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EVALUATING THE BASELINE EFFICACY OF THE ADAB ENVIRONMENTAL STRATEGIC MANAGEMENT MODEL IN FOSTERING YOUTH WASTE MANAGEMENT PRACTICES IN COASTAL COMMUNITIES

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Abstract:

Environmental issues in coastal areas require youth engagement. Conventional awareness campaigns are unable to effectively translate the sustainability knowledge into practice. This study evaluated the baseline efficacy of the ADAB Environmental Strategic Management Model which consisted of six action pillars (the HERO ALAM, Modul ADAB, and the KUDAH) to address waste management practices among coastal community youth. A pre-experimental single-group survey design was performed among 25 participants in Kuala Perlis, Malaysia. The program explored changes in participants' baseline scores of the four key elements, which included Environmental Knowledge, Environmental Attitude, Social Support, and Action Awareness. Multiple Linear Regression analysis found that the only significant predictor of Action Awareness was Environmental Knowledge ($\beta = 0.524$, $p = 0.016$), which explained 30.4% of the total variance ($R^2 = 0.304$, Adjusted $R^2 = 0.204$). The effect of attitude and social support on action awareness was not directly predictive. The practical implication of this study is that it provides coastal community organizers or policymakers with a validated baseline design for developing similar youth intervention modules for coastal environmental management.

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Waste Management, Coastal Sustainability, Efficacy Model Development, Environmental Leadership, Coastal Community Youth, ADAB Project, KUDAH

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Introduction

Plastic waste pollution in coastal areas is becoming severe and threatening the local biodiversity. According to the global marine plastic pollution statistics, Malaysia is among the top ten (10) countries contributing to ocean plastic waste with an approximate figure of 0.14 to 0.37 million tons of plastic waste that ends up in the country's oceans yearly (Jambeck et al., 2015; World Bank Group, 2021). According to the report by the World Bank Group (2021), over eighty-one percent (81%) of the plastic waste that contaminates Malaysia's coastal marine system consists of single-use plastic, food packaging materials and beverage bottles. Fauziah et al. (2015) report from local statistics indicated that macro and microplastic dumping in Malaysia's coastal region and water is at its peak due to improper waste management.

Based on the observation and informal talks with the local community members and school administrators, single-use plastic waste, food packaging and beverage bottles are continuously overflowing from the rivers' mouths to the mangroves during the tide. Preliminary interviews conducted with some community members and selected schools' heads showed that although beach cleaning activities are usually performed by the private organization, within a week, the beaches are polluted again with the same waste materials. Thus, it becomes evident that beach cleaning activities by private organizations without involving the inculcation of self-practiced knowledge to the youths cannot solve the waste management problem in the coastal community.

Therefore, it is essential to involve Generations Z and Alpha in finding a long-term solution to the environmental menace of plastic waste pollution. Anak Didik dan Alam Berbudi Project (ADAB) is a strategic management model aimed at empowering coastal community youths by creating awareness regarding sustainable practices of 6R (Refuse, Reduce, Reuse, Repair, Recycle and Rot). This project creates value for the children as little changemakers.

Problem Statement

Although several environmental management strategies have been carried out in the coastal community, solid waste accumulation, especially plastic waste pollution, continues to be a critical environmental issue. The traditional regulatory and physical management approaches lack sustainability in creating physical practices among the younger generations. Coastal community study by Othman et al. (2023) shows that there is a low ratio of source-separated

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waste in the coastal community due to the lack of continued hands-on training and education. Besides, the study by Othman et al. (2023) and Tiew et al (2019) supports that the low rate of

source-separated waste in the coastal community is primarily caused by the absence of continued public participation. In addition, the study by Afroz et al. (2013) public awareness and participation in 3R (reduce, reuse, recycle) waste practices in Malaysia remain inconsistent across urban and coastal settings.

Despite frequent clean-up activities conducted by local government and non-governmental sectors, existing coastal environmental initiatives have been conducted as stand-alone activities. One of the most prevalent challenges of the traditional clean-up events is the gap between attitudes and behaviours as well as an inadequate understanding of experiential learning mechanisms to address the attitudes and behaviours of the target generation in an effective and sustainable manner. The ADAB Project addresses the gap by integrating structured 6R classroom instruction and active litter collection in relation to regular beach recreation (KUDAH).

Research Objective

The objective of this pilot study was to assess the baseline efficacy of the ADAB Environmental Strategic Management Model. The term 'efficacy' refers to the ability of the combined three pillars of the project (HERO ALAM, ADAB Module, and KUDAH) to encourage and predict the level of physical or Action Awareness (AA) of coastal community youth. The study examined the baseline contribution of three key elements, including Environmental Knowledge (EK), Environmental Attitude (EA), and Social Support (SS).

Conceptual Framework and Model Framework

ADAB Model Integration (HERO ALAM, ADAB and KUDAH)

The ADAB Project functions through a synergistic 3-pillar implementation architecture designed to bridge the cognitive action divide, known as ADAB model integration as follows: (1) HERO ALAM (Leadership & Eco-mindset Anchor) that focuses on empowering youth peer-leaders with intrinsic motivation and ethical stewardship, (2) ADAB Learning Module (Structured Cognitive Input) which delivered across 8 structured weekly sessions, providing actionable literacy on 6R principles (Rethink, Refuse, Reduce, Reuse, Recycle, Rot) and (3) KUDAH Activities (Kutip Waste During Leisure - Active Experiential Output) that converts classroom learning into physical practice by integrating litter collection into everyday recreational beach activities.

ADAB Project Implementation

Module Content and Locations

The program was conducted in October, November, and December 2025, comprising module content and locations as detailed in Table 1 below:

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Table 1: ADAB Project Module Content and Locations

Session	Module / Content	Location
Session 1	Module 1: Personal Hygiene	Kg. Tanah Baru, Kuala Perlis
Session 2	Module 2: Home & Environmental Cleanliness	Kg. Tanah Baru, Kuala Perlis
Session 3	Module 3: Islam in Cleanliness Aspects	Kg. Tanah Baru, Kuala Perlis
Session 4	Module 4: Know Materials & Waste	Kg. Tanah Baru, Kuala Perlis
Session 5	Module 5: 6R Practices (Part 1)	Kg. Tanah Baru, Kuala Perlis
Session 6	Module 5: 6R Practices (Part 2)	Kg. Tanah Baru, Kuala Perlis
Session 7	Module 5: 6R Practices (Part 3)	Kg. Tanah Baru, Kuala Perlis
Session 8	Outdoor Program (Closing)	Perlis State Park / Gua Kelam / Rimba Herba

Equipment

The equipment listed in Table 2 required to support the practical execution of the ADAB Project is as follows:

Table 2: List of Equipment

No.	Equipment
1	Trash bags (SEKOPLAS RePlus Mini Roll HDPE L)
2	Waste grabbers (Pick-Up & Reaching Tool)
3	Gloves (Batik Knitted Cotton Safety Gloves)
4	Mini luggage scale
5	Gunny bags (No Plastic Bag, Go ECO)

Literature Review

Action Awareness

Action awareness is a physical practice behaviour and the individual's continuous commitment to environmental preservation, such as 6R waste management and clean-up activities. In the theories of Theory of Planned Behaviour (TPB) and Value Belief Norm (VBN), action awareness is the translation of intentional behaviours and moral obligation (Memery et al., 2021). Action and awareness require structured experimental knowledge for students to develop physical practices as their daily routine life (Janmaimool and Khajornfarr, 2020). National awareness surveys in Malaysia indicate that high awareness does not necessarily translate into participation unless there is a structured experimental intervention (Mei et al., 2016). Besides, Sari and Kusuma (2020) agree that youths need targeted special programs to participate in coastal environmental management activities to bridge the awareness-participation gap. A pilot study with a small sample size ($N < 30$) fit because Sekaran and Bougie (2020) recommends a pilot study with a small sample size before implementing the research design at a larger scale to examine the early intervention modules' effectiveness.

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Environmental Knowledge

Environmental knowledge refers to individuals' cognitive awareness of environmental issues and waste management practices. Thus, explain that action-oriented knowledge is the most significant predictor of recycling activities among students. Knowledge provides confidence to perform physical activities by translating cognitive awareness into action. In addition, expound that action-oriented knowledge is vital in influencing recycling behaviour among students, thus, establishing psychological recycling intentions. This is because Chen (2016) explains that cognitive knowledge about waste management activities predicts individuals' intention and physical recycling practices. In addition, Zen et al. (2013) explains that frameworks for household waste management emphasize that source separation behaviours require clear structural support and public policy enforcement in the Malaysian context (Zen et al., 2014).

Environmental Attitude

Environmental attitude refers to an individual's emotional evaluation and moral obligation. Although TPB theory advocates that positive attitudes drive behaviour, several empirical studies contradicted this ideology. Tam and Chan (2017) conducted a meta-analysis study and revealed a gap between attitude and behaviour, especially among Generation Z and Alpha. Students report high attitude scores, but their attitudes do not translate into physical practices unless they have adequate procedural knowledge and accessible facilities.

Social Support

Social support refers to external sources and social environments, such as schools, parents and communities, that facilitate or hinder individual behaviour. Othman et al. (2023) and Chawla (2020) reveal that social support provides the necessary infrastructure that facilitates coastal student participation, although the influence is conditional upon the level of cognitive knowledge.

Summary of Literature Review

Table 3: Synthesis of Key Literature Review

Authors & Year	Variables Examined	Context & Sample	Key Findings
Jambeck 949 tal. (2015)	Global Marine Plastic Pollution	192 Coastal Countries	Malaysia ranks 8th globally for mismanaged plastic waste discharge into oceans (0.14–0.37 million tonnes/year).
World Bank Group (2021)	Plastic Ecosystem & Recycling	Coastal & Marine Waters, Malaysia	81% of marine litter in Malaysia consists of single-use plastics.
Fauziah 949 tal. (2015)	Plastic Waste Distribution	Aquatic Ecosystems, Malaysia	Coastal plastic debris pollution is high 949 tal949 poor domestik waste management.
Tam & Chan (2017)	Attitude	Meta-Analysis Review	An attitude-behavior gap exists where high pro-environmental

			attitudes do not guarantee physical action.
Othman 950 tal. (2023)	Community Support, Waste Management	Coastal Communities, Malaysia	Local community support and external intervention programs increase practical involvement.
Janmaimool & Khajornfarr (2020)	Experiential Learning	Primary School Students	Hands-on activity exposure transfers cognitive knowledge into action.
Memery 950 tal. (2021)	TPB, VBN	Generations Z & Alpha	Integration of TPB and VBN proves action requires cognitive ability (self-efficacy).
Chawla (2020)	Early Childhood Experience	Environmental Education Studies	Early childhood outdoor engagement forms long-term eco-friendly habits.
Mei 950 tal. (2016)	Environmental Awareness & Behavior	General Public, Malaysia	High environmental awareness does not automatically correspond to high pro-environmental behavior scores.
Chen (2016)	Waste Reduction & Plastic Bag Use	Consumer Behavior (TPB Framework)	Specific procedural knowledge significantly predicts individual intentions to reduce plastic waste and adopt sustainable habits.
Tiew 950 tal. (2019)	Waste Separation at Source	Households & Communities, Malaysia	Public participation in waste separation remains limited without persistent educational enablers and community support.
Sari & Kusuma (2020)	Youth Involvement & Coastal Management	Coastal Communities & Youth	Empowering youth through hands-on coastal programs effectively bridges the gap between environmental knowledge and physical action.

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Research Framework

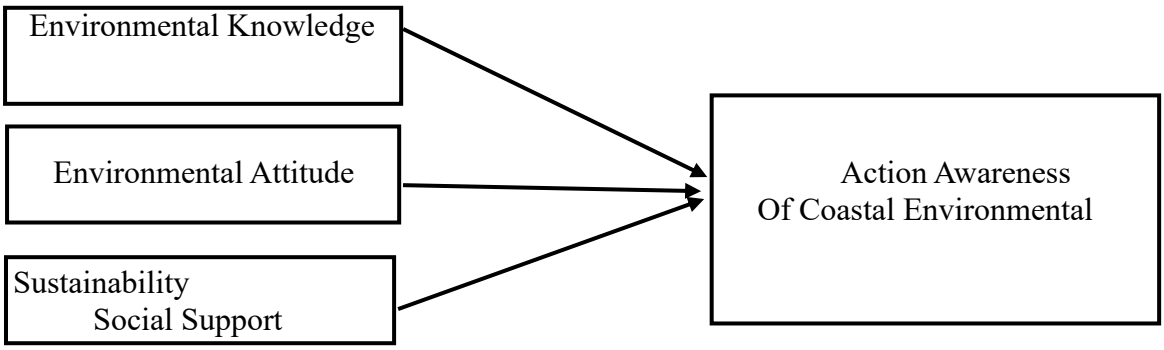


Figure 1: Research Framework

Based on the conceptual research framework, three main hypotheses were tested:

H1: Environmental Knowledge (EK) significantly influences Action Awareness (AA) regarding coastal environmental sustainability.
H2: Environmental Attitude (EA) significantly influences Action Awareness (AA) regarding coastal environmental sustainability.
H3: Social Support (SS) significantly influence Action Awareness (AA) regarding coastal environmental sustainability.

Research Methodology

This study utilized a single-group pilot pre-experimental evaluation design (N=25) conducted in Kampung Tanah Baru, Kuala Perlis, Malaysia. Non-probability purposive sampling was employed to recruit primary and secondary school youth participating in the 8-week ADAB intervention program (executed between October and December 2025). This investigation was designed as an exploratory pilot baseline assessment to test intervention feasibility and measuring instruments, a comparison control group was not included at this stage.

The pilot scope serves to establish preliminary effect sizes prior to executing full quasi-experimental designs with longitudinal control cohorts. All constructs were evaluated using a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree). The measurement instrument comprised 4 demographic items in Section A, followed by 5 items for each research variable as follows: Section B: Environmental Knowledge (EK) Section C: Environmental Attitude (EA) Section D: Action Awareness (AA) and Section E: Social Support (SS).

Quantitative survey data were analysed using IBM SPSS Statistics Version 27. Analysis followed a three-stage process that included: (1) Internal consistency and scale reliability via Cronbach's Alpha; (2) Pearson bivariate correlation to explore relationship directionality; and (3) Multiple regression analysis to test the effect of EK, EA and SS on Action Awareness (AA). All regression diagnostic tests were completed before conducting the hypothesis testing.

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Findings

Respondent Demographic Profile

Table 4 displays the demographic profile of the pilot sample (N=25). Respondents comprised 84.0% (N=21) female and 12.0% (N=3) male. The majority were aged 10 to 12 years (56.0%, N=14) and attended SK Kuala Perlis (72.0%, N=18). A total of 88.0% (N=22) reported previous participation in environmental activities. Overall, the sample represents a group of highly motivated upper primary school students with extensive baseline exposure to school-based sustainability initiatives. This high level of engagement serves as an appropriate foundation for assessing the initial response to the ADAB Model intervention.

Table 4: Respondent Demographic Profile

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	3	12.0
	Female	21	84.0
	Missing	1	4.0
Age	7–9 years	6	24.0
	10–12 years	14	56.0
	13–15 years	4	16.0
School	SK Kuala Perlis	18	72.0
	SK Bahiyah	1	4.0
	SJK Phin Lin	1	4.0
	Anak Didik	5	20.0
Prior Environmental Activity Participation	Yes	22	88.0
	No	1	4.0

Note: N= 25, *p<0.05, **p<0.01

Reliability Analysis

Table 5: Construct Reliability Analysis

Variable / Construct	Cronbach's Alpha (α)	No. of Items	Internal Consistency Level
Environmental Knowledge (EK)	0.654	5	Good
Environmental Attitude (EA)	0.840	5	High
Social Support (SS)	0.760	5	High
Action Awareness (AA)	0.695	5	Good

Note: N= 25, *p<0.05, **p<0.01

Internal consistency reliability analysis was conducted using Cronbach's Alpha (α) for all constructs. As can be seen in Table 5 below, all items had scores above the minimum threshold of acceptability, ranging from 0.654 to 0.840. This suggests that the scales had good internal consistency reliability. For the dependent variable, Action Awareness (AA) was recorded as α = 0.695 which is satisfactory. For the Environmental Knowledge construct, an alpha of α = 0.654 was recorded while Environmental Attitude (EA) registered an alpha of α = 0.840.

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Overall, statistical analysis shows that the measurement items have sufficient reliability for further analysis using parametric correlation and regression procedures.

Correlation Analysis

Table 6: Pearson Correlation Analysis

Variable	EK	EA	IS	AA
Environmental Knowledge (EK)	1			
Environmental Attitude (EA)	0.409*	1		
Social Support (SS)	0.341	0.619**	1	
Action Awareness (AA)	0.498*	0.094	0.265	1

Note: N= 25, *p<0.05, **p<0.01

Pearson correlation analysis was conducted to establish the relationship between independent and dependent variables. The analysis results are presented in Table 6. The result showed that most variables had significant positive correlations. The exception was Social Support (SS) where no significant correlations were recorded with Environmental Knowledge (EK) and Environmental Attitude (EA) and Action Awareness (AA) in the baseline matrix.

Multiple Regression Analysis

Table 7: Multiple Regression Analysis Results

Dependent Variable: Action Awareness (AA)			
Independent Variables:	(β)	Sig.	Hypothesis Result
Environmental Knowledge (EK)	0.524	0.016*	H1: Supported
Environmental Attitude (EA)	-0.282	0.254	H2: Not Supported
Social Support (SS)	0.262	0.275	H3: Not Supported
R Square	0.304		
Adjusted R Square	0.204		

Note: N= 25, *p<0.05, **p<0.01

Multiple linear regression analysis was performed to examine the effect capacity of the independent variables on Action Awareness. The analysis results are presented in Table 7. The overall regression model was statistically significant, explaining 30.4% of the variance in Action Awareness ($R^2 = 0.304$, Adjusted $R^2 = 0.204$). Environmental Knowledge (EK) had a significant positive effect on Action Awareness ($\beta = 0.524$, $p = 0.016$). In contrast, Environmental Attitude ($\beta = -0.282$, $p = 0.254$) and Social Support ($\beta = 0.262$, $p = 0.275$) were not statistically significant in the baseline model.

Discussion and Implications

Findings from this pilot study showed that environmental knowledge has a significant positive effect on action awareness among coastal community youths. In addition, the result revealed that Environmental attitude does not have a unique effect on physical practice (Action Awareness) thus explaining the attitude-behaviour gap. This finding supports Tam and Chan's (2017) study that indicated the lack of procedures and facilities predicts the low rates of recycling practices among students. According to Othman et al. (2023) and Chawla (2020),

social support provides the necessary infrastructural support to facilitate student participation in environmental activities, but it was not significant in this study possibly due to limited cognitive knowledge of the students.

Conclusion

The provision of practical tools and training enables the youth to become effective agents of change in their communities. Future research should consider a larger sample size and a longer duration of the study while adopting more sophisticated modelling techniques such as Partial Least Squares Structural Equation Modelling (PLS-SEM).

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Ethics Statement:	This study was conducted in full adherence to institutional ethical guidelines. As the survey was non-invasive, posed minimal risk, and contained no sensitive or personally identifiable questions, it was formally acknowledged by the participating school administration and community leaders. Informed consent was obtained from all participants prior to data collection and participation was entirely voluntary with guaranteed confidentiality and anonymity.
Author Contribution Statement:	All authors contributed significantly to the development of this manuscript. The [First Author] was responsible for the execution of the field program, survey administration, literature review and drafting the initial manuscript. The [Second Author] who is also the corresponding author, led the conceptualization, methodology design, data analysis, critical revision and overall supervision of the study. The [Third Author] assisted with data entry and preliminary data formatting. All authors have read and approved the final manuscript prior to submission.
Declaration on the Use of Artificial Intelligence (AI)	The author(s) declare that AI [Google Gemini] was used during the preparation of this manuscript for preliminary language editing, grammar refinement and structural reorganization based on the authors' explicit directives. All AI-assisted content was subsequently re-checked, thoroughly reviewed and verified by the author(s), who retain full responsibility for the accuracy, integrity and final content of the manuscript.

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