Campus Sustainability: Does Student Engagement with Eco-Campus Environmental Activities and Green Initiatives Really Matter?

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Abstract This study seeks to investigate the relationship between (a) personal willingness towards environmental activities, (b) attitudes towards personal responsibility, and (c) attitudes toward the faculty's responsibility for creating a sustainable environment, and intention to engage in eco-campus environmental activities and green initiatives. The research used multiple regressions for data analysis in an attempt to achieve the objective across a sample of 374 students in a public university in Sabah, Malaysia. Their participation was purely voluntary. The construct validity was assessed by computing the exploratory factor analysis with varimax rotations. Empirical results revealed that personal willingness towards environmental activities, and attitudes towards the faculty's responsibility for creating a sustainable environment significantly affect students' intention to engage with eco-campus environmental activities and green initiatives. The first was found to have the strongest effect. The research provides a unique perspective of students' intention to engage with eco-campus environmental activities and green initiatives, which has previously not been much covered in the Malaysia context. The measurement produced can be used as a research tool for more exploratory and explanatory research regarding the investigated issues. Direction for future research is also presented.

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1   Introduction

A sustainable university or green university is defined as "a higher educational institution, that as a whole or in part, addresses, involves in and promotes, on a regional or global level, the maximisation of positive environmental, economic, societal, and health effects of the use of resources to fulfil the functions of teaching, research, outreach, partnership, and stewardship in order to help society make the transition to sustainable lifestyles" Velazquez et al. (2006, p. 810). A green campus provides a sustainable environment for its society by focusing on aspects such as its finances, environmental conservation and partnership activities (such as recycling, waste reduction and community-outreach programs), transportation system, providing courses on sustainability as well as energy conservation programs.

Campus sustainability has received more attention from university management and policy-makers in Malaysia in recent years. More universities have increased their strategic commitment and established long-term goals for sustainability practices as part of university achievement. According to GreenMetric (2014), University of Putra Malaysia (UPM) is ranked 16th among 25 of the world's greenest universities, after University of Bath (ranked 15th) and University of California, Berkeley (ranked 14th). The ranking was based on several indicators such as overall campus setting (including number of students, percentage of areas in campus covered with planted vegetation, percentage of budget allocated for sustainability programs and efforts), energy and climate change efforts, waste management, water management, transportation system within the campus and sustainability courses offered by the university. The recent ranking shows that the higher education institutions in Malaysia are making progress with their serious efforts in achieving a sustainable campus.

In East Malaysia, Universiti Malaysia Sabah (UMS) is the only university that has currently set a target to become an eco-campus by 2018. With this goal, the university has seriously laid out 5 year plans to become a green university. Apparently, the Centre for EcoCampus Management was established in 2013 with five core values namely: sustainable development, ecological protection, resource conservation, environmental stewardship and environmental compatibility (EcoCampus Management Centre 2014). The centre continuously develops, implements and closely monitors the planned core activities in the eco-campus such as 3R (reduce, reuse, recycle) project, emission reduction project, energy and water audit and conservation, seminars and workshops, landscaping, as well as outreach programmes.

In an exploratory study on the readiness and development of green university in Malaysia, Hooi et al. (2012) found that one of the issues in green university initiatives was the poor awareness about the concept of sustainability among the campus society (this includes the faculty members, staff and students). Regardless of how a sustainable campus is defined or measured, it must always start with human behavioural change. Some research suggested that knowledge of sustainability is important to students as well as the campus society because a university is an ideal place to educate students on sustainability principals and practice which can be assessed by the learning environment as well as in pedagogical ways (Kagawa 2007; Norazah 2014).

There are minimal studies on students' intention to engage with eco-campus environmental activities and green initiatives in Asian countries, including Malaysia, as compared to Western countries (Lee 2008). Indeed, currently there is no specific, significant information on students' intention to engage with eco-campus environmental activities and green initiatives, particularly in the Malaysian context. Hence, this study seeks to investigate the relationship between (a) personal willingness towards environmental activities, (b) attitudes towards personal responsibility, and (c) attitudes towards the faculty's responsibility for creating a sustainable environment, and intention to engage with eco-campus environmental activities and green initiatives.

This chapter is organized as follows: the next section provides a review of literature, followed by the methodology applied. The succeeding section provides results of the findings and the discussion while the final section presents conclusions drawn from the results, and summarizes the implications of the study with directions for future research.

2 Literature Review

2.1 Personal Willingness Towards Environmental Activities

University should provide ample infrastructure to facilitate green activities and also to initiate more opportunities for students to get involve with green campus initiatives (Kagawa 2007). Besides the tangible facilities, motivation is vital as students are also consumers. Thus, they addressed consumers' responsibility in several actions such as changing their purchasing habits, recycling, saving the energy and/or water, and using the public transportation to commute. Even though changing behaviour takes time, when the students have experienced themselves with environmental activities in the campus (i.e. electricity usage reduction, saving the water, recycling) they are more motivated and started making the changes with their own willingness—where in the future can become natural habits (Savageau 2013). Hence, the following hypothesis is posited:

H1: Personal willingness towards environmental activities positively affects students' intention to engage with eco-campus environmental activities and green initiatives.

2.2 Attitudes Towards the Faculty's Responsibility and Attitudes Towards Personal Responsibility for Creating a Sustainable Environment

Attitude is a set of beliefs, an evaluation of a certain action (Ajzen 1991). This study looked into two types of attitude: internal attitude and external attitude. The internal attitude is the individual's personal belief in environmental sustainability efforts. Meanwhile, external attitude is the individual's evaluation of others in trying to achieve environmental sustainability. Numerous studies have indicated that attitude is one of the most substantial factors in adolescent consumers (Kim and Choi 2005; Lee 2008; Norazah 2014; Wahid et al. 2011). Personal responsibility attitude refers to individuals' beliefs in their ecological-related actions such as recycling or energy saving behaviour. The key to strong belief in ecological behaviour is the individual's "autonomous motivation" which then becomes a positive motivation to support environment-related activities while being more responsible in daily consumption (Huffman et al. 2014). According to Fraj and Martinez (2007), some people have a tendency to resist changing their habits as they believe that the faculty or their organization should be taking the responsibility for preserving the environment rather than them. Based on the literature, this study proposed that:

H2: Attitudes towards personal responsibility for creating a sustainable environment positively affect students' intention to engage in eco-campus environmental and green initiatives.

H3: Attitudes towards faculty's responsibility for creating a sustainable environment positively affect students' intention to engage in eco-campus environmental and green initiatives.

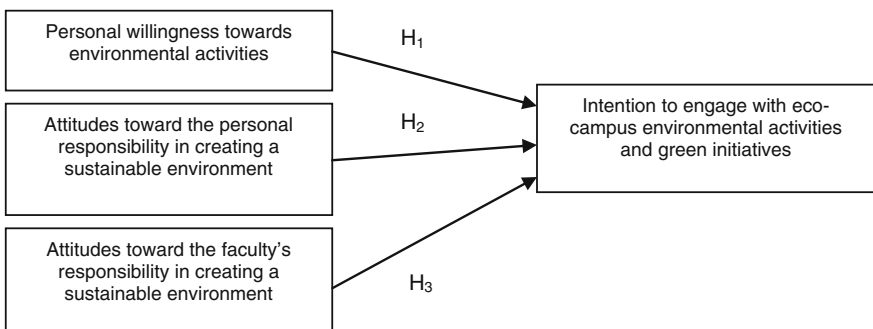Based on the above mentioned literature, the proposed theoretical framework is illustrated in Fig. 1.

Fig. 1 Proposed theoretical framework

3 Methods and Research Instruments

3.1 Sampling

The respondents for this study were students at Kota Kinabalu Campus, Labuan International Campus, and Sandakan Campus of Universiti Malaysia Sabah (UMS) using self-administered questionnaires. Students were chosen because they belong to Generation Y (born between 1978 and 1994) and tend to be more concerned about the green environment and influence their parents' purchasing decisions (Coddington 1993; Tulgan and Martin 2001). The interviewees' responses were coded to allow the data to be stored, retrieved, and analysed by computer. The total sample size of this study was 374 according to the Krejcie and Morgan (1970) formula based on the total population of UMS students that is 14,329. For a better representation of samples from each faculty in UMS, proportionate stratified random sampling was applied to ensure respondents represented their groups. This was achieved by taking equal percentages of samples from each faculty.

3.2 Questionnaire Development

The first part of the three-section questionnaire contained general demographic questions, while the second part comprised questions about respondents' frequency of recycling. The final part of the questionnaire included sixteen questions on the students' personal willingness towards environmental activities, attitudes towards personal responsibility and attitudes towards the faculty's responsibility for creating a sustainable environment, and intention to engage in eco-campus environmental activities and green initiatives. The measurement items were adapted from the following sources: personal willingness towards environmental activities: 3 items (Figueredo and Tsarenko 2013), attitudes towards personal responsibility in creating a sustainable environment: 3 items (Emanuel and Adams 2011), attitudes towards the faculty's responsibility for creating a sustainable environment: 7 items (Emanuel and Adams 2011), and intention to engage in eco-campus environmental activities and green initiatives: 3 items (Fielding et al. 2008). All the items were measured on five-point Likert scales, with responses ranging from "strongly disagree" to "strongly agree". All were fixed-alternative questions, which required the respondents to select from a predetermined set of responses.

3.3 Statistical Techniques Used

Statistical techniques were used to process the data using descriptive, correlation, factor analysis, and multiple regression analysis via the computer program Statistical Package for Social Sciences (SPSS) version 21. The reliability of the data collected was determined using Cronbach's Alpha analysis. Finally, multiple regression analysis was performed to investigate the relationships between the independent variables (i.e. personal willingness towards environmental activities,

attitudes towards the faculty's responsibility and attitudes towards personal responsibility in creating a sustainable environment), and the dependent variable (i.e. intention to engage in eco-campus environmental activities and green initiatives).

4 Results

Table 1 enumerates the frequency analysis of respondents' socio-demographic background. 374 respondents were involved in this study of which 66 % were female and 34 % male. They were mainly Malays between 20 and 22 years old. More than three-fourths of the participants were undergraduates undertaking degree programs (95 %), 4 % were postgraduates.

4.1 Frequency to Engage with Environmental Activities

Descriptive statistics on respondents' frequency to engage with environmental activities such as recycle at home, use recycled paper, use recycle bins, recycle plastic bottles, and use public transport, including energy conservation in the past one month are detailed in Table 2. A significant number of respondents (86 %) have recycled at home at least six times in the past one month, while 20 % have recycled more than six times in the past one month. With regards to frequency of using recycled paper in the campus, only 10 % have done it more than ten times in the past one month, 50 % 1–3 times, and 20 % 4–9 times in the past one month. More than three-quarters of the respondents (78 %) use recycle bins, and 64 % re-use plastic bottles 1–6 times in the campus in the past one month. A quarter of the respondents have participated in energy conservation (i.e. reducing electricity usage) in the campus 4–6 times, close to half of the respondents provided a response of 1.3 times, whereas the balance have been participated more than ten times in the past one month. In the campus, 31 % of students have used public

Table 1 Socio-demographic profile of respondents

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Gender			*Race*		
Male	128	34.2	Malay	169	45.2
Female	246	65.8	Chinese	51	13.6
Age (years old)			Indian	48	12.8
<19	122	32.6	Others	106	28.3
20–22	212	56.7	*Level of studies*		
23–25	28	7.5	Undergraduate	357	95.5
26–28	9	2.4	Postgraduate	17	4.5

Table 2 Frequency to engage with environmental activities

Items	1–3 times	4–6 times	7–9 times	10–12 times	>12 times
Frequency to perform recycling at home in the past one month	243 (65.0)	78 (20.9)	33 (8.8)	12 (3.2)	8 (2.1)
Frequency to use recycled papers in the campus in the past one month	185 (49.5)	108 (28.9)	45 (12.0)	19 (5.1)	17 (4.5)
Frequency to use the recycle bins to recycle in the campus in the past one month	179 (47.9)	112 (29.9)	43 (11.5)	14 (3.7)	26 (7.0)
Frequency to use the plastic bottles in the campus in the past one month	141 (37.7)	100 (26.7)	59 (15.8)	26 (7.0)	47 (12.6)
Frequency to involve in energy conservation (i.e. reducing the electricity usage) in the campus in the past one month	172 (46.0)	96 (25.7)	57 (15.2)	25 (6.7)	24 (6.4)
Frequency of using the public transport to campus in the past one month	151 (40.4)	56 (15.0)	26 (7.0)	24 (6.4)	117 (31.3)

Note Values in bracket refers to percentages

transport more than 12 times in the past one month, 28 % 4–12 times, 41 % less than three times in the past one month.

4.2 Factor Analysis of Willingness to Engage in Environmental Activities

Factor analysis of willingness to engage in environmental activities was run three items. This factor had eigenvalue of 2.147 and explained 71.555 % of the variance (see Table 3). The Kaiser-Meyer-Olkin was valued at 0.692 and the Bartlett's test score was significant ($\chi2 = 362.811$, $p < 0.01$). The anti-image correlation analysis and communalities for all items exceeded 0.5. Factor loadings for all items were

Table 3 Factor analysis of willingness to engage in environmental activities

Items	Factor loadings
I am interested to take part in environmental volunteer work	0.881
I am willing to participate in recycling program held for eco-campus	0.844
I think I should be a green representative for the green campaigns in my campus	0.812
Eigenvalue	2.147
Percentage of variance explained	71.555
Kaiser-Meyer-Olkin measure of sampling adequacy	0.692
Bartlett's test of sphericity	362.811
Significant	0.000

Table 4 Factor analysis of attitudes toward personal responsibility for sustainability

Items	Factor loadings
I will support and participate in my faculty's initiatives to protect the environment	0.889
I want to help to create a sustainable campus, community and world	0.883
Eigenvalue	1.651
Percentage of variance explained	55.048
Kaiser-Meyer-Olkin measure of sampling adequacy	0.513
Bartlett's test of sphericity	183.410
Significant	0.000

well above the acceptable level of 0.50, ranging between 0.812 and 0.881. The first referred to the statement 'I think I should be a green representative for the green campaigns in my campus', while the last appeared for the statement 'I am interested in taking part in environmental volunteer work'.

4.3 Factor Analysis of Attitudes Toward Personal Responsibility for Sustainability

Attitudes toward personal responsibility for sustainability comprised three items. Principal component analysis was used as an extraction method in this factor analysis with varimax rotation. Eigenvalue of this analysis was 1.651 and 55.048 percent of the total variance was explained. The Kaiser-Meyer-Olkin was valued at 0.513 and the Bartlett's test score was significant ($\chi^2 = 183.410$, $p < 0.01$). In the anti-image correlation analysis, communalities for all items measured more than 0.5. Out of the three items, an item like 'I will not support my faculty's actions to protect the environment' was discarded for not meeting the cut-off value of 0.50. Table 4 exhibits the additional two items had loadings ranging between 0.883 and 0.889 where the first appeared in the statement 'I want to help to create a sustainable campus, community and world', and respondents were positive about item 'I will support and participate in my faculty's initiatives to protect the environment'.

4.4 Factor Analysis of Attitudes Towards the Faculty's Responsibility for Sustainability

Factor analysis was carried out for attitudes towards the faculty's responsibility for sustainability, which consisted of seven items (see Table 5). Factor loadings revealed scores in the range of 0.692–0.789 which were above the recommended threshold point of 0.50. Empirical results noted that the statement 'I believe that everyone in my faculty should support sustainable solutions to environmental problems' (loading = 0.789) turned out to have the highest factor loadings, followed

Table 5 Factor analysis of attitudes towards the faculty's responsibility for sustainability

Items	Factor loadings
I believe that everyone in my faculty should support sustainable solutions to environmental problems	0.789
I believe that my faculty should make sustainability in campus planning, development, and day-to-day operations	0.777
I want to help to create a sustainable campus, community and world	0.776
I do believe that everyone in my faculty should have to support sustainable solutions to environmental problems	0.776
I do believe it is necessary for my faculty to include environmental education across the curriculum	0.711
I will support my faculty's actions to protect the environment	0.710
I will support and participate in my faculty's initiatives to protect the environment	0.692
Eigenvalue	3.916
Percentage of variance explained	55.949
Kaiser-Meyer-Olkin measure of sampling adequacy	0.851
Bartlett's test of sphericity	1162.018
Significant	0.000

by 'I believe that my faculty should ensure sustainability in campus planning, development, and day-to-day operations' (loading = 0.777), and 'I want to help to create a sustainable campus, community and world' (loading = 0.776). Respondents considered 'I will support and participate in my faculty's initiatives to protect the environment' as the least vital item in determining their attitudes towards the faculty's responsibility for sustainability with loadings = 0.692. Eigenvalue of this analysis was 3.916 and the percentage of variance explained was 55.949 %. The Kaiser-Meyer-Olkin was valued at 0.850 and the Bartlett's test of sphericity result was significant at 0.000. The anti-image correlation analysis and communalities for all items were higher than 0.5.

4.5 Reliability Analysis

Table 6 shows that all constructs were satisfied to the criteria of reliability with Cronbach's Alpha values of more than 0.70 (i.e. Cronbach's Alpha ranging from 0.762 to 0.868), signifying satisfactory reliability for the scale items measuring each construct.

Table 6 Reliability analysis

Variables	No. of items	No. of item deleted	Cronbach's alpha
Willingness to Engage in Environmental Activities (WEE)	3	–	0.797
Attitudes toward Personal Responsibility for Sustainability (APR)	3	1	0.762
Attitudes towards the Faculty's Responsibility for Sustainability (AFR)	7	–	0.868
Behavioural Intention towards Environmental Activities (BIT)	3	–	0.825

4.6 Correlation Analysis

Pearson correlation coefficients were computed to describe the strength and the association between two matrix constructs. Table 7 shows that all inter-construct correlations were below 1.00, significant and positively correlated at the $p < 0.05$ level, displaying a positive correlation array among matrix variables. Significance results show no multicollinearity problem exists in this research. With regards to association with students' intention to engage in eco-campus environmental activities and green initiatives, personal willingness towards environmental activities ($r = 0.287$, $p < 0.01$) turned out to have the strongest correlation coefficients.

Next, attitudes towards the faculty's responsibility in creating a sustainable environment ($r = 0.240$, $p < 0.01$) significantly correlated with students' intention to engage in eco-campus environmental activities and green initiatives. Last but not least, the study showed that attitudes towards personal responsibility in creating a sustainable environment had a significant and positive link with students' intention to engage in eco-campus environmental activities and green initiatives. Respondents mainly agree with and rated 4 = agree on two dominant factors namely, attitudes toward personal responsibility for sustainability (M = 4.051), and attitudes toward faculty's responsibility in creating a sustainable environment (M = 4.035).

Table 7 Inter-construct correlations

Variables	WEE	APR	AFR	BIT	Mean	SD	Skewness	Kurtosis
WEE	1.000				3.823	0.743	−0.127	−0.356
APR	0.489**	1.000			4.051	0.690	−0.356	−0.052
AFR	0.446**	0.528**	1.000		4.035	0.628	−0.542	0.260
BIT	0.287**	0.193**	0.240**	1.000	3.454	0.699	0.244	0.423

Notes **Correlation is significant at the 0.01 level (2-tailed); SD = Standard deviation

4.7 Relationships with Students' Intention to Engage in Eco-Campus Environmental Activities and Green Initiatives

In the regression model, the independent variables (i.e. personal willingness towards environmental activities, attitudes towards the faculty's responsibility and attitudes towards personal responsibility in creating a sustainable environment), and the dependent variable (i.e. intention to engage in eco-campus environmental activities and green initiatives) were entered. The explanatory power (R^2) of the predictor construct (i.e. intention to engage in eco-campus environmental activities and green initiatives) is 29 %, indicating that the model accounts for 29 % of the variance in the dependent variable. All independent variables have variance inflation factor (VIF) values ranging from 1.404 to 1.560 which is less than the cut-off point of 10, and tolerance values ranging from 0.641 to 0.712 which is above the threshold of 0.10, thus ensuring that multicollinearity is absent. The Durbin-Watson value was 1.924 (see Table 8), which was relatively near to 2, showing the independence of error term.

Figure 2 exhibits the normal probability plot (P–P) and the scatter plot of the model where no major deviations from norms exist, with most of the scores rectangularly distributed in the centre.

Table 8 details the unstandardized β-coefficient among the independent variables ranging from 0.015 to 0.207. The multiple regression equation is specified below:

Intention to engage in eco-campus environmental activities and green initiatives = 2.000 + 0.207 (personal willingness towards environmental activities) + 0.015 (attitudes towards personal responsibility in creating a sustainable environment) + 0.149 (attitudes towards the faculty's responsibility for creating a sustainable environment).

H1 postulated that personal willingness towards environmental activities positively affects students' intention to engage with eco-campus environmental activities and green initiatives. The study result, as available in Table 8, supports this assertion; the standardized beta coefficient is 0.220, t-value > 1.960, and $p < 0.05$.

Table 8 Relationships with students' intention to engage with eco-campus environmental activities and green initiatives

	Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	2.000	0.252		7.922	0.000	–	–
WEE	0.207	0.055	0.220*	3.767	0.000	0.712	1.404
APR	0.015	0.062	0.014	0.235	0.814	0.641	1.560
AFR	0.149	0.067	0.134*	2.236	0.026	0.675	1.481

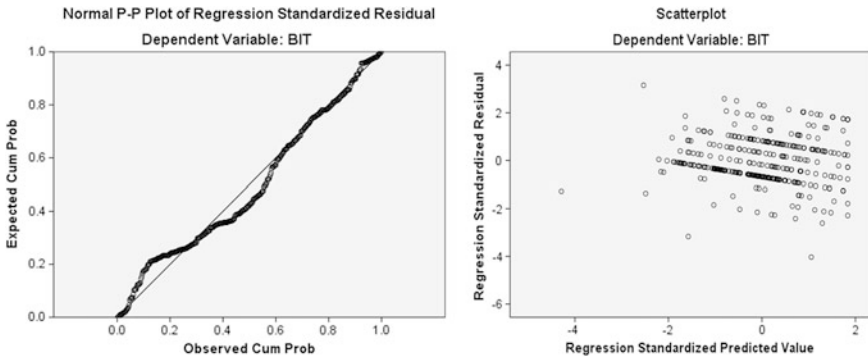*Notes* *Statistically significant at $p < 0.05$ (for t-value > 1.960); Durbin-Watson = 1.924

Fig. 2 Normal probability plot (P–P) and scatter plot

In H2, it is proposed that attitudes towards personal responsibility in creating a sustainable environment positively affect students' intention to engage in eco-campus environmental activities and green initiatives. However, the t-value < 1.960, infers the result does not support this hypothesis ($\beta_2 = 0.014$, t-value $= 0.235$, $p > 0.05$). Thus, H2 is not reinforced. The final hypothesis, H3 states that attitudes towards the faculty's responsibility for creating a sustainable environment positively affects students' intention to engage in eco-campus environmental activities and green initiatives. The result shows the standardized beta coefficient of 0.134 with t-value > 1.960 and $p < 0.05$, hence supporting H3.

5   Discussion

This study investigated the relationship between personal willingness towards environmental activities, attitudes towards personal responsibility and attitudes towards the faculties' responsibility for creating a sustainable environment, and intention to engage in eco-campus environmental activities and green initiatives. Empirical results of multiple regression analysis revealed that personal willingness towards environmental activities affects students' intention to engage in eco-campus environmental activities and green initiatives. Hence, H1 is supported. This factor was found to have the strongest effect. This result is comparable with prior findings (Savageau 2013). Students stated that they should be green representatives for the green campaigns in the campus. They are also interested in taking part in environmental volunteer work, and eco-campus environmental activities and green initiatives. Indeed, they are also willing to participate in recycling programs held for the eco-campus.

Next, the link between attitudes towards the personal responsibility for creating a sustainable environment and students' intention to engage with eco-campus environmental activities and green initiatives is executed in H2. Surprisingly, this hypothesis is not supported. Based on the exploratory factor analysis, students'

attitudes towards personal responsibility in creating a sustainable environment is positive when they state that they are willing to help the university management to create a sustainable campus, express positive support and participate in faculty's initiatives to protect the environment.

The final factor, attitudes toward the faculty's responsibility for creating a sustainable environment, is rated highly among students in impacting their intention to engage with eco-campus environmental activities and green initiatives. The strength of the connection between the two constructs provides evidence that attitudes towards the faculty's responsibility for creating a sustainable environment has a positive and significant influence on students' intention to engage with eco-campus environmental activities and green initiatives, signifying H3 is sustained. Students' rated agree on item 'I believe that everyone in my faculty should support sustainable solutions to environmental problems', followed by 'I believe that my faculty should ensure sustainability in campus planning, development, and day-to-day operations'. This significant finding coincides with prior studies such as Huffman et al. (2014), Lee (2008), Norazah (2014), Wahid et al. (2011).

6   Conclusion

The research provides a unique perspective of students' intention to engage in eco-campus environmental activities and green initiatives, which is not much covered in the literature in the Malaysia context. In terms of theoretical implications, the measurement produced can be used as a research tool for more exploratory and explanatory research regarding the impact of personal willingness towards environmental activities, attitudes toward personal responsibility and attitudes toward the faculty's responsibility in creating a sustainable environment, on students' intention to engage with eco-campus environmental activities and green initiatives.

In addition, results of the research study suggest that attitudes toward the faculty's responsibility in creating a sustainable environment are important discussion areas that may need further attention, beside aspects of personal willingness towards environmental activities. Hence, from managerial perspectives, university management should arouse students' intention to engage in eco-campus environmental activities and green initiatives so that everyone in the faculty should support sustainable solutions to environmental problems. It is crucial for university management to emphasize sustainability in campus planning, development, and day-to-day operations. Interestingly, the study confirms that students support and participate in the faculties' initiatives to protect the environment. It is also necessary for faculty to include environmental education across the curriculum. For instance, green marketing should be introduced in the faculty that offers business and management disciplines.

The sample in this study was only distributed among 374 students in a public university in Sabah, Malaysia, limiting the generalizability of the research findings. Therefore, enlargement of the sample is suggested in future research as different nationalities would present differing attributes of personal willingness towards environmental activities, attitudes towards personal responsibility and attitudes towards the faculties' responsibility for creating a sustainable environment, and intention to engage with eco-campus environmental activities and green initiatives. The results could be used for comparative purposes and to overcome the limits of generalizability in sample coverage.

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