (Campos et al., 2022; Floris et al., 2020). Equally, in Spain, the study by Faura-Martínez et al. (2022) on sustainability of the university noted that in the evaluation of students, there were issues related to lack of preparedness and difficulties in transiting to online. Within Africa, the need for evaluation in higher education institutions has received different perspectives. For instance, Nsibance and Modiba (2024) discovered that in South African universities, there is emphasis on teaching evaluation of professional development and accountability. Conversely, the study by Nsibane and Modiba (2024) stated that there is less attention on teaching and learning evaluation. Evaluation is key as countries aim to achieve sustainable development goals agenda 2030 while Omotosho et al. (2025) hinted that sustainability is gaining attention in academia. Given that sustainability is gaining attention of scholars like Asvanyi and Gedeon (2025) and Liu et al. (2026), there is a need to provide more research on this topic from different countries such as Tanzania. In addition, the focus on Sustainability Consciousness (SC) can enhance our understanding of sustainability from the context of Tanzania.

However, the integration of Monitoring, Evaluation and Learning (MEL) in education models is still minimal as evident in studies such as Marco (2023), Silaji et al. (2025), and Wanjiru and Joseph (2026), hence more research is needed. The limited literature on MEL in education is a challenge especially towards achieving sustainable development goals 2030 in education institutions. The demand for improved teaching and learning models and the supply of improved models is not even. In addition, this study is of the opinion that there are even less studies on SC model among university internal stakeholders being staff and students. Another study by Yamaguchi et al. (2023) revealed that literature reviews on journal articles related to sustainable development goals 5, 9, 10, 14 and 16 have research gaps that should be explored by other studies. This is a clear indication that the research sustainable development goals gaps exist which according to this study is viewed as demand and supply of sustainable development goals gaps. Hence, more studies are needed in order to guide the education sector. This study's main objective is to examine demand and supply of innovative SC model in education institutions. Specifically, this study analyses demand for sustainable development extra-curricular activities and supply of projects related to sustainable development in higher education institutions and, analyses of any modules that have sustainability concepts included in the content and/or assessments and university-related sustainability projects.

Literature

Innovative Sustainability Consciousness

Sustainability Consciousness (SC) has received various definitions from different scholars such as Olsson et al. (2016), Gericke et al. (2019) and Mohamed et al. (2024). The term SC is defined by Gericke et al. (2019) as experiences or awareness of sustainability phenomena whilst Olsson et al. (2016) defined SC as attitudes, behaviors and knowledge about sustainability. On the other hand, Olsson (2014) stated that SC integrates the three pillars of sustainable development and puts emphasis on attitudes, behaviors and knowingness. Furthermore, these various definitions of SC by Gericke et al. (2019) and Olsson et al. (2016) show that experiences, awareness, attitudes, behaviors and knowledge are important in defining the concept of SC. In analyzing the differences between definitions of SC, it is clear that there are strengths and limitations from these previous studies. For example, the definition by Gericke et al. (2019) is limited to experiences and awareness while Olsson et al. (2016) strengthen the SC definition by including attitudes, behaviors and knowledge as dimensions that can define SC but can also be used a measure of SC. Other scholars have also mentioned about SC and these are Liu et al. (2026), Manchanda et al. (2023), Othman et al. (2025), Salamzadeh et al. (2025), Uleanya et al. (2025), and Welbeck and Larbi (2026). For instance, Uleanya et al. (2025) combined awareness, attitude and

behaviors by referring to SC as an individual's awareness, attitudes, and behaviors regarding environmental, social, and economic sustainability. However, the need for innovative research declared by Mishra et al. (2024) has prompted this study to connect the concept of innovative to SC forming the concept of innovative SC. In Africa, the study by Aliyu (2026) conducted in Nigeria indicated the need to integrate SC into healthcare services. Hence, the integration or inclusion of SC with other services or concepts is vital. In view of this, and in proposing the SC model, this paper therefore, considers and defines innovative SC as the use of not only social, economic and environmental pillars of sustainable development goals by university internal stakeholders but also the inclusion of institution and MEL.

Demand and Supply Gaps of Sustainable Development Goals

The term sustainable development goals appear in several studies and reports. The United Nations Global Impact (2014) described the sustainable development goals as a sustainability-oriented change with targets. Other scholars like Whittingham et al. (2022) mentioned that the sustainable development goals act as a common framework that can guide and shape global efforts and be used differently by firms operating in specific institutional environments. Other scholars like Okeke (2024), Singh and Zaidi (2025), and Yang et al. (2026) have also mentioned sustainability in relation to services supply chain, management supply practices and multi-trade credit. Although supply is covered in relation to sustainability in past studies, this paper brings forth the connection of demand and supply with sustainable development goals. Whilst the study by Moreno and Cueto (2022) described sustainable development goals as progress in terms of decrease, stagnating, moderate and on track, this study describes the sustainable development goals from a demand and supply perspective and thus the concept of demand and supply gaps of sustainable development goals. Furthermore, the gaps are presented in terms of variations between the pillars of sustainable development goals among development stakeholders of the universities.

Development stakeholders

Stakeholders are both internal and external in any projects. For instance, Lehtinen et al. (2021) gave examples of internal stakeholders in a project as owners, contractors or designers while external stakeholders such as suppliers and government institutions. Universities are education entities run by stakeholders who are responsible for the development of the institution. In higher education institutions, these stakeholders as development stakeholders can be both internal and external. However, for purposes of this study, the connection of development to stakeholders is termed as development stakeholders who are internal stakeholders of the university (leaders, academic staff and students).

Theoretical Frame

Theoretical frame for this study is co-evolutionary theory which considers the multi-level effects of stakeholders. Co-evolution is a concept that was coined by Ehrlich and Raven (1964) which assumes that a natural selection of two or more groups that are ecologically related. However, in this study, the application of the co-evolutionary theory is confined to understanding the demand and supply of sustainable development goals among university internal stakeholders in higher education institutions. For the selected universities of this study, there are three levels in the internal stakeholders and these are leaders, academic staff and students. One of the identified elements of the co-evolutionary models for adaption of strategic management and organizations is that it places emphasis on the interaction within the university and between the university and its environment (Lewin & Volberda, 1999).

Sustainable Development Goals' evaluation and Innovative SC among development stakeholders in Higher Education Institutions

Evaluation of sustainable development goals is crucial. Past studies such as Whittingham et al. (2022) have revealed the importance of linking sustainability reporting to sustainable development goals. Using

a computer-aided text analysis, the findings have shown there is increased alignment with language of certain sustainable development goals among firms, and there were changes among firms across industries based on institutional characteristics. These results imply that changes in firms in relation to sustainable development goals are based on institutional characteristics. However, there are less studies of a similar nature in higher education institutions. Moreover, the existing literature and in particular Moreno and Cueto (2022) have revealed that the institutional aspect with sustainable development goals 16 and 17 in studying sustainability can be treated as the fourth dimension in sustainable development. Hence, this study also considers institutional as one of the dimensions of sustainable development after social, economic and environmental.

In Moreno and Cueto (2022), the study had concentrated on grouping the efforts of African countries towards the sustainable development goals using a cluster analysis and Anova with findings revealing that countries within Africa such as Tanzania, Uganda, Zambia and Zimbabwe have challenges of sustainability and were grouped in cluster 3 which are rated as having progress of 0.25 in achieving the sustainable development goals which signifies significant major challenges while a trend rate of 1.45 indicates both stagnating and a moderate improvement. However, a similar study in reference to the education sector and in particular higher education institutions is needed and this study expands literature by proposing a model through evaluating the demand and supply of SC.

Literature on SC exists (Asvanyi & Gedeon, 2025; Liu et al., 2026; Manchanda et al., 2023; Othman et al., 2025; Salamzadeh et al., 2025; Uleanya et al., 2025; Welbeck & Larbi, 2026) but it is limited. In fact, Mishra et al. (2024) conducted a bibliometric analysis from 2015 to 2022 and the study revealed the sustainable development goals-related research is mainly from China, UK and the USA (31%) and most of the topics covered include circular economy, food security and poverty. This shows that other countries in Africa including Tanzania need to do more research related to sustainable development goals and be innovative. Welbeck and Larbi (2026) confined their study on SC among students in Ghana. Hence, this study is motivated to examine innovative sustainability consciousness among development stakeholders in higher education institutions in Tanzania. Furthermore, this study's specific objective is to analyse demand for sustainable development extra-curricular activities and supply of project related to sustainable development in higher education institutions and, to analyse any modules that have sustainability concepts included in the content and/or assessments and university-related sustainability projects.

Methodology

Research design

The study area is Tanzania and a cross-sectional design was deployed. The methodology approach is quantitative and qualitative. The quantitative results are supplemented by qualitative data so as to obtain a clear picture of SC in the context of Tanzania. Further, the selection of mixed method where quantitative approach is used allows for generalization of findings within the context of Tanzania' higher education institutions in reference to SC. The unit of analysis is staff and students in 6 universities namely The Open University of Tanzania (OUT), St. Augustine University of Tanzania (SAUT), University of Dodoma (UDOM), Mbeya University of Science and Technology (MUST), State University of Zanzibar (SUZA) and Nelson Mandela African Institute of Science and Technology (NM-AIST).

The data was collected quantitatively from a sample size of 743 students and 119 staff in 6 universities as well as 25 face to face interviews. The sampling procedure used to obtain the staff and students was purposive sampling through staff and student leaders and then snowballing sampling was used by the staff leaders and student leaders to inform their colleagues to fill in the online survey questionnaire. For the 743 students and 119 staff. Similarly, a purposive sampling was used to obtain the 25 interviewees who were (7 leaders, 8 academic staff and 10 students) from the selected universities.

Data Instruments, Data collection and Analysis

The statements for the survey questionnaire to obtain the quantitative data were adapted from Gericke et al. (2019). The dimensions to measure SC are attitude, behaviour and knowingness and the statements centre around the three pillars of sustainable development which are social, economic, and environment plus the fourth pillar called institutional which was suggested by Moreno and Cueto (2022). The interview guide supplemented the survey questionnaires. Therefore, this study had the survey questionnaire and interview guide and the data was collected from the respondents concurrently. The survey questionnaire was distributed to the respondents via the online QuestionPro form. Descriptive statistics was used to present the collected data in frequencies and percentages. The inferential statistics used the Phi and Cramer's V to test the significance values which was assisted by the Statistical Package for Social Sciences (SPSS) version 25 while the qualitative data was analyzed using NVivo version 14 which is a software for coding, summarizing and interpreting data for purposes of obtaining the emerged themes to supplement the quantitative results. However, before the qualitative data was entered in NVivo for analysis, the recorded interviews were transcribed. Once the qualitative data was entered in the NVivo then the four researchers engaged in the coding exercise. To ensure consistency in coding from the multiple coders then the data was entered and checked by more than one person so as to minimize errors in data entry and processing.

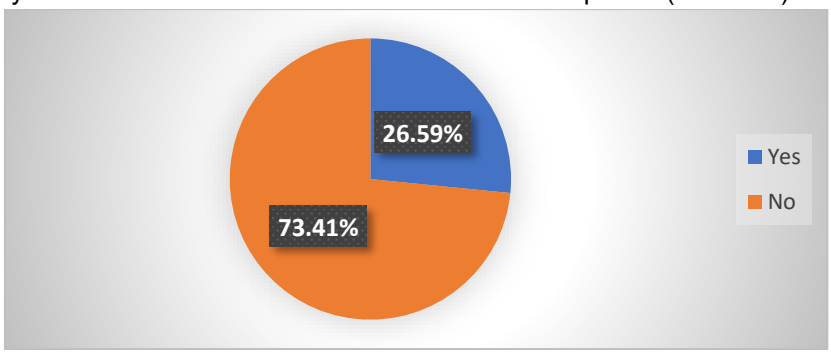
Limitations of this Study

This study was limited to higher education institutions including open and distance learning. Future studies may explore a similar research in secondary schools. In addition, this study had methodological constraints in terms of geographical coverage since the study is concentrated within Tanzania and therefore, future studies may conduct similar research in other African countries and beyond.

Findings

The findings in Figure 1 have indicated that majority of students have not had any extra-curricular activities with the core focus on sustainable development (73.41%).

Figure 1. Had any extra-curricular activities on sustainable development (Students).

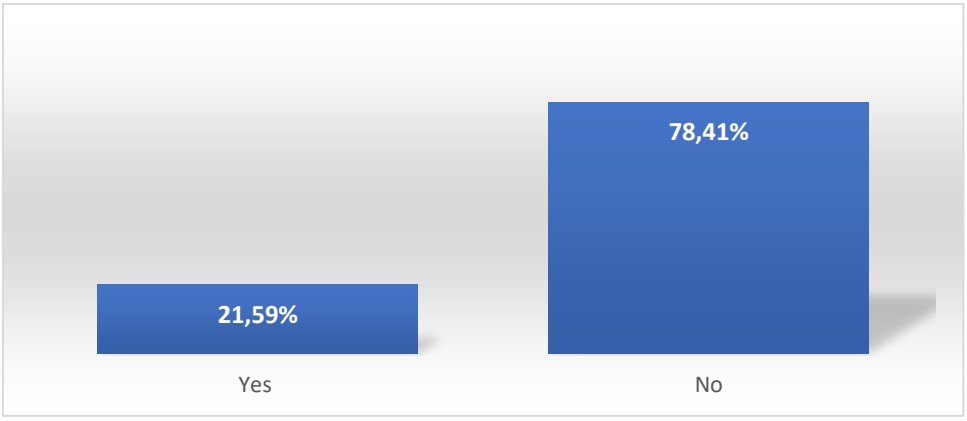


Source: Field data

Interestingly, Figure 2 reveals that most students stated that they have not had any university project(s) with the core focus being on sustainable development (78.41%). One of the interviewed students hinted on not having any modules on SC even in reference to managing waste by adding that:

"……*the main issue is lack of education. We need to educate students about proper waste management, considering our campus is in a wetland area.*"

Figure 2. University project(s) with core focus on sustainable development.



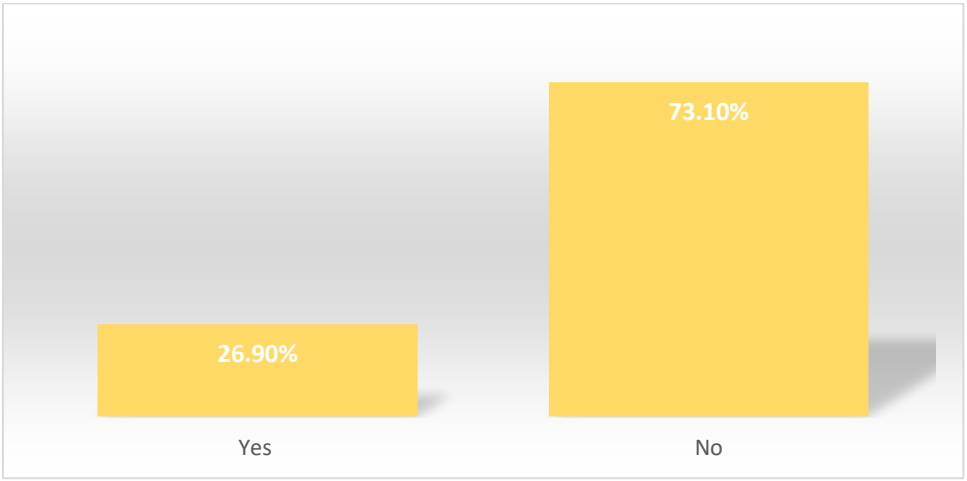
Source: Field data

Figure 3 indicated that most of the staff did not have any university-related sustainability projects which they were or are involved in (73.10%). And those few staff that said yes and added that:

"I am involved in the planting tree projects"

"I am in the STEM project and green-house gases emission"

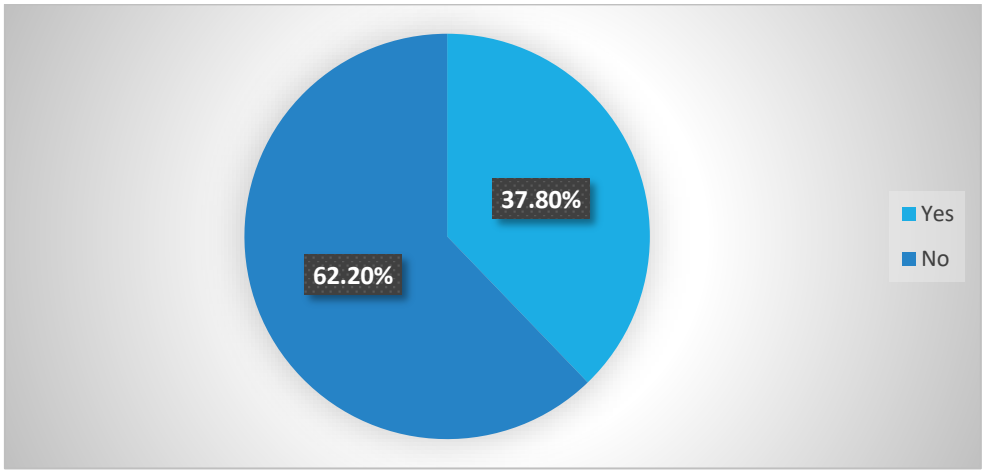
Figure 3. University-related sustainability projects that they were or are involved.



Source: Field data

Further findings show that 62.20% of the staff are not teaching any modules that have sustainability concepts included in the content and/or assessments (See Figure 4).

Figure 4. Teach any modules that have sustainability concepts included in the content/or assessment.



Source: Field data

Table 1 show that the students' level of SC is highest for attitude in the economic aspect of sustainable development by strongly agreeing that it is important to reduce poverty (68.5%). This is followed by knowingness for the aspect of economic with students who strongly agreed on the elimination of poverty globally is necessary for sustainable development (58.3%). Behavior is last on the environment dimension where the majority of the students strongly agreed that they have changed their personal lifestyle in order to reduce waste e.g., throwing away less food or not wasting materials (43%).

Table 1. Knowingness, Attitude and Behaviors of SC (Students).

Variable	**SD (%)**	**D (%)**	**N (%)**	**A (%)**	**SA (%)**	**DK (%)**
Knowingness (Social, Economic and Environment)						
To achieve sustainable development, every human being is entitled to access to good education (SI)	5.7	3.8	5.0	35.4	49.1	1.1
Peaceful conflict resolution through discussion is necessary for sustainable development (S2)	2.3	1.6	4.4	39.6	50.3	1.8
Respecting human rights is necessary for sustainable development (S3)	3.5	0.8	3.8	36.8	54.1	1.1
I have adequate skills to promote sustainability practices (S4)	2.3	5.9	15.6	41.5	32.1	2.6
Elimination of poverty globally is necessary for sustainable development (E1)	3.0	2.0	3.4	31.8	58.3	1.5
Sustainable development requires that companies act responsibly toward their	2.2	2.4	6.2	43.9	42.5	2.8

employees, customers and suppliers (E2)						
Sustainable development requires fair distribution of goods and services amongst people in the world (E3)	2.6	3.0	6.1	40.1	46.2	2.2
Preserving biological diversity is necessary for sustainable development (En1)	2.4	0.7	5.4	34.7	54.3	2.4
Reducing water consumption is necessary for sustainable development (En2)	10.3	15.8	12.6	30.1	28.0	3.2
For sustainable development, people need to be educated in how to protect themselves against natural disasters (En3)	2.3	0.7	4.3	33.0	57.8	1.9
I have good access to electricity for sustainability practices (En4)	3.5	9.0	21.2	39.3	23.9	3.1
Attitude (Social, Economic and Environment)						
I think it is important to reduce poverty (E1)	2.4	0.7	0.4	26.6	68.5	1.4
It is important to take measures against problems that impact climate change (En3)	1.8	0.4	1.9	30.5	63.9	1.5
Behavior (Social, Economic and Environment)						
I have changed my personal lifestyle in order to reduce waste (e.g., throwing away less food or not wasting materials) (En1)	1.8	1.9	9.3	41.8	43.0	2.3

Note: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA), Do not Know (DK)
Source: Field data

Given the highest percentage score by students' level of SC for attitude in the economic aspect compared to behavior and knowingness, this paper conducted inferential statistics to ascertain whether these high percentages have significant relationships. The Phi and Cramer's V test in Table 2 revealed a significant value (p=0.000) for attitude on behavior and knowingness.

Table 2. Phi and Cramer's V: Students' level of SC on attitude in relation to knowingness and behavior

Knowingness			
Attitude		Value	Approximate Significance
	Phi	1.110	.000
	Cramer's V	.496	.000

Behavior			
Attitude		Value	Approximate Significance
	Phi	.752	.000
	Cramer's V	.337	.000

Source: Field data

Findings in Table 3 indicate that the staff level of SC is highest for attitude in the environmental aspect of sustainable development by strongly agreeing that it is important to take measures against problems that impact climate change (72.6%). This is followed by knowingness for social with the staff strongly agreeing on peaceful conflict resolution through discussion is necessary for sustainable development (61.2%) and respecting human rights is necessary for sustainable development (61.2%). Behavior is last on the social aspect where most of the staff strongly agreed on using a computer or mobile to chat, to text, to play games and so on, always treat others as respectfully as would be in real life (56.9%).

Table 3. Knowingness, Attitude and Behaviors of SC (Staff).

Variable	**SD (%)**	**D (%)**	**N (%)**	**A (%)**	**SA (%)**	**DK (%)**
Knowingness (Social, Economic and Environment)						
To achieve sustainable development, every human being is entitled to access to good education (S1)	5.2	4.3	2.6	34.5	53.4	0.00
Peaceful conflict resolution through discussion is necessary for sustainable development (S2)	4.3	0.9	3.4	30.2	61.2	0.00
Respecting human rights is necessary for sustainable development (S3)	5.2	0.9	4.3	28.4	61.2	0.00
I have access to resources for sustainability projects (S4)	6.9	18.1	25.9	20.7	25.0	3.4
I have adequate skills to promote sustainability practices (S5)	5.2	8.4	19.3	39.7	25.9	0.9
Elimination of poverty globally is necessary for sustainable development (E1)	2.6	0.9	25.6	70.9	0.00	0.00
Sustainable development requires that companies act responsibly toward their employees, customers and suppliers (E2)	4.3	2.6	30.8	61.5	0.9	0.00
Sustainable development requires fair distribution of goods and services amongst people in the world (E3)	3.4	0.9	7.7	30.8	56.4	0.9

Preserving biological diversity is necessary for sustainable development (En1)	1.7	3.4	22.2	72.6	00.0	0.00
Reducing water consumption is necessary for sustainable development (En2)	8.5	12.8	17.1	19.7	35.9	6.00
For sustainable development, people need to be educated in how to protect themselves against natural disasters (En3)	1.77	4.3	31.6	62.4	0.00	0.00
Attitude (Social, Economic and Environment)						
It is important to take measures against problems that impact climate change (En3)	1.7	0.9	0.9	23.9	72.6	000
Behavior (Social, Economic and Environment)						
When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life (S2)	1.7	0.9	6.0	33.6	56.9	0.9

Note: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA), Do not Know (DK)
Source: Field data

With highest percentage score for staff level of SC in attitude compared to knowingness and behavior, this study performed a Phi and Cramer's V test to test whether these highest scores have any significance. The Phi and Cramer's V test in Table 4 shows a significant value (p=0.000) for attitude on knowingness and behavior.

Table 4. Phi and Cramer's V: Staff level of SC on attitude in relation to knowingness and behavior

Knowingness			
Attitude		Value	Approximate Significance
	Phi	.723	.000
	Cramer's V	.361	.000
	Phi	.726	.000
	Cramer's V	.363	.000
Behavior			
Attitude		Value	Approximate Significance
	Phi	.746	.000
	Cramer's V	.373	.000

Source: Field data

For the case of staff, Table 5 is the institutional wise findings which is rated highest as attitude and this is mostly for the aspect of environment compared to knowingness (social) and behavior (social). For the attitude dimension of SC, the staff strongly agreed on stricter laws are needed to protect the environment (62.4%).

Table 5. Knowingness, Attitude and Behaviors of SC institutional wise (Staff).

Variable	SD (%)	D (%)	N (%)	A (%)	SA (%)	DK (%)
Knowingness (Social, Economic and Environment)						
Peaceful conflict resolution through discussion is necessary for sustainable development (S2)	4.3	0.9	3.4	30.2	61.2	0.00
Respecting human rights is necessary for sustainable development (S3)	5.2	0.9	4.3	28.4	61.2	0.00
Attitude (Social, Economic and Environment)						
Stricter laws are needed to protect the environment (En2)	3.4	0.9	6.8	23.9	62.4	2.6
Behavior (Social, Economic and Environment)						
I support an aid organization or environmental group (S1)	2.6	2.6	14.7	40.5	36.2	3.4

Note: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA), Do not Know (DK)
Source: Field data

While the staff's' attitude institutional wise scored highest in percentage, this paper carried out the Phi and Cramer's V to test the relationship of attitude (environment) on knowingness (social) and behavior (social). The findings in Table 6 reveal significant values of (p=0.00) on the relationship of attitude on knowingness while (p=0.021) for attitude on behavior.

Table 6. Phi and Cramer's V: Staff institutional wise with attitude on knowingness and behavior

Knowingness			
Attitude		Value	Approximate Significance
	Phi	.680	.000
	Cramer's V	.340	.000
	Phi	.722	.000
	Cramer's V	.361	.000
Behavior			
Attitude		Value	Approximate Significance
	Phi	.521	.021
	Cramer's V	.261	.021

Source: Field data

On the part of institutional as a forth pillar of sustainable development, the findings revealed that most of the students rated attitude in respect of the environment much higher compared to knowingness (social) and behavior (social). Furthermore, on the attitude dimension of SC, the students also strongly agreed (55.8%) on stricter laws needed to protect the environment as indicated in Table 7.

Table 7. Knowingness, Attitude and Behaviors of SC institutional wise (Students).

Variable	SD (%)	D (%)	N (%)	A (%)	SA (%)	DK (%)
Knowingness (Social, Economic and Environment)						
Peaceful conflict resolution through discussion is necessary for sustainable development (S2)	2.3	1.6	4.4	39.6	50.3	1.8
Respecting human rights is necessary for sustainable development (S3)	3.5	0.8	3.8	36.8	54.1	1.1
Attitude (Social, Economic and Environment)						
Stricter laws are needed to protect the environment (En2)	1.4	0.8	5.4	32.9	55.8	3.7
Behavior (Social, Economic and Environment)						
I support an aid organization or environmental group (S1)	1.6	3.5	8.4	45.9	37.1	3.4

Note: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA), Do not Know (DK)
Source: Field data

Similarly, for students' institutional wise showing findings of highest percentage score were further subjected to Phi and Cramer's V test. The relationship of attitude (environment) on knowingness (social) and behavior (social) in Table 8 reveal significant values of (p=0.00) on the relationship of attitude on knowingness and behavior.

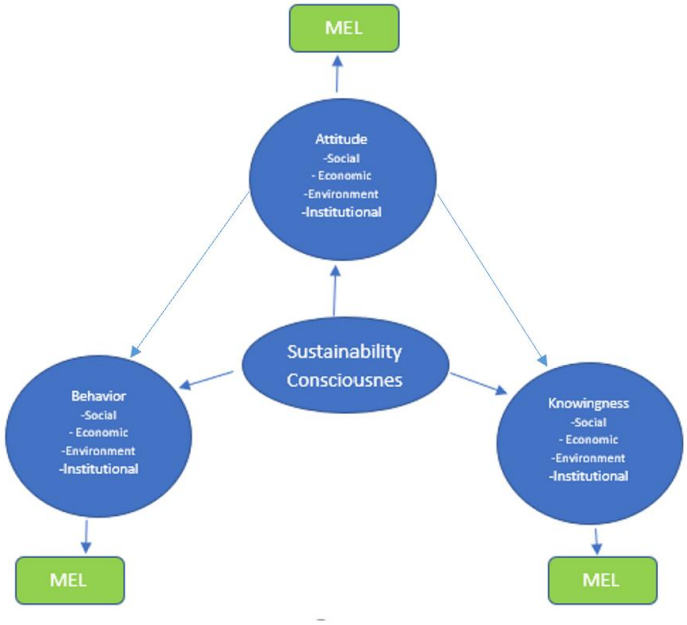
Table 8. Phi and Cramer's V: Students institutional wise with attitude on knowingness and behavior

Knowingness			
Attitude		Value	Approximate Significance
	Phi	.538	.000
	Cramer's V	.241	.000
	Phi	.596	.000
	Cramer's V	.267	.000
Behavior			
Attitude		Value	Approximate Significance
	Phi	.669	.000
	Cramer's V	.299	.000

Source: Field data

The proposed innovative SC model is indicated in Figure 5. The model shows that the dimensions of attitude on behavior and knowingness with the four pillars of sustainable development (social, economic, environment and institutional) can be integrated with MEL.

Figure 5. Innovative Sustainability Consciousness Model.



Source: Author's model

Discussions

The findings on the majority of students having not had any extra-curricular activities with the core focus on sustainable development suggest that most students have not had any extra-curricular activities focusing on sustainable development. On the other hand, this study found that the few students involved in university projects are those related to application of artificial intelligence in detecting diseases in maize crop, infrastructure buildings and cleaning environment. This further suggests that MEL is still not that integrated in these universities. These findings also imply that in order to achieve the sustainable development goals including SC in Tanzania then it is vital to create a SC model highlighting programs that ensure students receive extra-curricular activities, and engagement in sustainability projects that are integrated with MEL. In addition, most of the staff do not have any university-related sustainability projects which they are involved in and this finding is in line with Mohamed et al. (2024) that SC is a new concept and perhaps this may explain why the university-related sustainability projects in the context of Tanzanian universities are not there or not established yet. And those few staff narrated that they are only involved in projects dealing with planting trees, STEM, and green-house gases emission. The confirmation that staff are not teaching any modules that have sustainability concepts included in the content and/or assessments is evident that there are no modules on SC.

In developing the innovative SC model, this paper also analyzed the student's SC in terms of attitude, knowingness and behavior based on the three pillars of sustainable development being social, economic, and environmental. The interesting findings on students' higher attitude level as well as on the importance of reducing poverty suggest that the students' level of SC is highest in attitude compared to knowingness and behavior. Additional findings suggest that students' knowingness is mainly on supporting the statement that elimination of poverty globally is necessary for sustainable development while for behaviour in relation to the environment dimension focuses on the students' changed personal lifestyle in order to reduce waste such as throwing away less food or not wasting materials. In general, the innovative SC model in the context of students in Tanzania's selected higher education institutions imply that it is highest in terms of attitude (economics) compared to knowingness (economics) and

behaviour (environment). In further efforts to develop the innovative SC model, this paper analyzed the staff SC in terms of attitude, knowingness and behavior based on the three pillars of sustainable development. The findings suggest that the staff level of SC is highest for attitude in the environmental aspect of sustainable development by strongly agreeing that it is important to take measures against problems that impact climate change. This is followed by knowingness for social with the staff strongly agreeing on peaceful conflict resolution through discussion is necessary for sustainable development and respecting human rights is necessary for sustainable development. On the other hand, the findings further suggest that behavior is last on the social aspect where most of the staff strongly agreed on using a computer or mobile to chat, to text, to play games and so on, always treat others as respectfully as would be in real life. This further implies that for staff, the SC is highest in attitude (environment) then followed by knowingness (social) and then behaviour (social).

This study also analyzed the institutional dimension as the fourth pillar of sustainability and the findings suggest that the staff did have opinions related to the institutional dimension by rating highest for attitude and this is mostly for the aspect of environment compared to knowingness (social) and behavior (social). Additionally, for the attitude dimension of SC, the staff strongly agreed on stricter laws are needed to protect the environment. This implies that the SC for the staff emphasizes the need to have stricter laws on environment protection. These findings can assist to support sustainable development goals 16 which requires strong institutions to achieve the sustainable development goals and thus these results support the study by Moreno and Cueto (2022) for the institutional dimension of sustainability. On the students' findings on the institutional dimension suggest similarity to the staff in terms of rating attitude in respect of the environment much higher compared to knowingness (social) and behavior (social). The students also strongly agreed on stricter laws needed to protect the environment implying that they see the need to have stricter laws on environment protection. These results are in alignment with sustainable development goals 16 for strong institutions to achieve sustainable development goals as evident in Moreno and Cueto (2022).

From a co-evolutionary theory guidance for this paper, the findings of significant values of attitude on knowingness and behavior as well as institutional wise in terms of attitude on knowingness and behaviour for both staff and students have revealed the following conclusions: that for students the relationship between attitude for economic aspect (it is important to reduce poverty) has significance on knowingness for economic aspect (elimination of poverty globally is necessary for sustainable development) and behaviour in environment aspect (have changed their personal lifestyle in order to reduce waste e.g., throwing away less food or not wasting materials); and that for staff the relationship between attitude in the environmental aspect (it is important to take measures against problems that impact climate change) has significance on knowingness for social aspect (peaceful conflict resolution through discussion is necessary for sustainable development and respecting human rights is necessary for sustainable development), and behaviour for social aspect (using a computer or mobile to chat, to text, to play games and so on, always treat others as respectfully as would be in real life); Results suggest that for both staff and students' institutional wise in attitude for the environment aspect (stricter laws are needed to protect the environment) has significance on knowingness for the aspect of social (Peaceful conflict resolution through discussion is necessary for sustainable development, and Respecting human rights is necessary for sustainable development) and behaviour for the aspect of social (I support an aid organization or environmental group). The significant values as well as the results of no modules existing on SC as confirmed by students as well as the staff confirming that staff they are not teaching any modules that have sustainability concepts included in the content and/or assessments implies that there is need to integrate SC in universities and integrating SC which is not there is also an innovative way to propose model that combines the words and have innovative SC which can further have multiple effect if added with MEL. The addition of institutional as the forth pillar in sustainable development was initiated by Moreno and Cueto (2022). Hence, this study goes further by not only considering institutional as the forth pillar of sustainable developments but this paper's originality is on proposing MEL be integrated in SC. Therefore, given the findings from the staff and students in

reference to SC, this paper developed the proposed innovative SC model showing that MEL can be integrated in all four dimensions of sustainability in examining the demand and supply of sustainable development goals among development stakeholders (leaders, staff and students) in higher education institutions.

Conclusion and Suggestions

This paper's findings lead to the conclusion that many students have not had any extra-curricular activities and no university project(s) with the core focus on sustainable development. On the other hand, most of the staff do not teach any modules that have sustainability concepts included in the content and/or assessments and that, they are not involved in any university-related sustainability projects. Additionally, both students and staff as development stakeholders of universities have the same opinion regarding the institutional dimension by rating attitude in respect of the environment much higher compared to knowingness (social) and behavior (social). These findings also suggest that MEL has not been integrated in the selected universities. This finding further implies that in order to achieve the sustainable development goals including SC in Tanzania then it is vital to create a SC model. The innovative SC model which is highlighting the three dimensions (attitude, knowingness and behaviour) and the four pillars of sustainable development based on the findings of this paper can assist students to receive extra-curricular activities, and engagement in sustainability projects that are integrated with MEL.

From a practical implication to education authorities is that the demand for sustainable development extra-curricular activities and supply of sustainability projects can focus on issues of the importance to reduce poverty; elimination of poverty globally is necessary for sustainable development; changing personal lifestyle in order to reduce waste e.g., throwing away less food or not wasting materials; the importance of taking measures against problems that impact climate change; peaceful conflict resolution through discussion is necessary for sustainable development; respecting human rights is necessary for sustainable development; using a computer or mobile to chat, to text, to play games and so on, always treat others as respectfully as would be in real life; stricter laws are needed to protect the environment; and support an aid organization or environmental group. The integrated innovative SC model proposed in this study can benefit education practitioners, other education stakeholders as well as policy makers to strengthen the demand and supply side of MEL capacities in universities and open and distance learning institutions.

The suggestion is for future studies to explore a similar research by sampling government ministries and agencies. The suggestion is also for future researchers to explore a similar study in America and Europe. This paper adopted a cross-sectional research design and therefore, a suggestion to future studies to focus on a longitudinal study that can benefit our understanding SC in the long term.

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Sustainable Development Goals (SDGs)

This study is linked to the Quality education (SDG 4).

Data Accessibility Statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics and Consent

Ethical approval was obtained for the work described in this article.

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