Assessing Circular Economy Awareness and Practices among College Students Using the KAP Model: A Micro-Level Study

Sreekala K[1]Dr. Jeothilakshmi SK[2]

[1]Assistant Professor, PG Department of Commerce, Government College,Malappuram-676509,University of Calicut,Kerala,India
[2]Associate Professor, PG Department of Commerce, Sree Narayana College, Chelannur,Kozhikode-673616 ,University of Calicut ,Kerala,India

Abstract-The transition to a circular economy (CE) has become a global imperative in addressing environmental degradation, unsustainable consumption, and waste generation. This study assesses the awareness, attitudes, and practices related to CE among college students using the Knowledge–Attitude–Practice (KAP) model. Conducted at Government College Malappuram in Kerala, India, the research employed a descriptive, cross-sectional survey design with a stratified random sample of 60 undergraduate and postgraduate students across Arts, Science, and Commerce disciplines. A structured questionnaire was used to collect data on students' knowledge of CE principles, their attitudes toward sustainability, their engagement in circular practices (such as recycling and reuse), and perceived barriers to sustainable behaviour. Findings revealed a significant difference in awareness levels between undergraduate and postgraduate students, with postgraduates demonstrating higher CE knowledge. A strong positive correlation was observed between awareness and attitude, and a significant association was found between awareness and the frequency of circular practices. Despite adequate knowledge, several students reported infrastructural and motivational barriers that hinder the adoption of sustainable behaviors. The study underscores the importance of targeted awareness programs and institutional support to bridge the knowledge–practice gap. By providing micro-level insights, this research contributes to the design of behaviour-focused sustainability interventions within higher education institutions.

Index Terms- Circular Economy, KAP Model, Sustainability, College Students, Environmental Awareness, Behavioural Practices

1.INTRODUCTION

The growing global concern over environmental degradation, unsustainable resource use, and increasing waste generation has intensified the focus on circular economy (CE) as a viable pathway toward sustainable development. Unlike the conventional linear model of "take–make–dispose," the circular economy seeks to close resource loops through reuse, repair, recycling, and regeneration of materials and products (Ellen MacArthur Foundation, 2013). As global economies transition toward sustainability, embedding circular practices into daily life becomes crucial, particularly among the younger generation who will shape future consumption and production patterns.In this context, college students represent a key demographic. Their awareness and behavior toward sustainability can influence not only campus practices but also broader community engagement and policy outlooks (Kirchherr et al., 2018). Educational institutions serve as critical platforms for fostering sustainable mindsets through formal and informal learning, making the college campus an ideal microcosm to study the diffusion of circular economy values (Dlouhá et al., 2017).

Despite increasing discourse around CE in policy and academia, a significant gap remains between awareness and actual behavior, especially among youth. Understanding why some students actively engage in recycling or reuse, while others do not, requires a closer look at not just what they know, but what they feel and do. For this reason, the present study employs the Knowledge–Attitude–Practice (KAP) model**,** a well-established behavioral framework, to examine circular economy engagement among college students. The KAP model facilitates a structured approach to explore how knowledge of circular principles (e.g., 3Rs, sustainable consumption) influences students' attitudes, and how those attitudes, in turn, shape practices such as waste segregation, reuse, and eco-conscious purchasing.Focusing on a micro-level institutional context, this study aims to assess the awareness, attitudes, and practices related to circular economy among college students, and to identify perceived barriers that hinder the adoption of CE-aligned behaviors. By generating empirical insights grounded in the KAP model, the research seeks to contribute to the design of targeted interventions and educational strategies that promote sustainability on college campuses and beyond.

II.OBJECTIVES

- To assess the level of knowledge about circular economy principles among college students.
- To examine students' attitudes toward sustainability and the adoption of circular economy practices.
- To evaluate the extent of circular practices (reuse, recycling, reduction) adopted by college students.

III.RESEARCH QUESTIONS

RQ1 What is the current level of awareness and understanding of the circular economy among college students?

RQ2 What are the prevailing attitudes of students toward circular economy principles and sustainable practices?

RQ3 To what extent do college students engage in circular behaviors such as recycling, reuse, and waste minimization?

IV. LITERATURE REVIEW

IV. i Concept and Evolution of Circular Economy

The circular economy (CE) represents a systemic shift from the traditional linear model of production and consumption to a model that emphasizes longevity, renewability, reuse, and the regeneration of resources. CE is built on the core principles of minimizing waste, extending product life cycles, and creating closed-loop systems of resource use (Ellen MacArthur Foundation, 2013). Kirchherr et al. (2018), through an analysis of over 100 definitions, describe CE as a multi-dimensional concept encompassing environmental, economic, and systemic transformation. This regenerative model not only reduces environmental harm but also offers economic benefits by creating green jobs and fostering innovation.While initially framed as a technical and economic strategy, CE has evolved to include behavioral and cultural shifts necessary for sustainability transitions (Murray, Skene, & Haynes, 2017). These shifts require active participation from individuals and communities, thus extending the relevance of CE beyond industry into everyday life.

IV. ii Circular Economy in the Indian Context

India, with its rapidly growing population and consumption rates, faces significant challenges related to waste management and resource depletion. Recent national strategies, such as the Waste to Wealth Mission and Swachh Bharat Abhiyan, advocate for circular solutions and extended producer responsibility (NITI Aayog, 2021). However, despite policy attention, actual implementation and behavioral change at the grassroots level remain uneven.

Chaturvedi, Sharma, and Ahlawat (2021) argue that India's circular transition is hindered by infrastructural limitations, limited public awareness, and weak institutional coordination. Academic engagement with CE is still emerging in India, and there remains a lack of micro-level studies that assess public or student behavior through theoretical lenses such as KAP or TPB (Theory of Planned Behavior).

IV. iii Role of Educational Institutions and Youth

Educational institutions play a critical role in promoting sustainability and fostering environmentally responsible behavior among students. Universities and colleges can serve as living laboratories for circular practices through green campus initiatives, sustainability curricula, and student-led environmental clubs (Dlouhá et al., 2017).

Young people, especially college students, are uniquely positioned to champion CE principles as both consumers and future professionals. Studies show that students who are exposed to sustainability education are more likely to develop pro-environmental attitudes and behaviors (Aranda-Camacho et al., 2020). However, there is often a gap between what students know about sustainability and what they actually do, highlighting the need for deeper behavioral investigations.

IV.iv The KAP Model in Environmental Research

The Knowledge–Attitude–Practice (KAP) model is a widely used behavioral framework in public health, education, and increasingly, environmental studies. It assumes a linear progression where knowledge acquisition influences attitude formation, which then leads to behavioral change (Launiala, 2009). This model has been effectively used to study waste management behavior, energy use, and climate change awareness among different populations (Ojomo et al., 2015; Ahmed et al., 2020).

In the context of CE, the KAP model provides a useful structure to assess whether students' awareness of sustainability concepts translates into meaningful practices such as recycling, reuse, or avoidance of single-use products. It also helps identify whether positive attitudes are sufficient for behavioral adoption, or if other barriers intervene. Despite its relevance, the model has rarely been applied to explore circular economy behaviors in Indian educational contexts.

IV.v Research Gap

Although the literature acknowledges the importance of youth engagement in sustainability and CE, empirical research applying the KAP model to Circular economy behaviors among college students in India is scarce. Most existing studies either focus on general environmental attitudes or assess institutional CE policies without considering individual behavior. Additionally, the majority of CE-related studies are conducted at macro or industrial levels, with limited attention to micro-level behavioral patterns within educational settings. This gap calls for focused, KAP-based research at the grassroots level to understand how knowledge and attitudes shape CE practices among students.

By addressing this gap, the present study seeks to contribute to the literature by providing a micro-level, behavior-focused understanding of circular economy engagement in an Indian college context. It uses the KAP model as both a theoretical and analytical lens to assess the current state of CE knowledge, attitudes, and practices among students, and to inform future educational interventions and sustainability policies.

V.THEORETICAL FRAMEWORK

This study is underpinned by **the** Knowledge–Attitude–Practice (KAP) model, a widely used behavioral framework that explains how individuals acquire knowledge, develop attitudes, and translate these into observable practices. Originally developed in the fields of public health and education, the KAP model has since been adapted across various disciplines, including environmental research and sustainability studies, due to its ability to examine how awareness influences behavior change (Launiala, 2009).

According to the KAP model, behavior change is a sequential process that begins with knowledge acquisition. Knowledge refers to the awareness or understanding of a subject—in this case, concepts related to the circular economy, such as resource efficiency, the 3Rs (Reduce, Reuse, Recycle), and sustainable consumption patterns. The second stage involves the formation of attitudes, which encompass personal beliefs, feelings, or dispositions toward a behavior or issue. Positive attitudes toward sustainability and waste reduction are often necessary precursors to action. Finally, these attitudes are expected to manifest as practices—the actual behaviors undertaken by individuals, such as recycling waste, reusing materials, or choosing eco-friendly products.

This theoretical framework is particularly relevant to the circular economy, as successful implementation at the societal level requires not only systemic changes but also individual-level behavioral transformation. College students, as emerging leaders and consumers, play a crucial role in shaping future sustainability norms. By applying the KAP model, this study aims to assess how well students understand circular economy principles, how they feel about sustainability, and to what extent this is reflected in their everyday practices.

The model also allows for the exploration of gaps and inconsistencies—for example, students may possess adequate knowledge but fail to adopt sustainable practices due to lack of motivation, infrastructural barriers, or social influences. Hence, the KAP framework provides a comprehensive lens through which to analyze the interconnectedness of awareness, attitudes, and actions regarding circular economy practices.

VI.CONCEPTUAL FRAMEWORK

The conceptual framework for this study is grounded in the Knowledge–Attitude–Practice (KAP) model, which provides a structured behavioral lens to examine how students engage with circular economy (CE) principles. The model assumes that behavioral change occurs in a linear sequence: **knowledge** leads to the formation of **attitudes**, which in turn influence actual **practices**. This framework is particularly relevant for exploring individual-level engagement with sustainability in the educational context.

As illustrated in the diagram, the framework consists of four core components:

VI.i Knowledge of Circular Economy

This refers to students' awareness and understanding of CE concepts such as the 3Rs (Reduce, Reuse, Recycle), sustainable consumption, waste segregation, and resource efficiency. It forms the cognitive foundation that shapes attitudes toward sustainability.

VI.ii Attitude toward Circular Economy

Attitude encompasses students' values, beliefs, and predispositions regarding sustainability and environmental responsibility. Positive attitudes are considered necessary precursors to adopting CE-related behaviors.

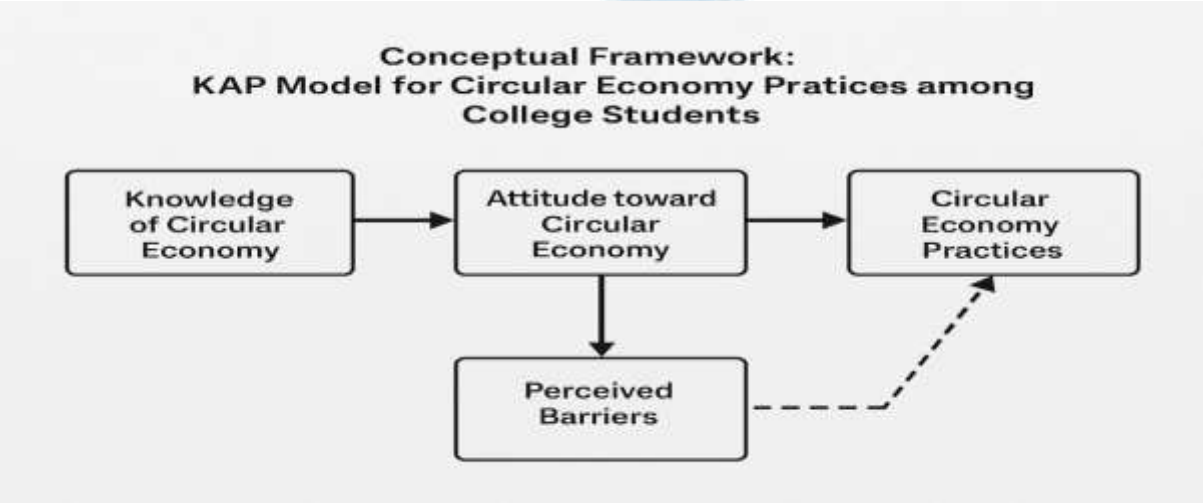
VI.iii Circular Economy Practices

This component represents actual behaviors undertaken by students, such as reusing materials, avoiding single-use products, recycling waste, and participating in eco-friendly initiatives. These practices reflect the extent to which knowledge and attitude are translated into action.

VI.ivPerceived Barriers

Perceived barriers are included as a moderating factor in the framework. These are psychological, infrastructural, or contextual obstacles—such as lack of motivation, absence of recycling facilities, or peer influence—that may hinder the conversion of knowledge and attitude into practice. In the model, perceived barriers are shown to influence both the formation of attitude and the execution of sustainable practices, potentially weakening the knowledge → practice link.

By incorporating perceived barriers, this framework recognizes that even students with high knowledge and favorable attitudes may fail to engage in sustainable behaviors due to external or internal limitations. Thus, the model not only facilitates an understanding of the linear KAP sequence but also enables the identification of gaps and inhibitors in the behavior change process.This conceptual model forms the analytical foundation for the study, guiding both the design of the research instrument and the interpretation of the data.



VII.METHODOLOGY

VII.i Research Design

A descriptive,cross sectional survey was used to assess the Knowledge,Attitude and Practice(KAP) of college students towards Circular Economy.KAP model was used as a conceptual framework to explore behavioural dimensions related to circular economy.

VII.ii Study Area and Population

The study was conducted in Government College Malappuram, a higher education institution located in Malappuram district ,Kerala, India. Undergraduate and Post graduate students enrolled in various disciplines such as Arts/Humanities,Commerce and Science constitutes the population.College students were selected as target population due to their critical role in adoption and dissemination of sustainable practices in future.

VII.iii Sampling Technique and Sample Size

A two-stage stratified random sampling technique was used to ensure that students from different academic backgrounds and study levels were adequately represented. The total population was first stratified by course of study (Arts, Science, Commerce and language) and then by level of study (Undergraduate and Postgraduate), resulting in six distinct strata.By using simple random sampling method,10 respondents from each UG strata and 5 respondents from each PG strata were selected ,which constituted a total sample size of 60.

VII.iv Instrument for Data Collection

The primary data were collected using a structured, self-administered questionnaire designed around the three components of the KAP model:

Section A: Demographic Profile – age, gender, course of study, year of study, and residence type

Section B: Knowledge – 8 items measuring awareness of CE concepts (e.g., 3Rs, sustainable consumption) using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree)

Section C: Attitude – 8 items assessing students' perceptions and beliefs regarding CE and sustainability using the same Likert scale

Section D: Practice – 9 items assessing frequency of behaviors (e.g., reuse, recycling, avoiding single-use products) on a 5-point frequency scale (1 = Never to 5 = Always)

Section E: Perceived Barriers – multiple-choice items identifying common barriers to CE practice (e.g., lack of facilities, awareness, motivation)

The questionnaire was developed based on validated KAP-based tools used in prior environmental behavior studies (Ahmed et al., 2020) and contextualized for the CE theme.

VII.v Validity and Reliability

The instrument was subjected to content validation by academic experts in environmental studies and behavioral research. A pilot test was conducted with 25 students, and necessary modifications were made for clarity and consistency. The internal consistency of the questionnaire was tested using Cronbach's alpha, with all KAP scales achieving acceptable thresholds ($\alpha \geq 0.70$).

VII.vi Data Analysis

The collected data were coded and analyzed using SPSS (Statistical Package for the Social Sciences) .

H1: **There is a significant difference in circular economy awareness based on educational level (UG vs PG).**

Test Used: Independent Samples t-test

Group	Number	Mean Awareness Score	SD
UG	40	28.5	4.2
PG	20	32.1	3.9

Result

t(58) = -3.32, p = 0.0016

Interpretation

There is a statistically significant difference in awareness scores between UG and PG students, with PG students having higher awareness of circular economy principles.

H2: Students with higher awareness of circular economy exhibit more positive attitudes toward sustainability.

Test Used: Pearson's Correlation

Variable	Mean	SD
Awareness Score	30.1	4.5
Attitude Score	33.2	5.1

Result

r = 0.61, p < 0.001

Interpretation

There is a strong, positive correlation between awareness and attitude scores. Students with higher knowledge of CE tend to have more positive attitudes toward sustainability.

H3: There is a significant association between awareness level and engagement in circular practices.

Test Used: Chi-Square Test

Awareness Level	Low Practice	Medium Practice	High Practice	Total
Low	5	4	1	10
Medium	3	10	7	20
High	1	6	23	30

Result

$\chi^2(4) = 16.45$, p = 0.0024

Interpretation

There is a significant association between awareness and circular economy practices. Students with higher awareness are more likely to engage in high-frequency sustainable practices.

VIII. RESULTS AND DISCUSSION

The analysis of responses from 60 college students, including both undergraduate and postgraduate participants from various academic disciplines, revealed important insights into their knowledge, attitudes, and practices related to the circular economy. Descriptive statistics showed that while the majority of students demonstrated moderate to high awareness of circular economy concepts—such as the 3Rs, sustainable consumption, and resource regeneration—the actual implementation of these concepts through daily practices was comparatively lower. Hypothesis testing revealed significant differences in awareness scores based on educational level, with postgraduate students exhibiting higher knowledge than their undergraduate counterparts ($t = -3.32$, $p = 0.0016$). This suggests that academic maturity and greater exposure to environmental content may influence CE awareness. Furthermore, a strong positive correlation was found between knowledge and attitude ($r = 0.61$, $p < 0.001$), indicating that students who were more informed about CE principles also held more favorable views toward sustainability. This aligns with the theoretical assumption of the KAP model, which posits that knowledge acts as a foundation for attitude formation. Additionally, the study found a significant association between awareness level and the adoption of circular practices ($\chi^2 = 16.45$, $p = 0.0024$), confirming that students with greater CE awareness were more likely to engage in recycling, reuse, and reduction behaviors. Despite these encouraging patterns, several barriers were identified that hinder the full translation of knowledge and attitude into practice. Key constraints included lack of institutional support, inadequate recycling infrastructure, time limitations, and low motivation levels. These findings are consistent with prior research suggesting that while awareness and positive disposition toward sustainability are critical, they alone are insufficient for behavior change unless supported by enabling environments. The presence of such perceived barriers highlights the need for both systemic interventions and behavioral nudges to foster circular practices among students. Overall, the results reinforce the relevance of the KAP model in explaining environmental behavior in the Indian higher education context and suggest that targeted educational programs and infrastructure improvements could bridge the gap between awareness and sustainable action.

IX.CONCLUSION AND IMPLICATIONS

This study highlights the critical role of college students in advancing the circular economy by assessing their knowledge, attitudes, and practices through the KAP model. The findings demonstrate that while students generally possess a fair understanding of circular economy concepts and express positive attitudes toward sustainability, there remains a noticeable gap when it comes to consistent behavioral adoption. Educational level was found to influence awareness, and strong correlations were observed between knowledge, attitudes, and practices. However, the presence of perceived barriers—such as limited facilities, lack of motivation, and institutional constraints—prevents full behavioral translation. These insights underscore the importance of integrating circular economy principles into higher education curricula and campus life through experiential learning, green campus initiatives, and targeted awareness campaigns. Policymakers and educational administrators should prioritize infrastructure development and behavioral interventions to remove practical and psychological barriers. By nurturing informed and proactive student communities, institutions can serve as catalysts for broader societal transitions toward sustainability and circular economic systems.

X. LIMITATIONS AND FUTURE SCOPE

While this study provides valuable micro-level insights into the awareness and practices related to the circular economy among college students, it is not without limitations. The research was confined to a single government college in Malappuram, Kerala, which may limit the generalizability of the findings to other regions or institutional types. The relatively small sample size ($N = 60$) and reliance on self-reported data may introduce bias and affect the accuracy of the reported behaviors. Additionally, the cross-sectional design captures responses at a single point in time, thereby limiting the ability to track behavioral changes over time. Future research could expand the scope by including multiple institutions across urban and rural settings to capture broader patterns of CE engagement. Longitudinal studies could provide deeper insights into the progression of knowledge, attitude, and practices over time. Furthermore, integrating qualitative approaches such as interviews or focus groups could uncover deeper motivations and contextual factors influencing sustainable behaviors, thus enriching the KAP framework's application in environmental research.

XI.REFERENCES

Ahmed, S., Ahmad, M., & Nayak, J. K. (2020). Knowledge, attitude, and practice (KAP) towards sustainable waste management: A systematic review. *Environmental Science and Pollution Research*, 27, 1–15. https://doi.org/10.1007/s11356-020-08371-w

Aranda-Camacho, Y., Piñeros-Baquero, J. D., & Ariza-Montoya, J. (2020). Circular economy in higher education institutions: A systematic literature review. *Sustainability*, 12(20), 8031. https://doi.org/10.3390/su12208031

Chaturvedi, A., Sharma, Y., & Ahlawat, A. (2021). Circular economy in India: Challenges and the way forward. *Resources, Conservation and Recycling*, 167, 105440. https://doi.org/10.1016/j.resconrec.2020.105440

Dlouhá, J., Henderson, L., Kapitulčinová, D., & Mader, M. (2017). Sustainability-oriented higher education networks: Characteristics and challenges. *Journal of Cleaner Production*, 172, 4555–4566. https://doi.org/10.1016/j.jclepro.2017.06.090

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. https://ellenmacarthurfoundation.org

Kirchherr, J., Reike, D., & Hekkert, M. (2018). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters Journal*, 11(1). http://www.anthropologymatters.com/journal/2009-1/launiala_2009_how_much_can.pdf

Murray, A., Skene, K., & Haynes, K. (2017). The circular economy: An interdisciplinary exploration of the concept and application in a global context. *Journal of Business Ethics*, 140(3), 369–380. https://doi.org/10.1007/s10551-015-2693-2

NITI Aayog. (2021). *Policy framework for circular economy in India*. Government of India. https://www.niti.gov.in

Ojomo, E. O., Elliott, M., Amjad, U., & Bartram, J. (2015). Improving health outcomes through better sanitation: The KAP model in practice. *BMC Public Health*, 15(1), 1222. https://doi.org/10.1186/s12889-015-2573-6

Dlouhá, J., Henderson, L., Kapitulčinová, D., & Mader, M. (2017). Sustainability-oriented higher education networks: Characteristics and challenges. *Journal of Cleaner Production*, 172, 4555–4566. https://doi.org/10.1016/j.jclepro.2017.06.090

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. https://ellenmacarthurfoundation.org

Kirchherr, J., Reike, D., & Hekkert, M. (2018). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Chaturvedi, A., Sharma, Y., & Ahlawat, A. (2021). *Circular economy in India: Challenges and the way forward*. Journal of Resources, Conservation and Recycling, 167, 105440. https://doi.org/10.1016/j.resconrec.2020.105440

Dlouhá, J., Henderson, L., Kapitulčinová, D., & Mader, M. (2017). Sustainability-oriented higher education networks: Characteristics and challenges. *Journal of Cleaner Production*, 172, 4555–4566. https://doi.org/10.1016/j.jclepro.2017.06.090

Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition*. https://ellenmacarthurfoundation.org

Kirchherr, J., Reike, D., & Hekkert, M. (2018). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232. https://doi.org/10.1016/j.resconrec.2017.09.005

Murray, A., Skene, K., & Haynes, K. (2017). The circular economy: An interdisciplinary exploration of the concept and application in a global context. *Journal of Business Ethics*, 140(3), 369–380. https://doi.org/10.1007/s10551-015-2693-2