

Environmental Awareness and Behaviour of Nigerian University Students

Author: Ing. Loveth Aikowe

Supervisor: Ing. Jana Mazancová, Ph.D.

Doctoral Thesis Defense

13/5/2021



Faculty of Tropical
AgriSciences

Introduction



- Pro-environmental Awareness (PEA) a component of sustainability literacy
 - Often associated with environmental knowledge (Fu et al., 2018; Zhang et al., 2017)
- Pro-environmental behaviour (PEB) has been defined as any action conveyed with minimal environmental consequence (Steg and Vlek, 2009).
- However, PEB & PEA is influenced by a number of factors, external or internal such as individual's environmental knowledge or attitude (Juvan and Dolnicar, 2017; Vincete-Molina et al., 2013).
- Education has been attributed to be essential to many sustainable solutions worldwide (Wojuola and Alant 2019)
- Often, young people are at the forefront of awareness initiatives as important stakeholders who hold the key to future sustainability goals (Ifegbasan 2011).
- Increasing **environmental literacy** among young people is crucial (Yazici and Babalik, 2016; Kulozu, 2016).

Literature Review

Global Environmental Challenges – Climate change, **environmental pollution**, loss of biodiversity, etc

- Plastic waste is a major contributor to municipal solid waste and environmental pollution globally ([Sondo and Amoko, 2021](#))

Plastic Waste in Nigeria ([Babayemi et al., 2018](#); [Mwanza et al., 2018](#))

- Single use plastic behaviour
- 12% plastic recycling rate (India about 47%)
- Major importation of plastic materials over last 20 years

Waste Governance in Nigeria

- Lack of public awareness ([Ayodele et al., 2018](#); [Abd'Razack et al., 2017](#))
- National policy on solid waste management (2018)
- National policy on plastic waste (2020) ([Dumbili and Henderson 2020](#))
- Federal Environmental Protection Agency (replaced by National Environmental Standards and Regulations Agency)
- State Environmental Protection Agency

Literature review

Addressing these environmental problems requires

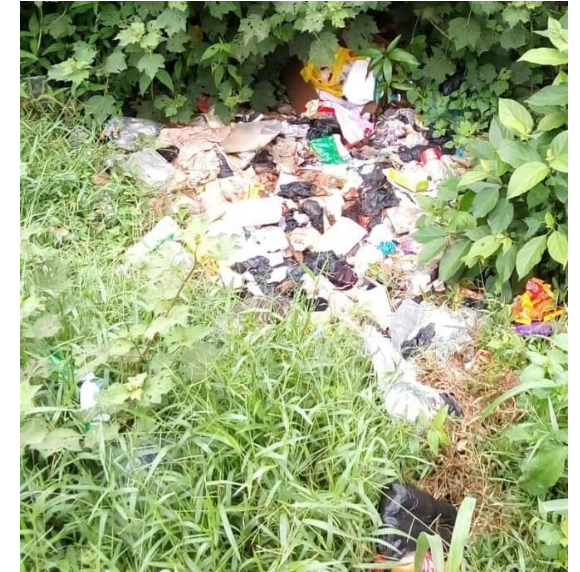
- Building a shared awareness ([Kulozu, 2016](#); [Yazici and Babalik, 2016](#))
- Sense of accountability worldwide ([Kulozu, 2016](#))
 - Especially in developing countries where 85% of the world's population reside ([Bahae et al., 2014](#)).
 - Through EA, society or an individual, react to environmental problems with actions of environmental protection ([Akkor and Gunduz, 2018](#)).

Education for Sustainability Development (ESD) – a way to advance Environmental Awareness (EA)

- A call for a more holistic approach in setting up ESD in Higher education. ([Melles and Paixao-Barradas, 2019](#)).

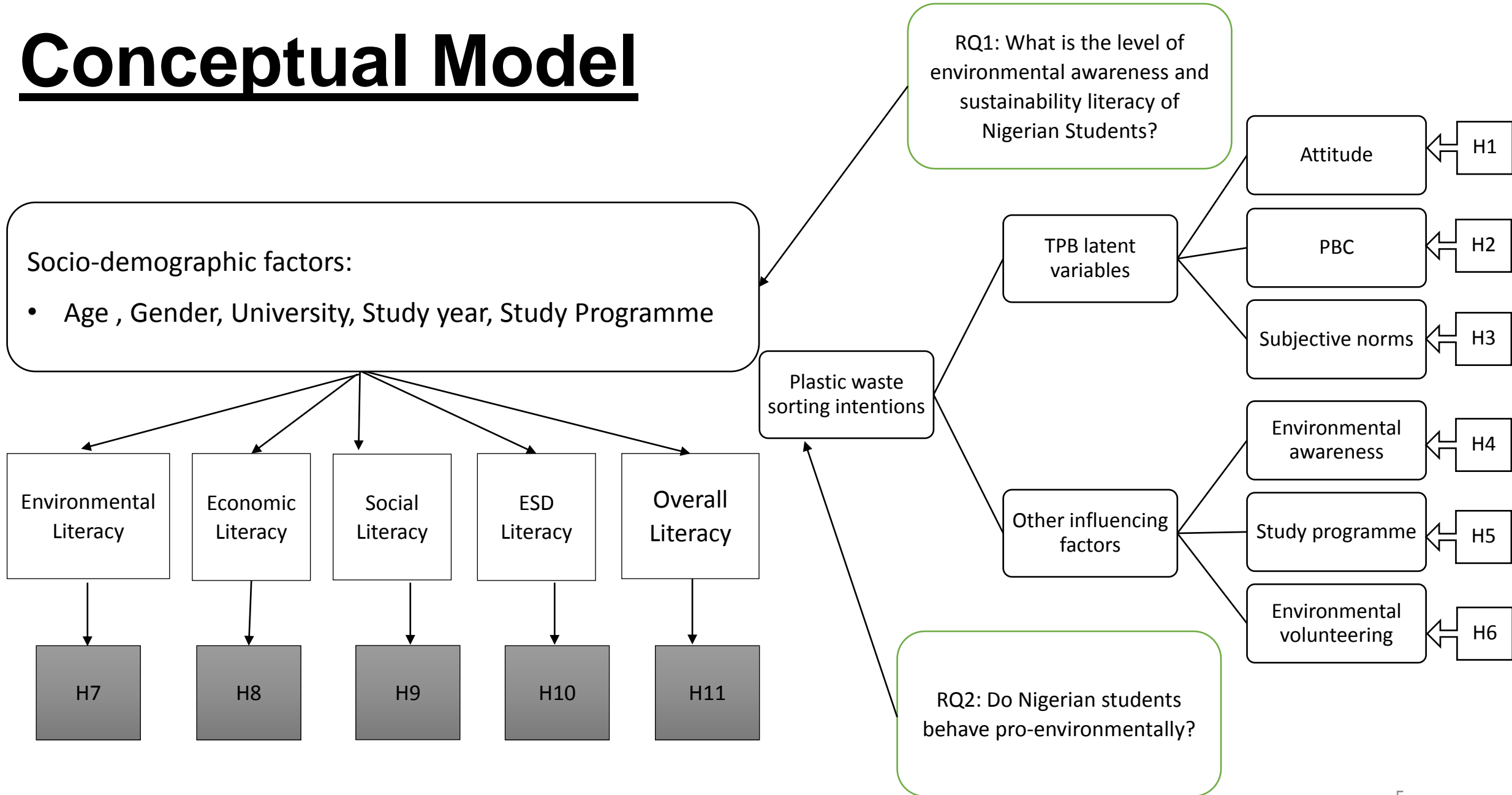
Waste Sorting Practices at Universities

- Quasi cities ([Adeniran et al., 2017](#))
- Global plastic sorting initiatives in Italy, Lithuania & China ([Fissi et al., 2021](#); [Dagiliute and Liobikiene 2015](#); [Geng et al., 2013](#))
- Nigeria university of Lagos – zero waste strategy ([Adeniran et al., 2017](#))



Waste dumpsite at a Nigerian University

Conceptual Model



Conceptual Model Development - SLT

- Sustainability Literacy (SLT) assessment inspired by two previously conducted study in Ohio state university, USA and Nigerian Engineering community, northern Nigeria ([Zwickle et al., 2014](#); [Akeel et al., 2019](#))

SLT conceptual Model

- Core module (International)
- Customised module (Local)
- Surveys – Socio-demographics + ESD

Some Questions from the SLT assessment

SLT conceptual Model

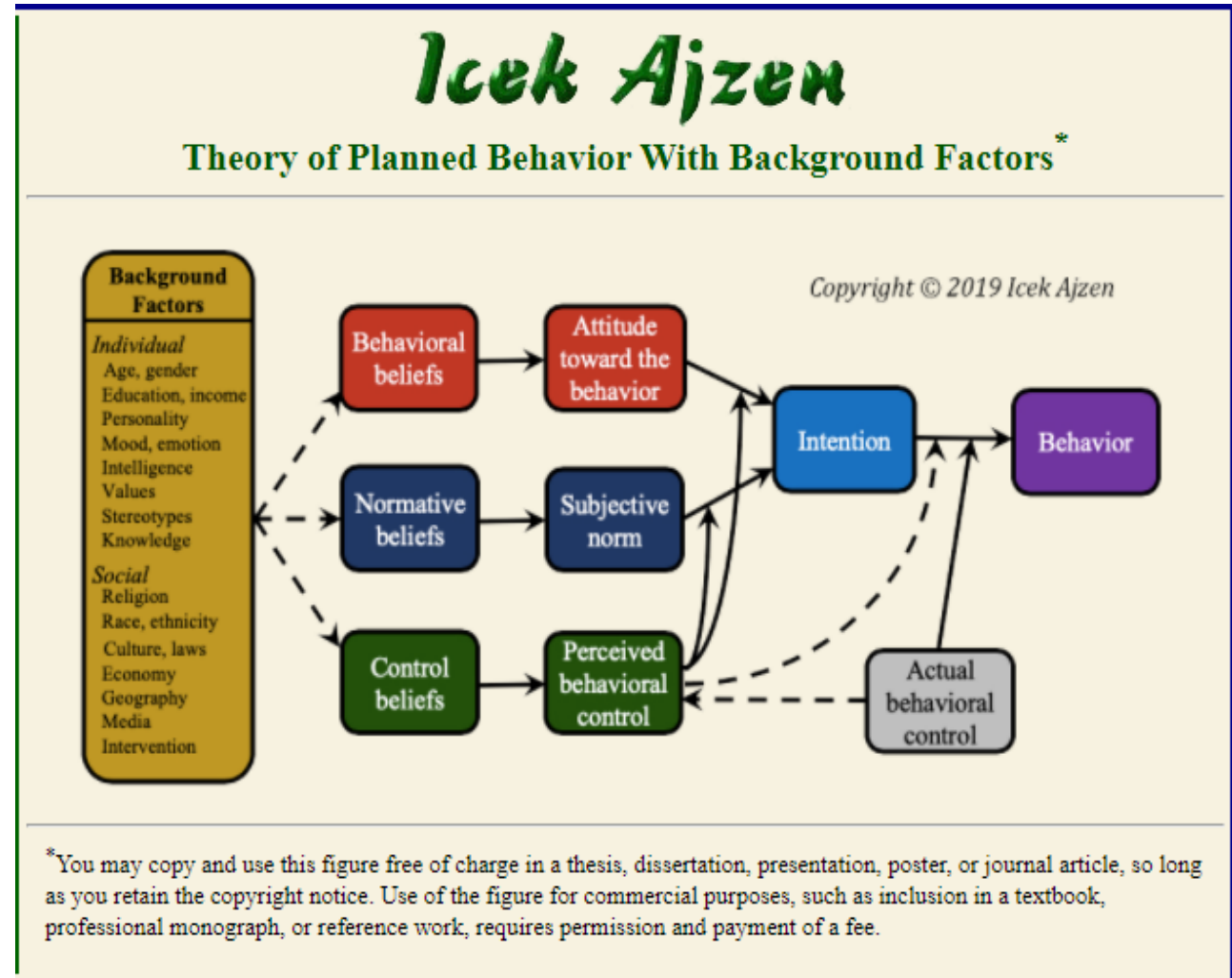
- Core module (International)
- Customised module (Local)
- Surveys – Socio-demographics + ESD



SLT questions	Module	Multiple choice options	References
Q1. Ozone layer protects us from acid rain and temperature fluctuations.	International/ Environment	True/ False /I don't know	Akeel et al. (2019) adapted from Zwickle et al. (2014) (ASK)
Q4. IPCC stands for	International/ Environment	-The international policy on climate change -The intergovernmental policy on climate change -The intergovernmental panel on climate change -I don't know	Sulitest®
Q5. Agenda 21 is a global treaty signed by UN member nations at the Stockholm Earth Summit in 1992.	International/ Environment	True/ False /I don't know	Akeel et al. (2019)
Q6. Long-term profitability is the most commonly used definition of economic sustainability.	International/ Economics	True / False /I don't know	Akeel et al. (2019) adapted from Zwickle et al. (2014) (ASK)
Q12. Federal Environmental Protection Agency is the primary agency that oversees environmental regulation in Nigeria.	Local/ Environment	True/ False /I don't know	Akeel et al. (2019) adapted from Zwickle et al. (2014) (ASK)
Q13. The internationally agreed poverty line is	International/ Social	\$ 1.90 , \$1.80, \$ 1.70, I don't know	Adapted from Akeel et al. (2019)

Conceptual Model Development - TPB

- Theory of planned behaviour model Inspired by Ajzen (1991) to form the basis of assessing the PBC, subjective norm (SN), and attitude that influences intention to participate in certain behaviours (kaffashi and Shamsudin 2019; Ajzen 1991).
- Other influencing factors have been identified in literature as significant in determining plastic waste separation (Zen et al., 2015; Zhang et al., 2011)



Subjective norms

- Support given by revered e.g friends, family, peers, teachers
- Injunctive norms – others encourage the behaviour
- Subjective norms – others do the behaviour themselves



Behavioural Attitudes

- Thought & feelings towards behaviour e.g recycling
- Affective Attitude– is the behaviour enjoyable or not?
- Instrumental Attitudes – is the behaviour harmful or beneficial

Perceived Behavioural Control

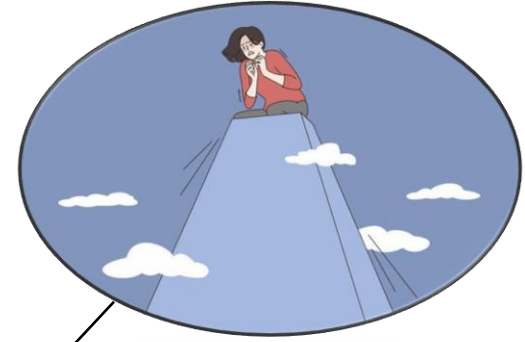
- Can challenges and barriers be overcome?
- Capable and Confident?



Attitude



Subj. Norms



PBC



Intention

- Stronger or Weaker depending on the variabilities in attitude, SN or PBC



TPB Construct

Latent construct	Description	Symbol
Attitudes towards plastic recycling and plastic waste sorting (AT)	Plastic recycling will improve environmental sanitation.	AT
	Waste sorting for plastic recycling is a good use of my effort.	AT1
	Waste sorting brings financial reward.	AT2
	Waste sorting is a good use of my free time.	AT3 AT4
Subjective norms towards plastic waste sorting (SN)	Classmates will approve of me gathering plastic for recycling.	SN
	People I revere will be pleased to see me sort plastic.	SN1
	My friends always separate plastic for recycle.	SN2
	It is expected that I sort plastic for recycling.	SN3 SN4
Perceived behavioral control towards plastic waste sorting (PBC)	Several opportunities for waste sorting exist around me.	PBC
	Nothing prevents me from sorting plastic waste regularly.	PBC1
	Choosing to sort plastic is solely dependent on me.	PBC2
	The distance to a recycling centre is very far.	PBC3 PBC4
Intention towards plastic waste sorting (INT)	I will commence plastic waste sorting from now on.	INT
	Frequency of my plastic sorting activity in the last 2 weeks	INT1 INT2

Adapted from Ajzen (1991) TPB model construct

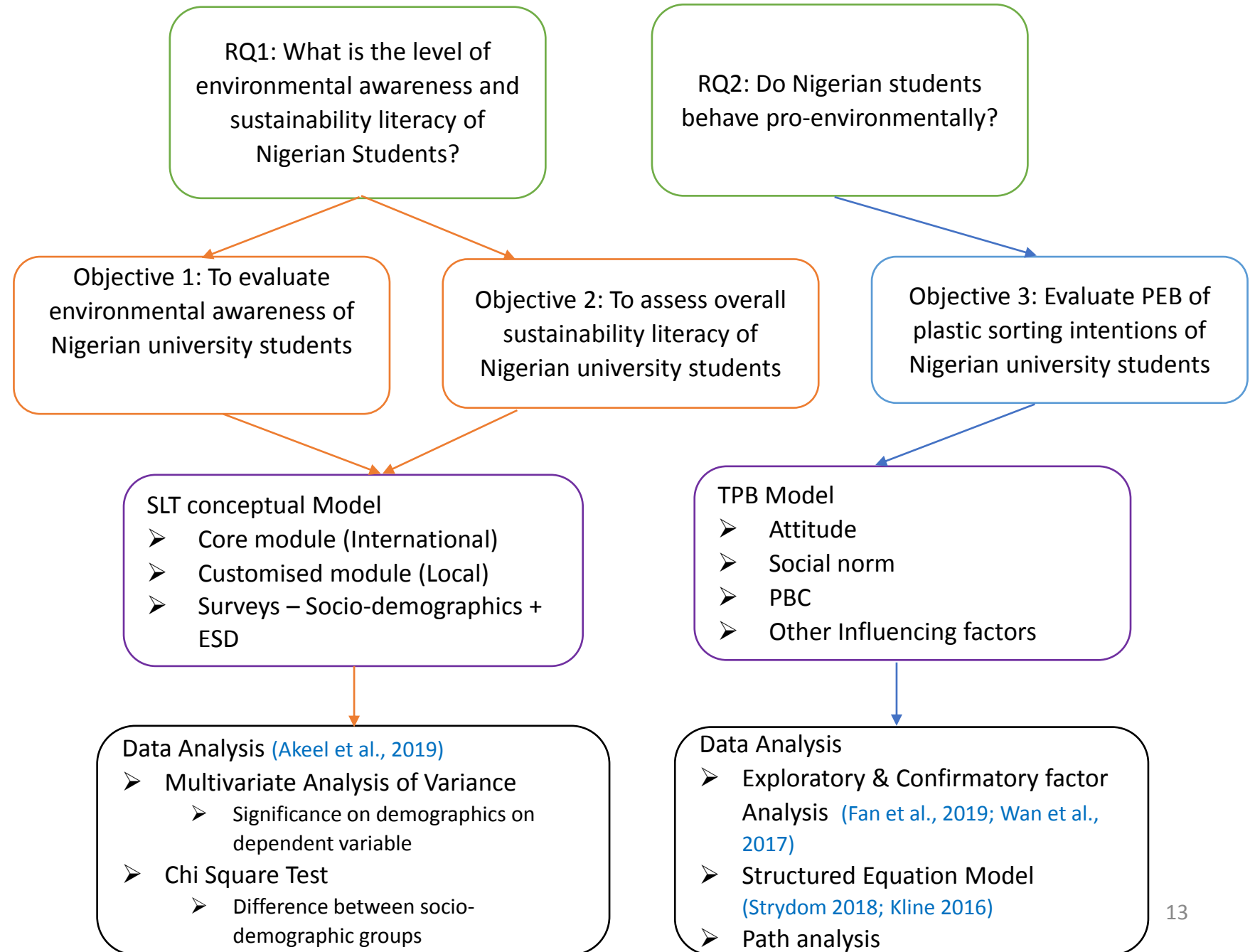
Methodology

- Period – June to July 2019
- Multistage Sampling
- Target area: Two Nigerian universities in Southwestern Region
 - Federal University of Agriculture, Abeokuta (FUNAAB) and the University of Ibadan (UI)
- Criteria for selecting the universities:
 - Top 10 ranking within the region - The selected universities belong to top 10 in the region (Mogaji, 2019)
 - More than 10 000 students enrolled, also offer courses on environmental education
 - Recognised for their prominent former graduates (Okebukola, 2011), some of whom have shown interests in environmental issues by lending their opinions to the matter.



Aims & Research Design

Paper based
Questionnaire
survey



- *RQ – Research Questions
- *SLT – Sustainability Literacy Test
- *TPB – Theory of Planned Behaviour
- *PBC – Perceived Behavioural Control
- *PEB – Pro-environmental Behaviour

Methodology

RQ1: What is the level of environmental awareness and sustainability literacy of Nigerian Students?

RQ2: Do Nigerian students behave pro-environmentally?

- Questionnaire Design (N=650)
 - Sustainability Literacy Test
 - Modification of Sulitest® and Assessment of Students Knowledge (ASK)
 - Multiple choice, open ended, true or false or I don't know; 15 minutes time frame
 - 21 Questions in total – 6 environmental, 3 social, 3 economic, 3 ESD, 5 demographic
 - Dichotomous score (pass or fail)
 - Environment (2 out of 6), other domains (at least 1 correctly answered question)
- Questionnaire Design (N=939)
 - Theory of Planned Behaviour Model
 - 7-point bipolar Likert scale
 - Part 1=14 Questionnaire Items
 - 4 TPB Items each (12), 2 questions on intention
 - Part 2 = self assessment demographic data

SEM RESULTS

- Attitude (AT)
 - Not statistically significant
 - Positive attitude does not always lead to intention
- Subjective Norm (SN)
 - Students did not feel peers sort plastic
- PBC
 - Highest standardized effect
 - Internal barriers non-limiting
 - External barrier - limiting

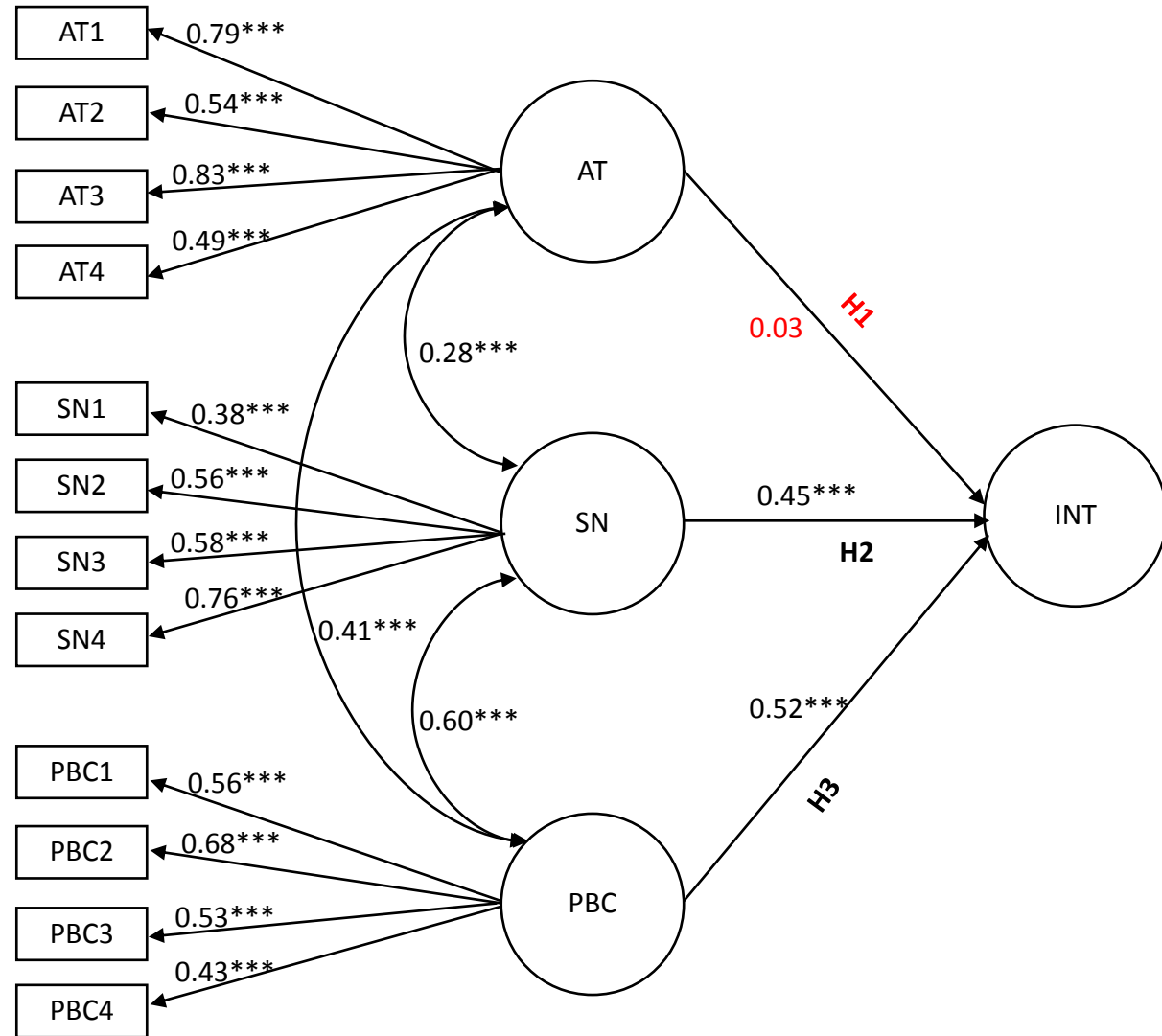


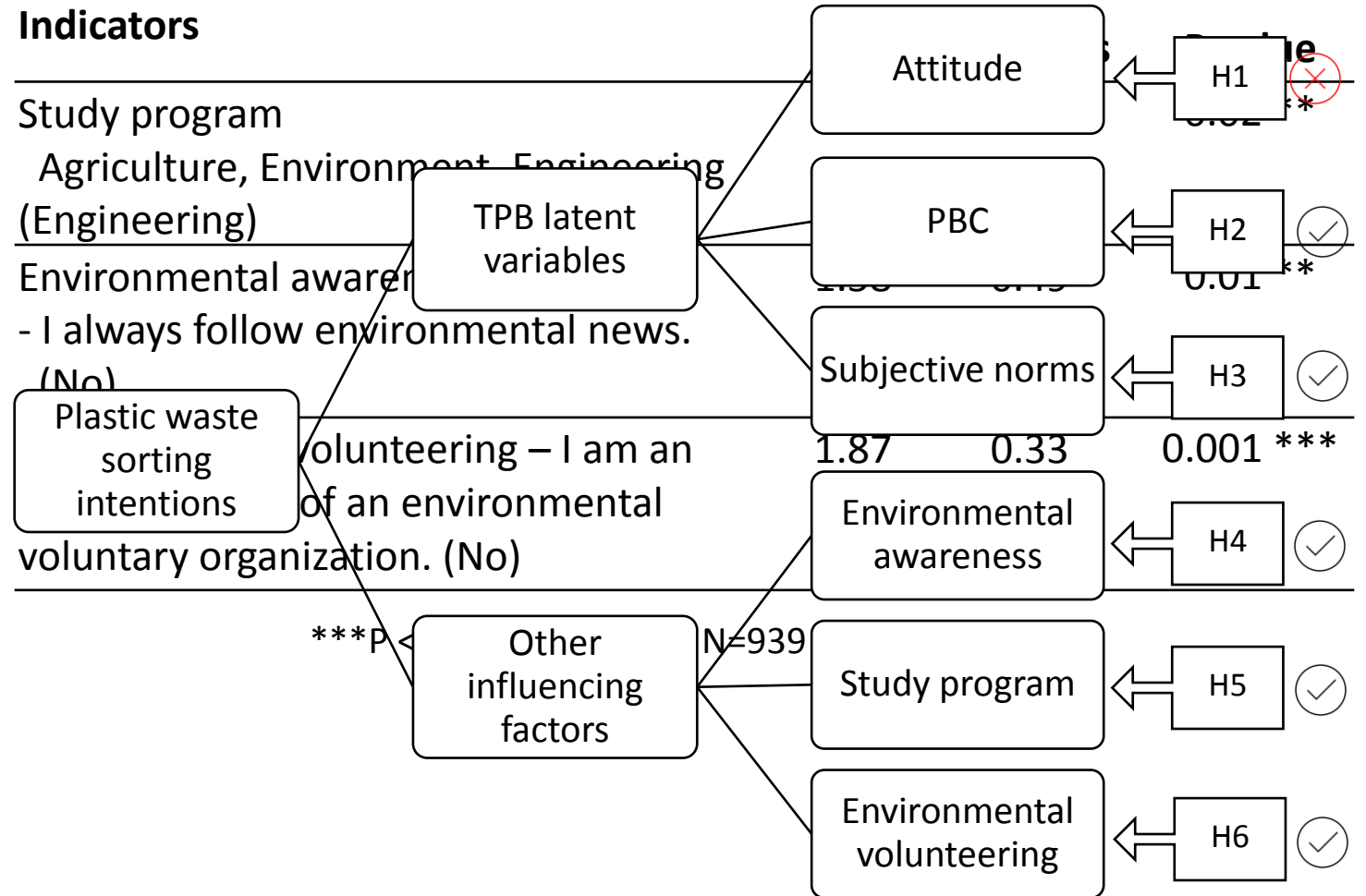
Figure 3. SEM Results; standardized path co-efficient; notes: RMSEA=0.02, CFI=0.99, TLI=0.99, NFI=0.99, X2 = 45.4, ***P < 0.01, N=939

- H1, rejected; H2,H3 Accepted
- PBC – Perceived Behavioral control
- SEM – Structural equation modeling

Results of other influencing factors

- **Hypothesis 4 (H4).** EA of students' significantly influences their waste sorting intentions.
- **Hypothesis 5 (H5).** Study program significantly influences student's waste sorting intentions.
- **Hypothesis 6 (H6).** Environmental volunteering activities significantly influences student's waste sorting intentions.
 - H4,H5,H6 accepted

Result of the path analysis on other influencing factors



Results of the SLT by MANOVA

- Overall- Low overall performance, Agriculture students performed better overall.

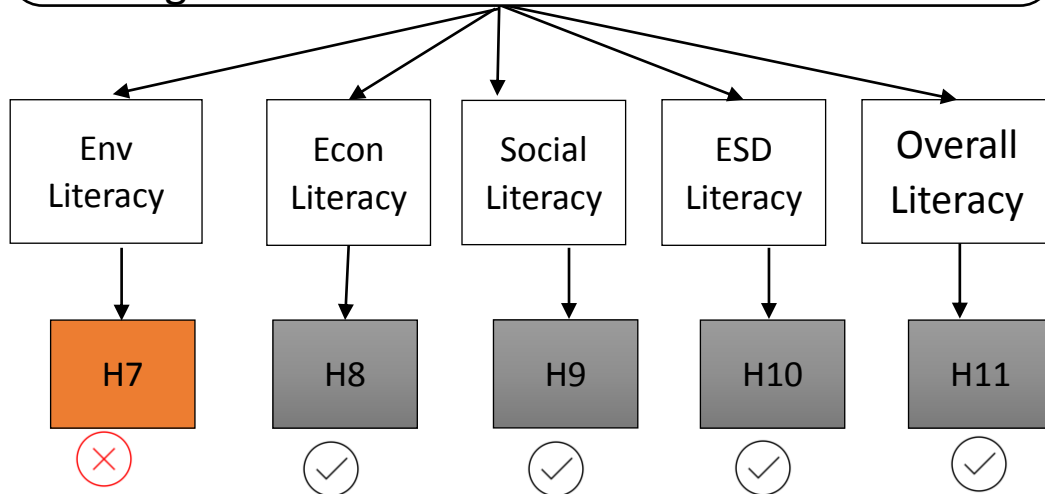
P VALUE ACROSS DOMAINS

Variables	Environment	Economics	Social	ESD	Overall
Age	0.427	0.973	0.020**	0.200	0.137
Gender	0.504	0.016**	0.577	0.182	0.566
University	0.113	0.045**	0.953	0.010***	0.545
Study year	0.255	0.075	0.694	0.736	0.284
Study prog.	0.063	0.070	0.006***	0.735	0.018**

P < 0.05, *P < 0.01 N=650

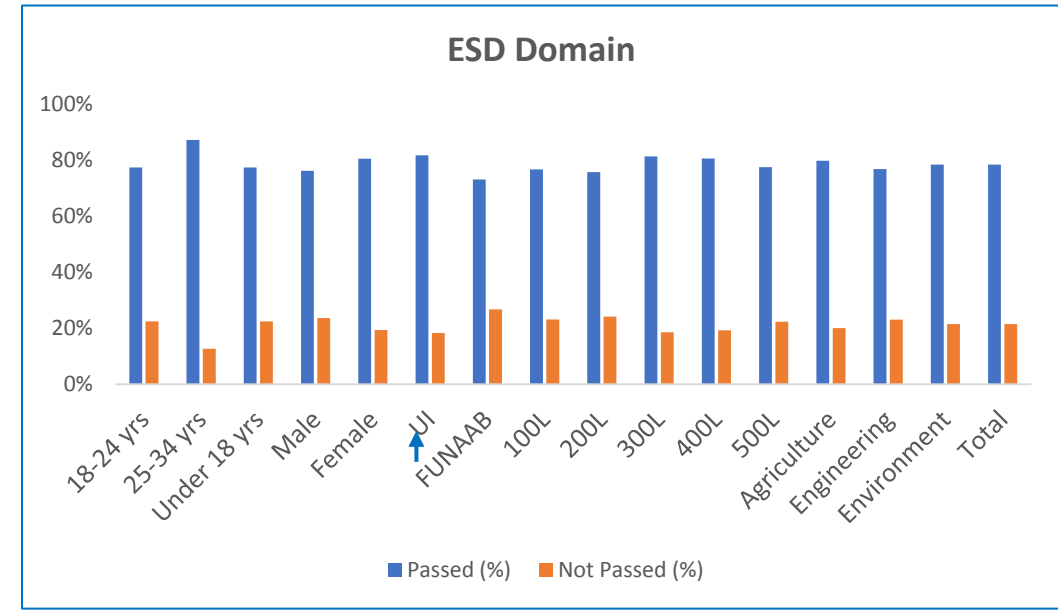
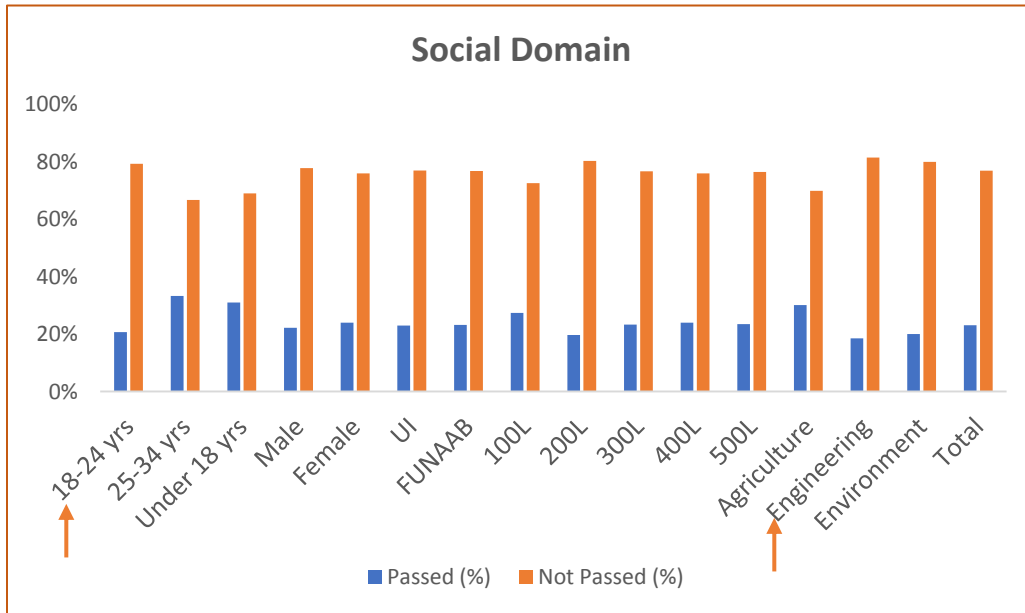
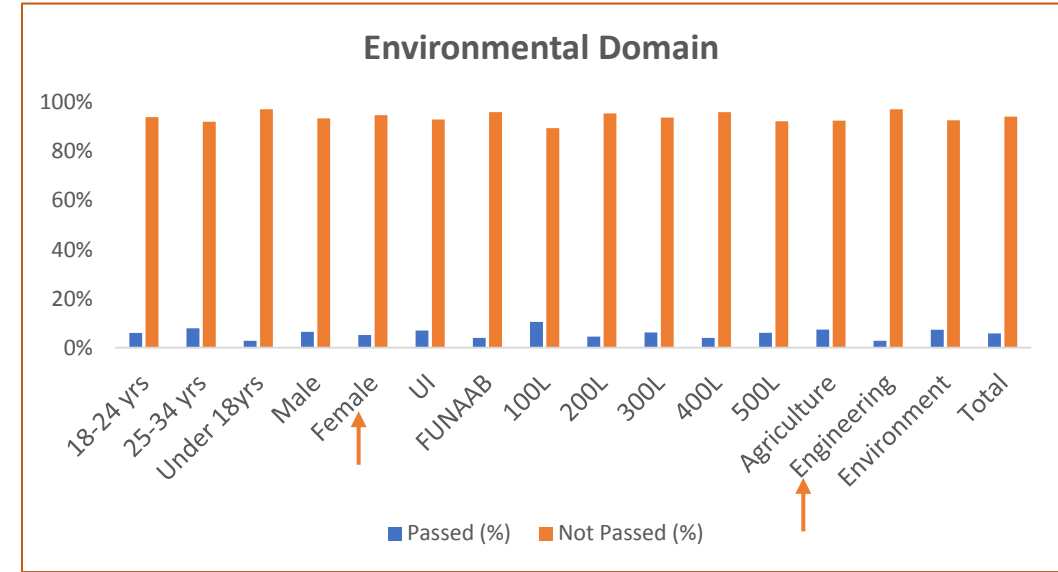
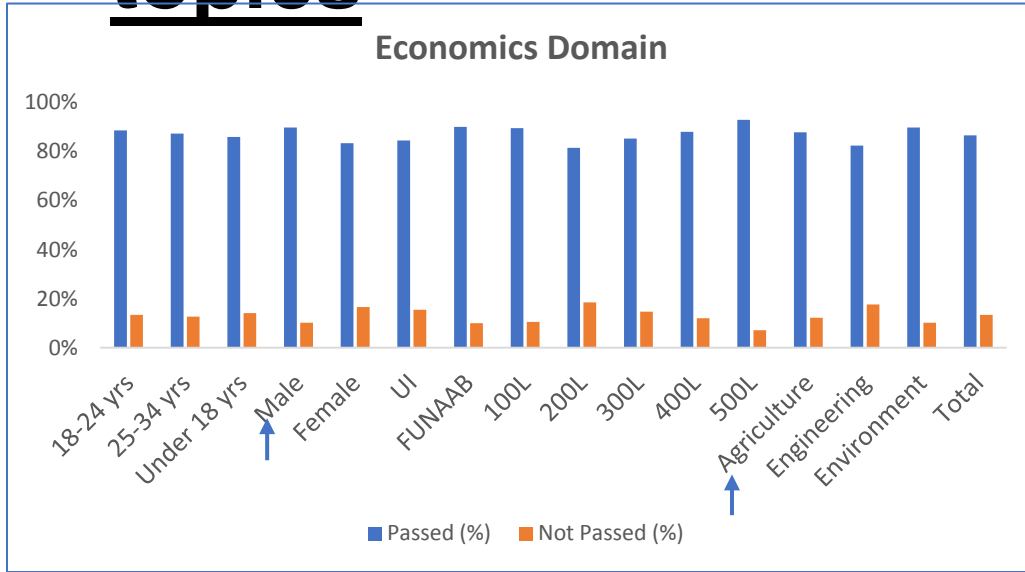
Socio-demographic factors:

- Age, Gender, University, Study year, Study Program



- Environment- Agric students performed better than env. students
- Economics- high pass rates Males, FUNAAB
- Social- low pass rates, least performing group, engineering students

Chi-square test results on Performance by SLT topics



Discussion on Findings

- Although AT towards plastic waste sorting attitudes is measured according to behavioural beliefs surrounding environmental benefits, AT was not statistically sig. Hence, as suggested by [Ahmed et al. \(2016\)](#) AT towards PEB should be encouraged amongst students via developing environmental knowledge when compared to students in United states.
 - Environmental volunteering and study programs are also useful determinants of PEB corroborated in other findings. Promoting environmental activities in an Hungarian university was claimed to positively impact PEB amongst the students ([Zsoka 2013](#))
 - E.g. ohio state study (ASK) pass rate of 73% where as Nigerian students scored 5.8% ([Zwickle et al., 2014](#))
- The findings where EA is found to be an initiative ([Ogunbode 2012](#)). ([Wang et al., 2021](#)) have emphasised the use of external barriers when promoting a PEB6.6%
 - They are however better in economic topics in the same comparison as above.
- SN investigating plastic sorting and recycling in China revealed that this PEB is deemed socially appealing ([Wan et al., 2017](#)), although this study also agrees that there was a focus on surrounding opinions relating to plastic sorting, many students did not feel their feel their peers were doing it.

SLT questions
Q1. Ozone layer protects us from acid rain and temperature fluctuations.

Conclusion



Students exhibiting a positive attitude towards a PEB is not enough. Nigeria HEIs could improve extracurricular activities related to environmental behaviour.

Over 80% of the student did not belong to an environmental volunteering initiative within or outside the university. E.g. exchange programs to see how other universities or organizations implement PEB.

PBC contributes the most in explaining why students may choose to sort their plastic waste or not. Hence eliminating the external barriers that prevent PEB is crucial

Students from this study overall environmental & sustainability literacy in Nigeria is generally low.

HEIs may adopt sustainability assessment tools e.g. Sulitest.org, ASK, STAUNCH, CSAF, SLA, SCIP Green campus, etc.

ASK – Assessment of Students knowledge

CSAF – Campus Sustainability Assessment Framework

SCIP – Sustainability cultural Indicators programme

SLA - Sustainability Livelihood Approaches

STAUNCH- Sustainability Tool for Assessing Universities' Curricula Holistically

Focused interventions into environmental programs in HEIs strongly recommended.

Recommendations

KEY MESSAGES FOR UNIVERSITIES

1. Education for SDG is a critical role for universities. Universities should aim to mainstream it to all their learners

2. To mainstream Education for the SDGs, Universities need to scale up existing activities and implement new types of activities.



KEY MESSAGES FOR POLICY MAKERS

3. A Ban on single-use plastic or a tax imposed on plastic use will reduce the ongoing threat from plastic pollution

4. Fast track recycling programs and also importantly advance plastic management policy frameworks



References

Ajzen, I. The Theory of Planned Behavior. *Organ. Behav. Hum. Decis. Process.* 1991, 50, 179–211.

Akeel, U., Bell, S., Mitchell, J.E., 2019. Assessing the sustainability literacy of the Nigerian engineering community. *J. Clean. Prod.* 212, 666–676.
<https://doi.org/10.1016/j.jclepro.2018.12.089>

Ayodele, T.R.; Alao, M.A.; Ogunjuyigbe, A.S.O. Recyclable Resources from Municipal Solid Waste: Assessment of Its Energy, Economic and Environmental Benefits in Nigeria. *Resour. Conserv. Recycl.* 2018, 134, 165–173.

Babayemi, J.O.; Ogundiran, M.B.; Weber, R.; Osibanjo, O. Initial Inventory of Plastics Imports in Nigeria as a Basis for More Sustainable Management Policies. *J. Health Pollut.* 2018, 8, 180601

Buckler, C., Creech, H., 2014. Shaping the Future We Want - UN Decade of Education for Sustainable Development (Final report). Paris: United Nations Educational, Scientific and Cultural Organization. Retrieved from <https://sustainabledevelopment.un.org/content/documents/1682Shaping%20the%20future%20we%20want.pdf>

Dumbili, E.; Henderson, L. The Challenge of Plastic Pollution in Nigeria. In *Plastic Waste and Recycling*; Elsevier: Amsterdam, The Netherlands, 2020; pp. 569–583.

Mwanza, B.G.; Mbohwa, C.; Telukdarie, A. Strategies for the Recovery and Recycling of Plastic Solid Waste (PSW): A Focus on Plastic Manufacturing Companies. *Procedia Manuf.* 2018, 21, 686–693.

Setó-Pamies, D., Papaoikonomou, E., 2015. A Multi-level Perspective for the Integration of Ethics, Corporate Social Responsibility and Sustainability (ECSRS) in Management Education. *Journal of Business Ethics*, 136, 523-538. doi: 10.1007/s10551-014-2535-7

Zizka, L., Varga, P., 2020. Teaching Sustainability in Higher Education Institutions: Assessing Hospitality Students' Sustainability Literacy. *J. Hosp. Tour. Educ.*
<https://doi.org/10.1080/10963758.2020.1726771>

Zwickle, A., Koontz, T.M., Slagle, K.M., Bruskotter, J.T., 2014. Assessing sustainability knowledge of a student population: Developing a tool to measure knowledge in the environmental, Economic and social domains. *Int. J. Sustain. High. Educ.* 15, 375–389. <https://doi.org/10.1108/IJSHE-01-2013-0008>



Thank you for listening.

aikowel@ftz.czu.cz