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Using Principal Component Analysis to Develop the Perceived Solid Waste Management Practice Scale for Senior High School Students

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ABSTRACT. This study aimed to measure the levels of Solid Waste Management Practices (SWMP) of Senior High School (SHS) students using a non-experimental descriptive, explanatory cross-sectional survey design to identify which practices are exercised by the students and to assess their levels of SWMP. In addition, to explore the interrelationships of various components involved in SWMP, the Principal Component Analysis (PCA) was utilized to develop the measurement tool. Among the total of 518 participants, the initial data from 312 students were subjected to PCA where three principal components and fifty (50)-items were retained using the following criteria: KMO (0.964) and Bartlette's test of sphericity (0.000), Kaiser's eigenvalue criterion (λ>1.0), and the scree plot test. Three principal components were identified: Blended Environmental Activism and Citizenship (2.93), Private-Sphere Behavior (3.15), and Policy Adherence and Engagement (3.16), wherein the students demonstrated a moderate level of SWMP, both in general (3.03) and across the three components, while the Grade 12 students (3.10) were observed to have a slightly higher level of SWMP in comparison to Grade 11 students (2.89). The results show that the SWMP of the students in the selected institution did not completely conform to the initial four categories of pro-environmental actions according to the Value-Belief-Norm Theory (Stern, 2000). Although the institution's SWM policy could still be strengthened, these findings imply that the SHS students already have the basic foundation to apply proper SWM. Principal factor analysis and confirmatory factor analysis could be conducted to evaluate its applicability to other niches and participants.

KEYWORDS: *solid waste practices, Solid Waste Management, Principal Component Analysis, blended environmental activism and citizenship, private-sphere behavior, policy support, pro-environmental actions*

INTRODUCTION

Since the advent of the 20th century, much emphasis has been given to the issues of Climate Change and Global Warming. Along with this, nations across the globe have exerted effort in creating solutions for emerging environmental concerns. According to Kovarik (2012), the word "environmental" circumscribes different concerns which are all interrelated and have been developed throughout history. Issues and concerns about the environment have risen long before the book Silent Spring was written by Rachel Carson in 1962 or even before Greenpeace activists revolted against whales' captivity.

On a global scale, nations have implemented policies and conducted conventions worldwide to create avenues to promote a more eco-friendly way of living. The Kyoto Protocol, a treaty adopted on December 11, 1997, was one such step in achieving a greener Earth which aimed to provide an additional means of meeting each country's targets by using three-market-based mechanisms, namely, emissions trading, clean development mechanism, and joint implementation. (National Solid Waste Management Strategy, 2012-2016)

The world now produces more than a billion tons of garbage a year, which it incinerates and buries and exports and recycles. Barges in New York transport as much as 3,600 tons of waste down the Hudson River every day. Residents of the Netherlands, which has a sophisticated recycling system, throw away the equivalent of more than 400,000 loaves of bread per day, and residents of Jakarta refer to the Indonesian city's growing dump simply as "the Mountain." (Sieff, 2017)

In the Philippines, which is currently populated with 105,836,967 people (UN, 2018), solid waste is considered as an indicator of urbanization because cities often generate more waste compared to rural areas. Metro Manila alone generates almost a quarter of the country's total waste generation. (National Solid Waste Management Strategy, 2012-2016)

The Philippines has endeavored to improve its management and operation of solid waste through several national laws, rules, and regulations about the environment, and this includes resolutions and ordinances issued by local government units. The Republic Act (RA) 9003, more commonly known as the Ecological Solid Waste Management Act of 2000, was the beginning of the Philippines' more aggressive initiative in recognizing the hazards posed by

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improper solid waste management. RA 9003 was based on the management of waste in the following hierarchy: source reduction and minimization; reuse, recycling, and resource recovery of wastes at the barangay level; efficient collection, proper transfer, and transport of wastes; and efficient management of residuals and of final disposal sites. (National Solid Waste Management Strategy, 2012-2016)

However, according to Plaza and based on ADB's report, seventeen years later, after the implementation of the 2000 Ecological Solid Waste Management Act, the law's objectives are yet to be achieved. Cities are still dumping waste on open dumpsites, and in 2010, when all the open dumpsites should have been closed as mandated by the law, 790 were still operating. Three major constraints have been identified in the article: the "Not In My Back Yard" (NIMBY) attitude; financing and governance; and the ban on incineration, which has eliminated a viable alternative to landfilling. (Remo, 2017)

It took sixteen years after the implementation of the 2000 Solid Waste Management Act before several dumpsites in the Albay province have been ordered for closure. The Office of the Ombudsman ordered the mayors of five municipalities and one city to shut down their open dumps or face criminal and administrative charges. In a National Solid Waste Commission (NSWC) report cited by Inquirer (2016), it was noted that almost all 113 towns and cities in Bicol violated the law, except for Legazpi City. (Arguelles, M., 2016) Legazpi City is the only local government unit in Bicol that has a modern sanitary landfill facility in compliance with RA 9003. However, despite the city government's campaign of "No segregation, no collection," some Legazpeños still lump their garbage in one trash box while others just throw their trash anywhere. (Narito, F., 2011) This development proves that it took almost a decade before LGUs started strictly implementing RA 9003.

On a positive note, it is no longer just LGUs who are taking strict measures to follow the solid waste management act. The Department of Education (DepEd) has also been strengthening its support for the environmental programs of the country, programs that are also being applauded by the Department of Environment and Natural Resources (DENR).

DepEd established the Youth for Environment in Schools (YES) Organization in 2003 to help increase the youth's awareness in terms of the Philippines' ecology and environment and establish specific and doable programs, projects, and activities to address issues and concerns on the environment and ecology. (DepEd.gov.ph, 2003) The recent 2017 National Search for Sustainable and Eco-Friendly Schools is another environmental initiative organized by DepEd in partnership with several government agencies. The search was originally launched in 2009 and is proof of DepEd's continuous effort to strengthen its environmental advocacy and support for the government's ecological initiatives. (nir.EMB.gov.ph, 2016) These awards aim to recognize the schools that promote sustainable and eco-friendly practices, which will serve as incentives for both public and private institutions to continue their efforts in implementing sustainable and eco-friendly practices.

University of Santo Tomas - Legazpi (UST-Legazpi), the participating university for the study, recently garnered the Meralco Energy Leadership Award, Nestle Water Leadership Award, and 1st place in the Regional Level during the 2017 National Search for Sustainable and Eco-Friendly Schools. Furthermore, it is located in a city that strictly implements the 'No Segregation, No Collection' and 'No Plastic' policies across all barangays, including private households and public establishments.

With the aforementioned concerns in terms of the solid waste management systems implemented at the global, national and regional level, this study was brought forward for the purpose of determining the students' level of solid waste management practice using a developed measurement tool. Since institutions are in charge of developing the younger members of society, it is in these formative years that students should be taught how to properly care for the environment. This research supports the University's aim in promoting eco-friendly practices and advocacies, as it specifically envisions to become a center in Bicol studies, environmental protection, disaster risk management, and preparedness. (UST-Legazpi Vision, 2018)

The study aimed to measure the levels of Solid Waste Management practices (SWMP) of Senior High School (SHS) students at the University of Santo Tomas – Legazpi using a developed measurement tool. Specifically, the study also identified the SWMP of SHS in the selected University; explored the underlying components of SWMP using Principal Component Analysis; developed a measurement tool to assess the levels of SWMP; and assess the levels of SWMP of SHS students using the developed measurement tool.

The study focused on creating a measurement tool for Solid Waste Management practices, specifically measuring the waste segregation practices among the Senior High School students of UST-Legazpi batch 2017-2018. The principles and components behind these practices were also assessed to determine which practices are relevant and evident in a local school setting.

The survey questionnaire used for the study was created by the researcher based on the common

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practices discussed in several related studies and literature indicated in Appendix D. The final measurement tool was generated, and the identified components were extracted based on the results of the Principal Component Analysis. The key respondents were the Senior High School students of UST-Legazpi. Three hundred twelve (312) students from batch SY 2017-2018 took the initial 60-item survey questionnaire, and 218 students from batch 2018-2019 answered the 50-item final measurement tool as a result of the PCA from the initial data gathering. The study was limited to solid waste management practices among senior high school students based on the school's policy for waste segregation. Likewise, the results of the study were based on the students' responses to the survey questionnaire administered as the basis for the measurement tool.

The study was limited to the students' actual practice in terms of solid waste management methods as manifested in the school's waste segregation policy, likewise determining if the institution's policies on waste disposal are being observed by the students or not. The relationship of the components was also identified using a correlation to expound on the definitions of identified components in the context of the study; however, explaining the fundamental causes of the relationship is beyond the scope of the study.

Conclusions from factor analysis techniques, like Principal Component Analysis, are restricted to the sample collected, and generalization of the results can be achieved only if analysis using different samples in different settings would reveal the same results. Additionally, the study only aimed to utilize the results of the tests to determine whether underlying components could be derived from the students' behavior or not. Pre-tests and post-tests results were not used as the study is only limited to the tool construction component with no intervention introduced to observe behavior changes.

In terms of the limitations of correlation analysis, the strength and direction of a linear relationship can be determined; however, it cannot determine which variable affects which variable and why such a linear relationship exists among the variables.

FRAMEWORK OF THE STUDY

Theoretical Framework

The Value-Belief-Norm theory links value theory, norm-activation theory, and the New Environmental Paradigm (NEP) perspective through a causal chain of five variables leading to behavior: personal values, ecological worldview, adverse consequences for valued objects, perceived ability to reduce the threat, and personal norms for pro-environmental action. The causal chain moves from relatively stable, central elements of personality and belief structure to more focused beliefs about human-environment relations, their consequences, and the individual's responsibility for taking corrective action. Each variable in the chain directly affects the next and may also directly affect variables farther down the chain. The link from values to environmentalism is mediated by particular beliefs, such as beliefs about which kinds of people or things are affected by environmental conditions and about whether there are individual actions that could alleviate threats to valued persons or things. (Stern, 2000)

The Value-Belief-Norm theory deals with the individual choices that a person makes, which then eventually results in pro-environmental action. According to Stern (2000), actions may be driven by personal norms, and this is a person's internal sense of obligation to act in a certain manner. These personal norms are often triggered when the individual believes that once these norms are violated, there will be negative effects on things that they deem important and that by acting accordingly, they will consider him/herself responsible for the consequences.

In the context of solid waste management and segregation, a student may be driven to follow the school cafeteria's policy of 'Clean As You Go' if this policy is in sync with what they believe in as proper and ethical, and that by violating this policy, they are going against their own belief systems and they are accepting the consequences of their actions. The present study was anchored on the Value-Belief-Norm theory, as it aimed to explore the underlying dimensions of pro-environmental actions in the form of solid waste management practices, and this could provide more insights as to how policy implementation can be measured within an institution and how it can still be improved and developed.

Conceptual Framework

Environmentally significant behavior can be defined in two ways: first, it can reasonably be defined by its impact: the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere itself; and second, from the actor's standpoint as behavior that is undertaken with the intention to change the environment. (Stern, 2000)

The aims of the present study, which was to assess if the students properly followed the school's solid waste segregation policy and to explore if their actions have corresponding underlying dimensions, were more directly associated with Stern's second definition of pro-environmental action as the students' behaviors were observed and the categories of their

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actions were explored which highlighted their intents and views about solid waste management.

Environmentally significant behavior, as discussed by Stern (2000), was explored in terms of the solid waste management practices observed and practiced by the respondents of the study. There are four underlying concepts that are used as themes in constructing the measurement tool for the present study. Based on his theory, pro-environmental actions may be categorized into the following themes: environmental activism, environmental citizenship, policy support, and private-sphere behavior, and these four categories were used as the initial components in developing the measurement tool for the present study.

Stern (2000) defines committed "Environmental Activism" as the active involvement, including the process of recruitment, in environmental organizations and demonstrations. It extends to include a set of environmental behaviors which could span from environmental group membership, involvement in political action and/or in environmental organizations, influencing policy or management decisions, and engaging in pro-environmental protection behaviors. (Paco and Rodrigues, 2016)

The second theme, "Environmental Citizenship," refers to non-activist public sphere behaviors and practices wherein individuals petition for environmental issues or join or contribute to environmental organizations (Stern, 2000). It can also be defined as "the relationship between individuals and common goods" where citizens participate in a continuous process of defining what sustainability really means. (Dobson & Bell's, 2006)

"Policy Support" is another public sphere behavior that mainly focuses on the support for environmental public policies and movement objectives which includes, but are not limited to, willingness to spend more in taxes to support environmental protection and stated approval of various environmental rules and regulations. (Stern, 2000) Antecedents and factors of policy support are important not only in choosing the most appropriate measure but also in developing and constructing new measures. (Harring, Jagers & Matti, 2017)

The fourth theme, "Private-Sphere Behavior," is the activities that are often conducted individually, like the purchase, use, and disposal of personal and household products that have an impact on the environment, no matter how small Stern (, 2000). Avoidance of purchasing certain products for environmental reasons, choosing between saving or re-using water, reduction of energy or fuel usage at home, limiting usage of private vehicles, and sorting of tins/plastics/newspapers for recycling are some examples of activities included in this fourth category. (Butkeviciene, 2017)

The first three themes are all considered as public sphere behaviors as these are actions that are mostly observed in public places, events, or gatherings or whenever an audience might be present. The last theme, private-sphere behavior, includes actions that are mostly conducted individually, either in their private households or without the presence of an audience.

The Value-Belief-Norm theory, as discussed by Stern (2000), deals with the individual choices that a person makes, which then eventually results in pro-environmental action. Practicing proper solid waste management behaviors is a pro-environmental action that is often guided by personal norms which are considered important by an individual as it is often associated with a responsibility for consequences once it is unfollowed; thus, Stern's (2000) categories for environmentally significant behaviors may be used to guide the levels of solid waste management practices of students as it is comparable to how pro-environmental actions are observed in individual choices. The relationship of these four components in terms of their relation to Solid Waste Management Practices is indicated in Figure 1.

Figure 1. Different pro-environmental actions as applied to Solid Waste Management practices

METHODOLOGY

Research Design

A quantitative non-experimental descriptive, explanatory cross-sectional survey design was used for the study. As a quantitative non-experimental descriptive study, no interventions were introduced to manipulate the variables in the study, and the components and the underlying principles that support the solid waste management practices were characterized using quantitative data. The explanatory research design was utilized to explain the association between the different components of solid waste management practices. As a cross-sectional survey design, quantitative data was gathered in a short amount of time using a survey questionnaire which

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was developed using the categories of pro-environmental actions as a framework for the underlying concepts behind solid waste management practices. This study also used a multivariate design, specifically the principal component analysis design, in order to explain the interrelationships of the various components of environmental practices as observed using the developed measurement tool.

Research Locale and Participants

The study was conducted at the University of Santo Tomas - Legazpi (UST - Legazpi) in Rawis, Legazpi City. The initial key respondents were the 312 Grade-11 and Grade-12 students taken from the combined 456 Grade-11 students and the 398 Grade-12 students from SY 2017-2018. The researcher used a simple random sampling method in choosing the initial respondents.

Table 1. Number of Senior High School student participants for initial data gathering

Grade Level	No. of Students	Total Population of SHS	No. of Respon-dents Required	Actual No. of Respon-dents
11	456	854	272	148
12	398			164
		TOTAL		312

Using the Slovin's formula with a 95% confidence level and 5% margin of error, 272 respondents would suffice to represent the total of 854 Grade-11 and Grade-12 Senior High School students from batch SY 2017-2018. The 312 initial respondents who took the survey were sufficient in representing the Senior High School students in the institution and were also sufficient for the 300 required number of respondents for PCA (Pallant, 2001). Slovin's formula was used for the study because the researcher had no preconceived ideas about the participants' behavior (Ellen, 2020) in terms of the initial identified principal components.

Another set of respondents were asked to answer the final 50-item survey questionnaire, which was composed of 218 SHS students chosen using convenience sampling. Convenience sampling was used due to regular class schedule constraints and to consider the availability of the respondents during the last few weeks of classes in SY 2018-2019. The second set of participants who responded to the final 50-item survey questionnaire were composed of 70 Grade 11 students and 148 Grade 12 students, which were not members of the initial population.

Data Gathering Procedure

The four categories of pro-environmental actions, according to Stern (2000), were used as the themes in creating the initial measurement tool, namely, Environmental Citizenship, Environmental Activism, Policy Support, and Private Sphere Behavior. These four categories for environmentally significant actions were used in determining the components of the measurement tool.

Prior to the administration of the survey, permission was sought, and it was coordinated with the Office of Research and the Senior High School Department to avoid conflict of schedules in the school's calendar and interruption of formal classes. The researcher personally facilitated the survey administration to ensure 100% retrieval of the data, and both parental and personal consent was sought from the respondents.

Within a two-week time frame, the students answered the initial 60-item test questionnaire using the school's intranet educational resources management system, and the data was retrieved, organized, tabulated, and analyzed using the SPSS software (ver. 17). The data from the initial 312 respondents were then analyzed using Principal Component Analysis (PCA), and the results of the factor extraction and rotation, which was further discussed in the Research Instrument and Data Analysis portion of this chapter, showed that 10 items could be extracted and three components should be retained which resulted to the final 50-item survey questionnaire. This developed measurement tool, as a result of the PCA, was used to conduct another set of the survey to 218 SHS students from batch SY 2018-2019.

The researcher developed the instrument based on the categories of environmental actions identified in the Value-Belief-Norm Theory by Paul C. Stern (2000). The environmental concepts used for the questionnaire items, specifically Solid Waste Management practices, were retrieved and collected from the related studies and literature discussed in Chapter 2 of the study. The sources of the initial 105 items were cited in Appendix A.

To address the validity of the test, the first draft of the instrument (105 items) was subjected to an initial assessment by the researcher's adviser. This draft was then content validated and assessed for readability, vocabulary, and grammar by an expert in the field of environmental science, which reduced the test questions to 60 items. The 60 questions were further developed based on the following principles: Environmental Activism; Environmental Citizenship; Policy Support; and Private Sphere Behavior. Each principle was represented by 15 practices that are

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appropriate for Senior High School students, and each item can be answered using a five-point Likert scale to measure the frequency of how often the students practice proper solid waste management. To address the reliability of the test, pilot testing in two sections of Grade 11 students was also conducted. The Cronbach alpha of the pilot test was 0.991, which indicated that the test has excellent internal consistency.

The initial data was then analyzed using Principal Component Analysis, and based on the results of the factor extraction and rotation, three principal components were extracted, and 50 questionnaire items were retained for the final measurement tool. Using the 50-item survey questionnaire, 218 Senior High School students were asked to answer the final questions, and the results of the 50-item survey questionnaire were also subjected to reliability testing, which showed a Cronbach alpha of 0.956, indicating that the test still had excellent internal consistency.

The results of the second survey were interpreted using this scale of interpretation as observed in the scores obtained by the students in the SWMP test: 1.0 – 1.5 (Very low level); 1.6 – 2.5 (Low level); 2.6 – 3.5 (Moderate level); 3.6 – 4.5 (High level); 4.6 – 5.0 (Very High level).

The Solid Waste Management Practice (SWMP) Survey Questionnaire was developed to identify the SHS students' levels of SWMP in terms of the school's SWM policy based on the three subscales identified from the reduced three components using PCA, namely, Blended Environmental Activism and Citizenship, Private-Sphere Behavior, and Policy Adherence and Engagement. Examples of items included in the five-Likert scale test are: *I encourage my peer groups to practice Reduce, Reuse, Recycle (3Rs); I help pick up pieces of trash after events in the community; I support the development of an environmental policy of my school; I reuse and recycle paper and old notebooks; I carry eco-bags when shopping.*

Data Analysis

The initial data from the first 312 respondents were subjected to Principal Component Analysis (PCA) before the underlying dimensions of the data were identified. A preliminary assessment of the suitability of the data was conducted to evaluate whether the data was appropriate for PCA using the following criteria: KMO and Bartlett's Test of Sphericity, Kaiser's Eigenvalue criterion, and Scree test.

The initial data was subjected to factor extraction, and the preliminary data's suitability was assessed based on the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which requires at least a measure of 0.600 for the data to be considered good for Principal Component Analysis (Kaiser, 1960). The Bartlett's Test of Sphericity was also taken into consideration which requires that the significance levels should be less than 0.05 ($p < 0.05$). (Bartlett, 1954).

During factor extraction, the initial eigenvalues of the data were also assessed, which represents the amount of total variance explained by a particular factor or component. (Field, 2013)

According to Kaiser (1960), only factors or components with an eigenvalue of 1.0 or more should be retained for further investigation. Another extraction criterion was taken into consideration during the initial assessment of the data, which was the scree test method. The scree plot shows the number of components to be retained based on the most obvious point of inflection, or break, in the plot. (Field, 2013)

To ensure that the number of components to be retained was as accurate as possible, three trial runs were conducted using PCA with the corresponding number of components for each trial: first trial – two components, second trial – three components, third trial – four components. Once the number of components was identified, two more trial runs were conducted with each different trial using a different type of rotation to compare the results of the analysis and identify which rotation was more appropriate for the existing data. In theory, Direct Oblimin Oblique rotation is most commonly used when the initially identified components are related to each other, whereas Varimax Orthogonal rotations are more applicable for components or factors that are independent of each other (Pallant, 2001).

After both factor extraction and rotation were conducted, the pattern matrix was examined, which helped in identifying which items can be retained and used for the final measurement tool. Only items with the highest factor loadings, beginning from a cut-off of .500, were retained for the final survey questionnaire. The .500/.200 rule was used for the study, where an item is retained if its primary loading is greater than .500-.600 and also if its second-highest factor loading is smaller than .200-.300. (Matsunaga, 2010) The factor loadings shown in the rotated pattern matrix were examined to identify and name the underlying dimensionality of the original set of variables and to compute the factor scores. (Polit and Beck, 2004)

The developed 50-item survey questionnaire was then used to gather a new set of data for analysis. The results from the second survey from 218 SHS respondents were analyzed using the Mean of the test scores to identify the most and least commonly exercised Solid Waste Management practices

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(SWMP) of the SHS students. The mean indicated the average score of the students in specific practice and the overall average of the students in terms of their levels of SWMP. An independent samples T-test was also used to compare the mean score of the Grade 11 students from the mean score of the Grade 12 students and to identify whether there is a statistically significant difference between the two groups in terms of their levels in SWMP.

The mean scores of the SHS students were also grouped using the identified three principal components. This was then computed and subjected to a Correlation analysis to assess whether there is an existing relationship among the three principal components and to describe the strength and direction of the linear relationship.

RESULTS AND DISCUSSION

Profile of Respondents

A total of 312 Senior High School (SHS) students took the initial survey, which was administered in a two-week timeframe. The initial 312 respondents, which were determined using random sampling, answered the 60-item survey questionnaire to identify the Solid Waste Management Practices (SWMP) of the SHS students in the institution.

The second set of respondents, which were composed of 218 students, was determined using convenience sampling, and they were asked to answer the 50-item developed measurement tool using Principal Component Analysis (PCA) to assess their levels of SWMP. The socio-demographic profiles and categories per STRAND of the students were not taken into consideration during the selection process as the respondents who took the surveys were randomly composed of the following STRANDS: Science, Technology, Mathematics and Engineering (STEM), Accountancy, Business and Management (ABM), Humanities and Social Sciences (HUMSS), General Academics (GAS), and Arts and Design.

Solid Waste Management Practices of Senior High School Students

This study primarily aimed to explore the levels of SWMP of SHS students using a developed measurement tool. The first question that the study sought to answer was "What are the Solid Waste Management Practices of Senior High School students in the University of Santo Tomas - Legazpi"? This was confirmed based on their total average scores using the initial 60-item survey questionnaires, which were used to develop the measurement tool using PCA on the initial data.

Using the preliminary 60 items for the developed SWMP measurement tool, the 15 most and least practiced solid waste management practices were identified by analyzing the initial data using the mean *(M)* of the test scores of the students. The top 15 practices (Appendix H) were highlighted because these were the practices that the students seem to practice more often, as high levels of practice were observed for each item. Throwing trash into the appropriate trash bin (3.98), reusing plastic/paper bags in supermarket purchases (3.90), carrying eco-bags when shopping (3.81), reusing and recycling paper and old notebooks (3.81), and asking myself whether they need the product before purchasing it (3.79) are the top five most solid waste management practices of the students. These were followed by following Legazpi city's 'no segregation no collection' policy (3.16), using public transportation or carpools instead of driving alone (3.74), following the school's policy on waste segregation (3.74), bringing a water bottle to school (3.74), and supporting school leaders who promote proper waste segregation (3.72). The remaining top 11-15 practices were enumerated in Appendix H.

Throwing trash into the appropriate trash bin (3.98), reusing plastic/paper bags in supermarket purchases (3.90), carrying eco-bags when shopping (3.81), reusing and recycling paper and old notebooks (3.81), and asking myself whether they need the product before purchasing it (3.79) are the top five most solid waste management practices of the students. These were followed by following Legazpi city's 'no segregation no collection' policy (3.16), using public transportation or car pools instead of driving alone (3.74), following the school's policy on waste segregation (3.74), bringing a water bottle to school (3.74), and supporting school leaders who promote proper waste segregation (3.72). The remaining top 11-15 practices were enumerated in Table 2.

In comparison to the results of previous studies, Mukama, et al. (2016) identified that respondents expressed a high willingness to separate their garbage and compost their biodegradables. A study by Gequinto (2016) also showed that the most practiced SWMP is the promotion of Reuse, Reduce, Recycle (3Rs), whereas, in the study of Ramos and Pecajas (2016), though SWMPs were moderately and fairly practiced, the most common method observed was the open burning for disposal of paper and carton wastes. A study by Bolaños (2011) also perceived that trainings, seminars, and workshops conducted by the school are significant activities in terms of solid waste management implementation, the celebration of the Environment Awareness Month and the school's Youth for the Environment organization were also highlights of the school's practices. The majority of the previous studies used a different categorization for

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SWMP, which was in terms of waste segregation, collection, storage, processing, and disposal. The categories used for the initial survey of the present study were based on the pro-environmental categories: environmental activism, environmental citizenship, policy support, and private-sphere behavior.

Throwing trash into the appropriate trash bin was observed to be the most commonly practiced SWMP. This implied that students were aware of the different categories of solid wastes and that these should be taken into consideration before each type of waste is disposed of. This could mean that disseminating more advanced information about waste disposal and encouraging students to continue their good habits in waste disposal could result in improvements in the overall level of SWMP in the institution.

It was also observed that the majority of the students, for the second and third most commonly practiced SWMP, reuse plastic or paper bags for supermarket purchases or they make it a habit to carry eco-bags when they are shopping, which means that students are not just aware of the 'No Plastic' policy being implemented in the city, but they also follow the said policy. One implication of this will be the potential acceptance and compliance of students if the school has intentions of strictly implementing this policy within the university which would include all food and supply purchases in the school concessionaires.

The results have shown that the students' fourth most practiced SWMP was reusing and recycling paper and old notebooks. This implied that the majority of the students' compliance to the SWM policy of the school might not only be driven by fear of consequences when rules are not followed but it could also be driven either by financial literacy and practicality or by a genuine innate sense of helping the environment. Lastly, the observed fifth most commonly practiced SWMP of the SHS students was asking themselves if they really need the product first before buying it. This showed that the majority of the students have a certain level of self-awareness when it comes to purchasing products. This could both be the result of having a high level of financial literacy or making sure that they contribute fewer wastes or unnecessary accumulated products to the environment.

The top five least practiced solid waste management practices among the senior high school students are: Joining poetry reading events that tackle environmental issues (2.56), joining debates that tackle environmental issues (2.63), donating financially to environmental youth groups in school (2.68), attending seminar-workshops about environmental protection in the community (2.71), and participating in environmental youth camps in the community (2.72).

These are followed by joining youth environmental groups in the community (2.73), joining online forums that tackle environmental issues (2.79), writing articles and poems about the environment (2.89), joining environmental signature campaigns in the community (2.90), and wearing shirts that boldly promote eco-friendly logos and prints (2.91). The remaining least practiced solid waste management practices among SHS are enumerated in Appendix I.

In relation to previous studies, the study by Mukama, et al. (2016) has shown that even though the respondents have expressed a high willingness to participate in waste separation and composting, the data collected showed that practices in waste disposal and separation were still poorly exercised. In the study by Gequinto (2016), the results have shown that waste recycling and waste treatment were the least practiced SWMP in the selected universities and colleges in CALABARZON. A different categorization for SWMP was used (waste segregation, collection, storage, processing, and disposal), which was different from the categories used for the initial survey of the present study (environmental activism, environmental citizenship, policy support, and private-sphere behavior).

While the students have shown that they are capable of practicing proper SWMP, the results of the initial survey have also highlighted practices that are least followed by the SHS students. Joining poetry reading events and debates that tackle environmental issues was determined as the least practiced SWMP. This could imply that students are not fond of participating in public poetry reading events and debates, especially events that are related to environmental issues. It could also be due to the fact that events such as these are limited, and there is not enough opportunity for students to join such activities.

Donating financially to environmental youth groups in the school is also another least practiced SWMP by the students. This could mean that students are either not given enough opportunity to willingly help environmental youth groups in terms of finances or that charity works are not deemed as part of their priorities in terms of school expenses. The same implications could also be true to the other least practiced SWMP. There could be very little to no opportunity for SHS students to attend seminar-workshops about environmental protection or participate in environmental youth camps in their community, or such practices could be deemed as not part of their priority tasks on top of all the other projects they have in school.

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The students mostly follow the basic principles in terms of proper solid waste management (e.g., throwing trash into the appropriate trash bin, not littering carelessly, etc.) because it is also mandated by the 'No Segregation, No Collection' and the 'No Plastic' policies being implemented in the city where they live in. However, the institution is yet to define a properly structured SWM policy where each process is indicated in a clear and concise manner, and the consequences for not following the policy are also defined. A well-defined and properly structured SWM policy could improve the levels of SWMP not just of the SHS students in general but of all the members of the institution.

Underlying dimensionality of solid waste management practices of SHS students

The underlying dimensionality of the Solid Waste Management Practices (SWMP) of the Senior High School (SHS) students was explored by subjecting the initial data from the 312 SHS students who took the preliminary 60-item survey questionnaire to a PCA. Before factor extraction and rotation were conducted, the suitability of the data was initially assessed using the following criteria: KMO and Bartlett's Test of Sphericity, Kaiser's Eigenvalue criterion, and Scree test. The results of the assessment of the sampling adequacy using KMO and Bartlett's Test of Sphericity were indicated in Table 4.

Table 4. KMO and Bartlett's Test of initial data

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.964
Bartlett's Test of Sphericity	Sig.	.000

The initial data was subjected to factor extraction, and it was observed that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, 0.964, was interpreted as 'marvelous' or adequate for the chosen data analysis, with 0.600 being considered as a good standard (Kaiser, 1960). Bartlett's Test of Sphericity indicated that the data was also considered appropriate for PCA with 0.000 significance levels ($p < 0.05$). (Bartlett, 1954)

Initially, seven components were observed to be potential components for extraction if Kaiser's (1960) criterion was to be followed, where only components with an eigenvalue of 1.0 or more should be retained for further investigation. The initial extraction showed that there could be seven components that could be retained for further investigation of the data and that the seven components accounted for 72% of the cumulative variance of the extraction sums of squared loadings among the initial 60 components. (Appendix E)

To ensure that the number of components for extraction was accurate, the data was also assessed using the Scree plot (Appendix F) from the initial PCA results, which indicated that based on the points of inflection, either two, three, or four components could be retained. Three trial runs were conducted with the corresponding number of components for each trial: first trial – two components, second trial – three components, third trial – four components. The second trial, where three components were extracted, was observed to be the most accurate because there was a lesser number of cross-loading items across the three principal components (Matsunaga, 2010) in comparison to the pattern matrix from the first and third trials. The pattern matrix of the second trial, where three components were extracted, was shown in Appendix G.

The data were then subjected to two more trial runs, wherein each different trial, a different type of rotation was used to identify which type of rotation was more appropriate for the existing data. Direct Oblimin Oblique rotation was then found to be the more appropriate type of rotation for the existing data since the four initial components used as a guide in constructing the survey questionnaire items are related to each other and cannot be considered as independent from each other, which is the main purpose of using the said rotation. (Pallant, 2001)

Table 5. Table of total variance explained from PCA results from Trial 2 (3 Components)

Components	**Initial Eigenvalues**			**Rotation Sums of Squared Loadings**
	Total	**% of Variance**	**Cumulative %**	**Total**
1	30.407	50.678	50.678	26.797
2	5.035	8.392	59.070	16.942
3	2.422	4.037	63.107	18.113

After extraction and rotation, the results indicated that the extracted three principal components explained a total of 63.107% of the cumulative variance (Table 5). The first principal component explained 50.678% of the total variance of the eigenvalues, wherein the second component explained 8.392% of the total variance, and the third component explained 4.037% of the total variance.

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The eigenvalues of the components after rotation were also displayed, and this indicated that the rotation optimized the component structure, which equalized the relative importance of the three components. Before rotation, principal component one accounted for considerably more variance than the other two components (50.678% compared to 8.392% and 4.037%), but after rotation, principal component one accounted for 26.797% of variance compared to 16.942% and 18.113%.

The underlying dimensions of solid waste management practices among Senior High School students were then identified, and the analysis resulted in three broad condensed variables or components: 1. Blended environmental activism and citizenship; 2. Private-sphere behavior; 3. Policy adherence and engagement.

The first dimension observed in the solid waste management practices of Senior High School students is the Blended Environmental Activism and Citizenship, which pertains to the committed or active involvement in environmental organizations and demonstrations and participating in petitions for environmental issues or joining or contributing to environmental organizations. This showed that activism and citizenship were not distinguishable in the solid waste management practices of the SHS students.

This was exemplified by the items with high factor loadings in Principal Component (PC) 1, such as: attending seminar workshops about environmental protection in the community, joining debates that tackle environmental issues, joining poetry reading events that tackle the environmental issue, joining youth environmental groups in the community, participating in environmental youth camps in the community. These practices were initially categorized separately under the Environmental Activism and Environmental Citizenship pro-environmental categories, according to Stern (2000).

The second dimension of solid waste management practices of the SHS students is Private-Sphere Behavior or individual actions that pertain to the purchase, use, and disposal of personal and household products that have environmental impacts. Examples of items with high factor loadings in this dimension are: carrying eco-bags when shopping, reusing plastic/paper bags in supermarket purchases, refusing bags from small purchases, asking first if the product is needed before buying it, and buying supermarket products packaged in recycled paper. These practices are consistent with the Private-Sphere Behavior pro-environmental category discussed in Stern's (2000) Value-Belief Norm theory,

The third dimension observed in the solid waste management practices of the students is Policy Adherence and Engagement, or the non-activist behavior that focused mainly on the support of environmental movement objectives and acceptance of public policies. Practices with high factor loadings under this dimension are: supporting school leaders who promote proper waste segregation, asking school officers about their plans for the environment, asking barangay youth officials about their plans for the environment, taking note of new environmental policies announced during school events, and supporting the development of environmental policy in school. Based on the initial framework, this pro-environmental category was initially labeled as Policy Support; however, after further analysis of the practices with high factor loadings under this component, Policy Adherence and Engagement was a more appropriate label because the SHS students as the respondents for this study initiated proactive actions to support and study the new environmental policies in addition to the standard compliance required of individuals who passively exercise Policy Support practices.

The majority of the reviewed studies identified the relationship of socio-demographic profiles to various variables such as awareness, knowledge, attitudes, and practice. As a new study, the present study identified practices of SHS students and explored the underlying dimensions of SWMP using Stern's (2000) categories of pro-environmental actions as a guide, which was reconstructed to three existing dimensions or components based on the PCA results.

Developed Measurement Tool

The first draft of the questionnaire was composed of 105 items which were initially categorized according to the principles identified in Stern's VBN Theory: Environmental Activism; Environmental Citizenship; Policy Support; and Private Sphere Behavior. After conducting the PCA, the initial four subscales from the four categories of pro-environmental actions were reduced to three, which was based on the extracted three Principal Components (PC), namely, blended environmental activism and citizenship private-sphere behavior, and policy adherence and engagement.

Items were then discarded using the .500/.200 rule (Matsunaga, 2010), which indicated that items with factor loadings that are lower than .500 should no longer be included in the final measurement tool. Based on this criterion, 10 items were discarded from the initial survey questionnaire, and 50 items were retained for the final measurement tool. The Solid Waste Management Practice (SWMP) Survey Questionnaire was developed to identify if SHS students are properly practicing the school's SWM policy and to assess their levels of SWMP based on the

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three subscales identified from the reduced three components using PCA. The complete 50-item developed final survey questionnaire was included in Appendix C.

The studies of Megersa (2018), Guerrero, Maas, and Hogland (2012), Pelletier et al. (1998), and Pai, Tung, Lin, Lin, Chan, Lin (2017) also utilized Principal Component Analysis (PCA) to determine factors and edit a previously developed measurement tool. Both Megersa (2018) and Guerrero, Maas, and Hogland (2012) used PCA to identify factors that could influence effective SWM. Pai, Tung, Lin, Lin, Chan, Lin (2017) edited a constructed measurement tool and evaluated the outcome measurement survey for the course Science, Technology and Society (STS) whereas Pelletier, et.al. (1998) used PCA to construct and validate the Motivation Towards the Environment Scale (MTES) using the different forms of motivation identified by Deci and Ryan as subscales for the measurement tool.

The present study is a new study that attempted to construct a measurement tool for SWMP using Stern's (2000) categories of pro-environmental actions from his Value-Belief Norm (VBN) Theory as a guide, which further explored the underlying dimensions of SWMP of students using VBN as the theoretical framework resulting in three identified underlying dimensions.

Level of Solid Waste Management Practices among Senior High School students using the developed measurement tool

The final 50-item developed measurement tool was used to measure the levels of SWMP of the SHS students based on the Mean (M) of the test results.

Table 6. Level of solid waste management practices of SHS students

Respondents	N	*M*	Interpretation
Grade 11	70	2.89	Moderate
Grade 12	148	3.10	Moderate
TOTAL	218	3.03	Moderate

Note: *t* Critical > *t* Stat = 1.98 > -2.10, *p* = 0.04

The results in Table 6 showed that students have a moderate level in terms of practicing proper solid waste management procedures based on the total average score of $M = 3.03$ in the final 50-item Solid Waste Management Practices survey questionnaire. Both the Grade 11 and Grade 12 SHS students showed a moderate level of SWMP based on their total average scores of $M = 2.89$ and $M = 3.10$, respectively. The Grade 12 SHS students showed a significantly higher level of Solid Waste Management Practices than the Grade 11 SHS students (*t* Critical > *t* Stat = 1.98 > -2.10, $p = 0.04$).

The research findings are similar to the results of the study of Gequinto (2016), which showed that SWMP of selected state universities in CALABARZON is generally implemented to a Great Extent using a five-point Likert scale with a resulting composite mean of 3.65. The SWMP tool used by Gequinto (2016) included the following categories: waste re-use, waste reduction, waste source collection, waste recycling, waste treatment, and waste disposal, which were different from the categories used for the present study's measurement tool. The present study's findings are also similar to the study of Ramos and Pecajas (2016), which showed that SWMP is also moderately practiced with a resulting composite mean of 3.46.

It was observed that there was a slightly higher significant difference (t Critical > t Stat = 1.98 > -2.10, p = 0.04) between the level of SWMP of Grade 12 SHS students and Grade 11 SHS students. These findings cannot be compared to the research findings of Adelou (2014) and Nuñez (2017) because they compared their results to gender and category of school previously enrolled in, although in the study of Ramos and Pecajas (2016), it was identified that the respondents' profile, particularly their gender, did not affect their levels of SWMP.

The results showed how this batch of Grade 12 students is more responsible in terms of following the SWM policy in the institution, and how this batch of Grade 11 students still need to develop a better sense of understanding as to why they need to follow and apply proper SWM not just inside the school, but also in their own households.

Bolaños (2011) focused on the activities undertaken by the school in the implementation of R.A. 9003 in terms of how it manifested in the level of awareness of the respondents in the selected school. However, the levels of SWMP of the respondents were not identified and assessed. Santiago (2016) described the extent of knowledge, attitudes, and practices of the respondents on solid waste management and identified that there is a significant difference in the knowledge and practices of the urban and rural barangay residents, whereas the present study measured the levels of practices of Senior High School students in an institution and compared the levels of the students in terms of their Grade levels, and the three components identified using PCA. The mean of the scores of the SHS students was grouped according to the three principal components, which was shown in Table 7.

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Table 7. Levels of solid waste management practices grouped according to principal components

Principal Component	N	*M*	Interpretation
PC1	218	2.93	Moderate
PC2	218	3.15	Moderate
PC3	218	3.16	Moderate

Using the developed measurement tool, in terms of the first principal component, Blended Environmental Activism and Citizenship (*M* = 2.93), the students obtained a moderate level of SWMP. The students also showed a moderate level in terms of both the second and third principal components, which are the Private-Sphere Behavior (*M* = 3.15) and Policy Adherence and Engagement (*M* = 3.16), respectively. As a new study, these results cannot be compared with the previously reviewed studies because the measurement tools developed and used in the previous studies did not utilize Stern's (2000) categories as a framework in creating the developed measurement tool. Both the studies of Ramos and Pecajas (2016) and Gequinto (2016) used the following categories in constructing their instruments: waste generation, waste storage, waste collection, waste transfer and transport, waste processing, and waste disposal. Similarly, the studies of Megersa (2018) and Guerrero, Maas, and Hogland (2012) utilized different measurement tools based on their own previous qualitative preliminary data gatherings.

Using the developed measurement tool, the SHS students were assessed to have moderate levels across all the three different components of SWMP. Although this shows that students tend to follow and moderately practice the different types of SWMP, some improvements could still be made to increase their levels of SWMP. Despite having similar interpretations observed in the levels of SWMP in terms of the three components, the levels of SWMP of the students under the first component, Blended Environmental Activism and Citizenship (*M* = 2.93), are still lower in comparison to the levels of SWMP of the other second and third components respectively (*M* = 3.15 and *M* = 3.16). This was further confirmed by the results of the first survey, where the top and least commonly practiced SWMP of the SHS students were observed.

Results Analysis

The results of the first survey, which indicated the top 15 commonly exercised SWMP, showed that nine (9) out of the top 15 practices were under the Private-Sphere Behavior component, this implied that the SHS students practice more Private-Sphere Behaviors more frequently in comparison to the other SWMP under the two components. Based on the least commonly exercised SWMP of SHS students, 13 out of the 15 least practiced SWMP are under the Blended Environmental Activism and Citizenship practices, which means that the students could only practice the SWMP under this component moderately. These results further confirmed why the SHS students have a lower level of SWMP in terms of the Blended Environmental Activism and Citizenship in comparison to the students' levels of SWMP in terms of Private-Sphere Behavior and Policy Adherence and Engagement.

To improve the students' levels of SWMP in terms of Blended Environmental Activism and Citizenship, providing more platforms for students to raise their opinions and actively engage in dialogues could help encourage students to become more open in discussing topics related to the environment, specifically proper solid waste management. Existing environment-related organizations, such as Cycle Green and PSYSC, should also be empowered and provided with sufficient resources so members of these youth groups could provide projects and events that could explain to other students why it's important to apply proper SWM principles not just in school, but in their own households as well.

To help improve the levels of SWMP of the students in the second component, Private-Sphere Behavior, providing in-depth seminars and trainings could help encourage them to engage in these practices as they become more aware of the advantages of implementing proper waste disposal practices not just for the institution and their household, but for the environment as well. Providing proper set-ups in the school, such as using properly labeled trash bins for waste disposals and utilizing a Clean-As-You-Go policy in the school cafeteria, could help the students develop the habit of implementing proper SWMP, which could eventually be applied in other aspects of their lives (e.g., future profession and raising their own families).

Furthermore, the involvement of student leaders in project-planning events and in policy development meetings could help increase the students' level of SWMP in terms of the third component, Policy Adherence, and Engagement. Involving the students would give them a sense of responsibility for their actions and an awareness for potential consequences, thus making the implementation of new policies more efficient, in comparison to primarily asking students to follow certain policies without explaining to them why the policy was created in the first place.

Table 8. Correlation matrix of the three principal components

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Principal Component	PC1	PC2	PC3
PC1	1	.091	.527*
PC2		1	.599*
PC3			1

* Correlation is significant at the 0.01 level (2-tailed).

Results of a correlation (Table 8) showed that there is a moderately positive correlation between PC1 (Blended Environmental Activism and Citizenship) and PC3 (Policy Adherence and Engagement), with values being $r(218) = .527$, $p = .000$. A moderately positive correlation was also observed between PC2 (Private-Sphere Behavior) and PC3 (Policy Adherence and Engagement), with values being $r(218) = .599$, $p = .000$. In comparison, PC1 (Blended Environmental Activism and Citizenship) and PC2 (Private-Sphere Behavior) have no observed significant linear relationship.

These findings implied that when students positively practice Blended Environmental Activism and Citizenship, they also tend to practice Policy Adherence and Engagement, and the same goes with students who positively practice Private-Sphere Behavior which also translates to students practicing Policy Adherence and Engagement. However, students who practice positive Blended Environmental activism and citizenship do not necessarily translate to students practicing Private-Sphere behaviors. The relationship between the three principal components is illustrated in Figure 2 below.

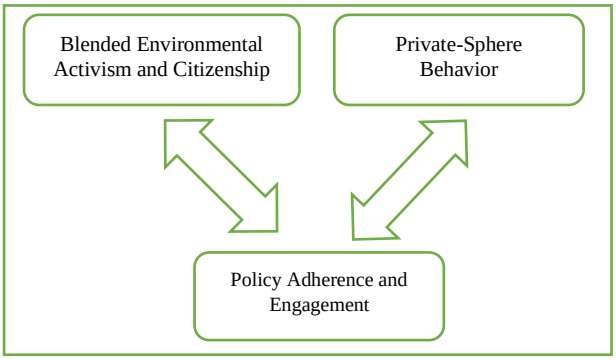

Figure 2. Dimensions of Solid Waste Management Practices of SHS students

In relation to the results of the initial survey, the observed correlation among the three components could further explain why the students only obtained a moderate level of SWMP in terms of their general average. The SHS students practiced more Private-Sphere Behavior practices in comparison to the other two components of SWMP because ten (10) out of the 15 commonly practiced SWMP are included under the said component. On the other hand, the SHS students practiced less Environmental Activism and Environmental Citizenship practices, as 13 out of the least 15 practiced SWMP are included under the Environmental Activism and Environmental Citizenship components.

After a correlation analysis was conducted, the components Blended Environmental Activism and Citizenship (initially identified as two separate components) and Private-Sphere Behavior were assessed to have no linear relationship between each other; thus, this could mean that even if students do tend to be active in publicly presenting or discussing his/her opinions about solid waste management practices, it does not automatically mean that the same student practices proper solid waste management practices in all instances, especially once a public audience is no longer present.

Though students may be very active in participating in debates or attending seminars and conferences about the environment, this does not automatically mean that the student still follows the SWM policy of the institution, especially if no one is present to witness or monitor his/her behavior. In addition, the students who also tend to engage in more Private-Sphere Behavior practices, like properly following the SWM policy in the school or being more responsible consumers, could also neglect to engage in Blended Environmental Activism and Citizenship practices.

In relation to the theoretical framework used for the present study, the solid waste management practices of the SHS students could be categorized using these three different components: Blended Environmental Activism and Citizenship, Private-Sphere Behavior, and Policy Adherence and Engagement. Using Stern's (2000) categories of pro-environmental actions as the framework for the study, the SWMP of the SHS students was not consistent with the first two categories: Environmental Activism and Environmental Citizenship. It was observed that the practices which were initially under the first two categories of Stern, identified using the initial survey and the results of the administered survey using the developed measurement tool, could only be categorized under one principal component or dimension: Blended Environmental Activism and Citizenship.

The practices that were categorized under the fourth category of Stern's (2000) pro-environmental actions, Private-Sphere Behavior, were observed to be consistent with the findings of the present study. Thus, the practices observed under the second principal component, which was identified using the results of the PCA and in relation to the results of the initial

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survey, are practices that pertain to actions that were found to be similar to Stern's definition of Private-Sphere Behavior.

In terms of the third identified Principal Component, Policy Adherence, and Engagement, this was initially labeled as Policy Support in reference to the third pro-environmental action category of Stern (2000) discussed in the theoretical framework. Further analysis of the practices with high factor loadings under this component has shown that Policy Adherence and Engagement was a more appropriate label because the SHS students as the respondents for this study initiated proactive actions to support and study new environmental policies in addition to the standard compliance required of individuals who passively exercise Policy Support practices.

In relation to the theoretical framework used for the present study, the Value-Belief-Norm theory by Stern (2000), these Solid Waste Management Practices as explored under each of the identified three Dimensions: Blended Environmental Activism and Citizenship, Private-Sphere Behavior, and Policy Adherence and Engagement, are examples of actions that are mostly driven by personal norms. Acting upon these personal norms, as viewed by the Senior High School students in their perspective, would often depend on their internal sense of obligation to act in a certain manner, whether they should follow the school's policy in SWM or not, or whether there would be consequences for not following the school's SWM policy. Even if students were given a complete set of instructions about how to specifically work on a Clean and Green project, if the students do not deem such a project as an important part of his or her personal norms and belief system, then this will not trigger a sense of obligation or responsibility which could lead to a pro-environmental action, or in this example implementing and accomplishing a Clean and Green project.

CONCLUSION AND RECOMMENDATION

Using the Value-Belief Norm (VBN) theory (Stern, 2000) as a framework, the results of the study have shown that the top five Solid Waste Management Practices (SWMP) of the Senior High School (SHS) students in the selected institution were composed of the following: Throwing trash into the appropriate trash bin, reusing plastic/paper bags in supermarket purchases, carrying eco-bags when shopping, reusing and recycling paper and old notebooks, and asking myself whether they need the product before purchasing it.

The five least practiced solid waste management practices among students were: Joining poetry reading events that tackle environmental issues, joining debates that tackle environmental issues, donating financially to environmental youth groups in school, attending seminar workshops about environmental protection in the community, and participating in environmental youth camps in the community.

The SWMP of the SHS students were explored using the three principal components identified using Principal Component Analysis (PCA) as the three underlying dimensions: Blended Environmental Activism and Citizenship, Private-Sphere Behavior, and Policy Adherence and Engagement. The practices which were first separately identified under the first two categories of pro-environmental actions were characterized under one dimension, Blended Environmental Activism, and Citizenship.

The practices which were initially considered under the third pro-environmental category of Stern (2000) were still identified and characterized under the third dimension; however, modifications were made, and it was renamed as Policy Adherence and Engagement, instead of Policy Support, to correspond with the practices explored under the third dimension. Lastly, the practices which were classified under the Private-Sphere Behavior category of pro-environmental actions were categorized under the second explored dimension, which was still consistent with practices initially defined under the Private-Sphere Behavior.

Using the developed measuring tool, the SHS students showed that they have a moderate level of Solid Waste Management Practice (SWMP) based on the developed measurement tool. However, the Grade 12 students have a slightly higher level of SWMP compared to the Grade 11 students. Identifying the cause of why the Grade 12 students have a slightly higher level of SWMP in comparison to the Grade 11 students is no longer included in the scope of the study.

The practices explored using the three dimensions were examples of actions that are mostly driven by personal norms. Thus, acting upon these personal norms, as viewed by the Senior High School students in their perspective, would depend on their internal sense of obligation to act in a certain manner, whether they should follow the school's policy in SWM or not, or whether there would be consequences for not following the school's SWM policy.

For future researches, the socio-demographic profile of the students could be included as variables in a similar field. The initial 60-item survey questionnaire could still be used to identify which practices are common and least practiced; however, item number 16 could be changed to 'I study the solid waste management principles under Earth Science.' The final 50-item developed measurement tool could

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be used to identify the level of Solid Waste Management Practice both in general and in terms of the three subscales.

The researcher also recommends that the level of SWMP of Grade-11 students could be assessed at the beginning of the school year and re-assessed when they are in Grade-12, before they graduate, to identify if there were any improvements in their levels of SWMP. A principal factors analysis and a confirmatory factor analysis could also be done to reassess the validity and reliability of the developed measurement tool and to also evaluate its applicability for other types of participants (e.g., teachers, administrators, non-teaching personnel, etc.).

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APPENDIX A

Solid Waste Management Practices Item Bank (Initial 105 items)

Practice Classification	Items	Source
Environmental Activist Public-Sphere Behaviour	1. Participate in initiatives of the school and organizations in writing to politicians expressing opinions on environmental issues	Enger, E., Smith, B., (1992) Environmental Science: A Study of Interrelationships (4th Edition) USA: WnCBrown Publishers
	2. Volunteer for local environmental groups during rallies and protest march	
	3. Encourage family and friends to practice 3Rs (Reduce, Reuse, Recycle)	Cunningham, W., Cunningham, M., (2010) Principles of Environmental Science: Inquiry and Applications (5th Edition) New York, USA: McGraw Hill
	4. Encourage family and friends to purchase environmentally responsible products	
	5. Promote recycling programs of the school and pro-environmental organizations	
	6. Join protests against the government or industrial projects that have a negative impact on the environment	
	7. Interested in joining seminars and activities to share measures and inspiration in saving the environment	
	8. Introduce environmental concerns to local groups	
	9. Participate in campus initiatives of determining water and energy usage in the school	
	10. Support the administration to buy locally grown produced food for the campus canteens	
	11. Support well-publicized initiatives against toxic waste dumpers	
	12. Promote locally grown products in fair trades to help protect the environment	
	13. Initiate economic development projects that provide local alternatives to natural resource	
	14. Participate in protest marches and public demonstrations to enlighten people of the negative effects of open dumping	
	15. Form alliances with other environmental activists	
	16. Join forums and debate issues to reduce improper solid waste segregation and help the environment	
	17. Sign pledges for environmental movements	
	18. Celebrate Earth Day by joining environmentalists in fun walk or fun run events	

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	19. Discourage burning of refuse and explain to anyone the effects of open burning whenever I see the conduct of the malpractice	Adeolu, A.T., Enesi, D.O. and Adeolu M.O. Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Badan, Oyo State Nigeria
	20. Wear shirts that boldly promote eco-friendly logos and prints	Retrieved from: www.patagonia.com
	21. Share and subscribe to online movements for environmental sustainability and proper waste disposal methods	
	22. Organize a campaign that reveals the negative effects of improper solid waste management	
	23. Join online forums that tackle environmental issues	
	24. Seek out non-government organizations' websites that promote campaigns for environmental sustainability	
	25. Publicly share articles and videos that promote proper waste segregation and environmentally sustainable practices.	
Sub-total		**25 items**
Non-Environmental Activist Public Sphere Behaviour		
Environmental Citizenship	1. Reuse bags by deducting a small amount from the customer's bill	Enger, E., Smith, B., (1992) Environmental Science: A Study of Interrelationships (4th Edition) USA: WnCBrown Publishers
Environmental Citizenship	2. Apply for internships in agencies or organizations that help contribute to the environment	Cunningham, W., Cunningham, M., (2010) Principles of Environmental Science: Inquiry and Applications (5th Edition) New York, USA: McGraw Hill
Environmental Citizenship	3. Join citizen science projects that help reduce waste in the environment	
Environmental Citizenship	4. Interested to enroll in environmental education classes to help develop awareness and appreciation for ecological systems	
Environmental Citizenship	5. Study Earth and Life science topics to develop awareness and appreciation for ecological systems	
Environmental Citizenship	6. Attend conferences about saving the environment	
Environmental Citizenship	7. Participate in activities on biodiversity conservation	
Environmental Citizenship	8. Support manufactured products in environmentally sustainable ways	Stern, Paul. (2000) Towards a Coherent Theory of Environmentally Significant Behaviour

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Environmental Citizenship	9. Use environmental consideration in decision making regarding environmental issues	
Environmental Citizenship	10. Participate in waste management activities in the school	Adeolu, A.T., Enesi D.O., and Adeolu, M.O. (2014). Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Ibadan, Oyo State, Nigeria. Journal of Research in Environmental Science and Toxicology, 3(5), 66-73.
Environmental Citizenship	11. Willing to attend any training, seminar-workshop on waste management and environmental protection	
Environmental Citizenship	12. Attend youth environmental group clubs in the school	
Environmental Citizenship	13. Participate in poster-making contests and essay writing competitions that help promote proper waste segregation and environmentally sustainable practices.	
Environmental Citizenship	14. Adopt proper purchasing habits in order to reduce the number of waste products I generate in school	
Environmental Citizenship	15. Reduce water consumption for environmental reasons	
Environmental Citizenship	16. Participate in a weekly sanitation program sponsored by the school organizations	
Environmental Citizenship	17.Attend youth environmental club events in your school	
Environmental Citizenship	18. Committed to minimizing the waste generated	
Environmental Citizenship	19. Participate in contests that trade fairs that help promote locally grown products	
Environmental Citizenship	20. Join science camps that promote proper waste segregation and environmentally sustainable practices	
Environmental Citizenship	21. Become a member of an environmental youth group that regularly monitors water and energy consumption in the school	
Environmental Citizenship	22. Participate in science fair projects that aim to create innovations and projects that can be a model for eco-friendly living	
Environmental Citizenship	23. Volunteer in events sponsored by school organizations that promote proper waste	

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	segregation and environmentally sustainable practices	
Environmental Citizenship	24. Volunteer to pick up random pieces of paper and trash after events and training	
Environmental Citizenship	25. Take into consideration the waste which will be generated when making school projects	
Sub-total		**25 items**
Policy support	1. Think about a solution to a solid waste management concern raised by school leaders and the administration	Enger, E., Smith, B., (1992) Environmental Science: A Study of Interrelationships (4th Edition) USA: WnCBrown Publishers
Policy support	2. Bring to attention specific solid waste management issues by bringing it up during group discussions in school forums and meetings	
Policy support	3. Read rules and policies about solid waste management posted in bulletin boards	
Policy Support	4. Contribute financially to an environmental group or organization in the school that works to protect the environment	
Policy support	5. Plant native trees and bushes in a watershed protection project	Cunningham, W., Cunningham, M., (2010) Principles of Environmental Science: Inquiry and Applications (5th Edition) New York, USA: McGraw Hill
Policy support	6. Help create projects that can be models for sustainability research and development	
Policy support	7. Vote for politicians in the barangay youth elections who have environmentally sustainable platforms	Stern, Paul. (2000) Towards a Coherent Theory of Environmentally Significant Behaviour
Policy support	8. Willingly donate financially to non-government organizations to protect the environment	
Policy support	9. Willingly pay higher-taxed to protect the environment	
Policy support	10. Willingly pay higher prices for purchased products to protect the environment	
Policy support	11. Support the development of the environmental policy of your school	Adeolu, A.T., Enesi D.O., and Adeolu, M.O. (2014). Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Ibadan, Oyo State, Nigeria. Journal of Research in Environmental

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		Science and Toxicology, 3(5), 66-73.
Policy support	12. Help clear a refuse site around the school premises	
Policy support	14. Follow Local Government Unit's policy on recycling	
Policy support	15. Vote for school leaders who have environmentally sustainable platforms	
Policy support	16. Support proactive leaders as classroom officers, especially those who show environmentally sustainable values	
Policy support	17. Take note of new environmental policies being announced during flag ceremonies and school events	
Policy support	18. Take note of new rules and regulations about solid waste management being disseminated within the local community	
Policy support	19. Ask barangay youth officials if there are new rules and regulations about solid waste management	
Policy support	20. Ask the school leaders if there are new environmental policies within the school	
Policy support	21. Bring to attention specific solid waste management concerns by bringing it up during youth leaders' meetings in the barangay	
Policy support	22. Follow the school's existing solid waste management policy	
Policy support	23. Contribute financially to an environmental group or organization in the barangay that works to protect the environment	
Policy support	24. Introduce a local community to support the school's community extension projects in terms of helping the environment	
Policy support	25. Introduce school youth leaders to your barangay officials to help create linkages for future environmentally sustainable projects	
Sub-total		**25 items**
Private-Sphere Behaviour	1. Recycle bottles and cans	Enger, E., Smith, B., (1992) Environmental Science: A Study of Interrelationships (4th Edition) USA: WnCBrown Publishers
	2. Avoid purchasing aerosol products	
	3. Use biodegradable, synthetic-chemicals-free soaps	
	4. Reuse and recycle paper and old notebooks	
	5. Use public transportation or carpools, instead of driving alone	

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	6. Buy paper products made from or packaged in recycled paper	
	7. Encourage parents to practice household composting at home	
	8. Reuse plastic/paper bags in supermarket purchases	
	9. Ask myself whether I really need the product before buying	Cunningham, W., Cunningham, M., (2010) Principles of Environmental Science: Inquiry and Applications (5th Edition) New York, USA: McGraw Hill
	10. Carry eco-bags when shopping	
	11. Refuse bags from small purchases	
	12. Bring water bottles in school	
	13. Choose items built to last when purchasing	
	14. Bring packed lunch in school	
	15. Use handkerchiefs and towels instead of paper towels and tissues	
	16. Use items as long as possible and don't replace them just because a new product becomes available	
	17. Use the library instead of purchasing books or buy electronic books instead	
	18. Avoid buying things I don't need or I won't use	
	19. Buy green labeled/ ecologically sustainable products	National Solid Waste Management Strategy 2012-2016
	20. Don't leave electronic devices on standby mode	Zsoka, A., Szerenyi, Z.M., Szechy, A., Kosis, T. (2013). Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior, and everyday pro-environmental activities of Hungarian high school and university student. 48 (2013) 126-138
	21. Buy energy-efficient bulbs	
	22. Compress bottles before discarding	
	23. Collect hazardous waste separately	
	24. Compost food waste at home	Miller, T.Jr., Spoolman, D., (2010) Environment (7th Edition) Asia: Wiley
	25. Cut on food waste by preparing meals for proper serving	
	26. Prepare packed lunch to reduce usage of disposable utensils and plates	

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	27. Cut on food waste by reheating leftover food at home	
	28. Change my purchasing habits in order to reduce the number of waste products I generate in school	Adeolu, A.T., Enesi D.O., and Adeolu, M.O. (2014). Assessment of Secondary School Students' Knowledge, Attitude and Practice towards Waste Management in Ibadan, Oyo State, Nigeria. Journal of Research in Environmental Science and Toxicology, 3(5), 66-73.
	29. Decide first on whether to reuse or recycle the waste rather than throw it away	
	30. Check the trash bin labels first before throwing anything away	
Sub-total		**30 items**
TOTAL		**105 items**

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APPENDIX B

Solid Waste Management Practices Questionnaire (Preliminary 60-item Survey Questionnaire)

Directions: For the following group of statements, please indicate **how often do you adhere to or comply with the following Solid Waste Management practices** by placing a check mark in the appropriate box. Be honest. There are no right or wrong answers.

5 - Always **4** - Often **3** - Sometimes/ Occasionally **2** - Rarely **1** - Never

	5 Always	**4** Often	**3** Sometimes	**2** Rarely	**1** Never
1. I encourage my family to practice Reduce, Reuse, Recycle (3Rs)					
2. I encourage my peer groups to practice Reduce, Reuse, Recycle (3Rs)					
3. I join environmental signature campaigns in the school					
4. I join environmental signature campaigns in the community					
5. I wear shirts that boldly promote eco-friendly logos and prints					
6. I share online movements for environmental sustainability and proper waste segregation					
7. I subscribe to online websites about environmental sustainability and proper waste disposal methods					
8. I join online forums that tackle environmental issues					
9. I follow social media pages about environmental sustainability and proper waste segregation					
10. I share social media posts about environmental sustainability and proper waste segregation					
11. I celebrate Earth Day by joining environmental fun walk/ fun run events					
12. I write articles and poems about the environment					
13. I share articles and poems about the environment					
14. I join debates that tackle environmental issues					
15. I join poetry reading events that tackle environmental issues					
16. I study the Earth and Life science subject					
17. I attend lectures and conferences about saving the environment in school					
18. I attend lectures and conferences about saving the environment in the community					
19. I attend the school's Environmental Summit					
20. I join youth environmental clubs in the school					
21. I join youth environmental groups in the community					
22. I participate in environmental youth camps in the school					

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23. I participate in environmental youth camps in the community					
24. I help pick up pieces of trash after events in the school					
25. I help pick up pieces of trash after events in the community					
26. I attend seminar-workshops about environmental protection in the school					
27. I attend seminar-workshops about environmental protection in the community					
28. I participate in waste management activities in the school					
29. I participate in waste management activities in the community					
30. I participate in monthly sanitation projects sponsored by school organizations					
31. I donate financially to environmental youth groups in school					
32. I willingly pay higher prices for green-labeled products					
33. I support the development of the environmental policy of my school					
34. I follow Legazpi city's 'No Segregation, No Collection' policy					
35. I follow Legazpi city's 'No Plastic' policy					
36. I follow the school's policy on waste segregation					
37. I support school leaders who promote proper waste segregation					
38. I take note of new environmental policies announced during school events					
39. I take note of new environmental policies in our barangay or community					
40. I ask barangay youth officials about their plans for the environment					
41. I ask school officers about their plans for the environment					
42. I read solid waste segregation policies posted on school bulletin boards					
43. I read solid waste segregation slogans posted in our community					
44. I vote for barangay youth leaders who have concrete plans for the environment					
45. I vote for school officers who have concrete plans for the environment					
46. I recycle bottles and cans					
47. I avoid purchasing aerosol products					
48. I collect hazardous waste separately					
49. I reuse and recycle paper and old notebooks					
50. I use public transportation or carpools instead of driving alone					
51. I buy supermarket products packaged in recycled paper					

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52. I reuse plastic/paper bags in supermarket purchases					
53. I ask myself if I really need the product before buying it					
54. I carry eco-bags when shopping					
55. I refuse bags from small purchases					
56. I bring a water bottle to school					
57. I bring packed lunch to school					
58. I compress bottles before discarding					
59. I compost food waste at home					
60. I throw the trash into the appropriate trash bin					

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APPENDIX C

Solid Waste Management Practices Questionnaire (Reduced Items after PCA)

Directions: For the following group of statements, please indicate **how often do you adhere to or comply with the following Solid Waste Management practices** by placing a check mark in the appropriate box. Be honest. There are no right or wrong answers.

5 - Always **4** - Often **3** - Sometimes/ Occasionally **2** - Rarely **1** - Never

	5 Always	**4** Often	**3** Sometimes	**2** Rarely	**1** Never
1. I encourage my peer groups to practice Reduce, Reuse, Recycle (3Rs)					
2. I join environmental signature campaigns in the school					
3. I join environmental signature campaigns in the community					
4. I wear shirts that boldly promote eco-friendly logos and prints					
5. I share online movements for environmental sustainability and proper waste segregation					
6. I subscribe to online websites about environmental sustainability and proper waste disposal methods					
7. I join online forums that tackle environmental issues					
8. I follow social media pages about environmental sustainability and proper waste segregation					
9. I share social media posts about environmental sustainability and proper waste segregation					
10. I celebrate Earth Day by joining environmental fun walk/ fun run events					
11. I write articles and poems about the environment					
12. I share articles and poems about the environment					
13. I join debates that tackle environmental issues					
14. I join poetry reading events that tackle environmental issues					
15. I attend lectures and conferences about saving the environment in school					
16. I attend lectures and conferences about saving the environment in the community					
17. I attend the school's Environmental Summit					
18. I join youth environmental clubs in the school					
19. I join youth environmental groups in the community					
20. I participate in environmental youth camps in the school					
21. I participate in environmental youth camps in the community					
22. I help pick up pieces of trash after events in the community					

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23. I attend seminar-workshops about environmental protection in the school					
24. I attend seminar-workshops about environmental protection in the community					
25. I participate in waste management activities in the school					
26. I participate in waste management activities in the community					
27. I participate in monthly sanitation projects sponsored by school organizations					
28. I donate financially to environmental youth groups in school					
29. I support the development of the environmental policy of my school					
30. I follow Legazpi city's 'No Segregation, No Collection' policy					
31. I follow Legazpi city's 'No Plastic' policy					
32. I follow the school's policy on waste segregation					
33. I support school leaders who promote proper waste segregation					
34. I take note of new environmental policies announced during school events					
35. I take note of new environmental policies in our barangay or community					
36. I ask barangay youth officials about their plans for the environment					
37. I ask school officers about their plans for the environment					
38. I read solid waste segregation policies posted on school bulletin boards					
39. I read solid waste segregation slogans posted in our community					
40. I vote for barangay youth leaders who have concrete plans for the environment					
41. I vote for school officers who have concrete plans for the environment					
42. I reuse and recycle paper and old notebooks					
43. I use public transportation or carpools instead of driving alone					
44. I buy supermarket products packaged in recycled paper					
45. I reuse plastic/paper bags in supermarket purchases					
46. I ask myself if I really need the product before buying it					
47. I carry eco-bags when shopping					
48. I refuse bags from small purchases					
49. I bring a water bottle to school					
50. I throw the trash into the appropriate trash bin					

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APPENDIX D

Consent Form to Respondents

Dear Respondents:

Greetings!

I am currently conducting a study that aims to determine the students' level of solid waste management practices. As part of the course requirement to finish the degree in Master of Arts in Education, Major in Environmental Science, the results of this research will help curriculum planners and policymakers identify the strengths and weaknesses of SHS students in terms of practicing proper solid waste management.

May I request your assistance in conducting this study by completing the attached questionnaire? Your honest responses will be very important for the completion of this research, and this could help not just our institution's curriculum planners and policymakers improve the SWM policies but at the same time help our environmentalists as it aims to identify the underlying dimensions or principles behind SWM practices.

Complete confidentiality will be observed, and your personal information will not be disclosed to anybody. Some basic information will be asked from you, which will be needed for further analysis of data. For questions and clarifications, please feel free to email me using this email address: esterjoy.agudo@yahoo.com.

Thank you very much.

Very truly yours,

Ester Joy D. Agudo

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APPENDIX E

Table of total variance explained from initial PCA results

Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	30.407	50.678	50.678	30.407	50.678	50.678
2	5.035	8.392	59.070	5.035	8.392	59.070
3	2.422	4.037	63.107	2.422	4.037	63.107
4	1.876	3.126	66.233	1.876	3.126	66.233
5	1.450	2.417	68.650	1.450	2.417	68.650
6	1.127	1.879	70.529	1.127	1.879	70.529
7	1.005	1.675	72.204	1.005	1.675	72.204
8	.940	1.567	73.770			
9	.900	1.501	75.271			
10	.855	1.426	76.697			

Extraction Method: Principal Component Analysis.

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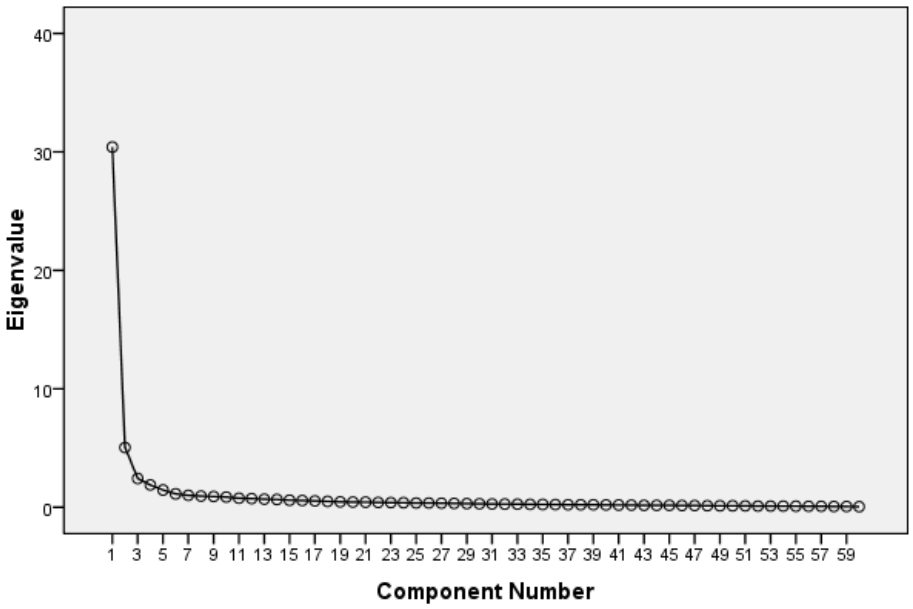
APPENDIX F

Scree Plot of initial data for extraction and rotation



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APPENDIX G

Underlying dimensions of SWMP among SHS students based on PCA extraction results

Pattern Matrix	Component		
	1	2	3
ECitem27. I attend seminar-workshops about environmental protection in the community	.924		
EAitem14. I join debates that tackle environmental issues	.919		
EAitem15. I join poetry reading events that tackle environmental issues	.917		
ECitem21. I join youth environmental groups in the community	.908		
ECitem23. I participate in environmental youth camps in the community	.898		
EAitem8. I join online forums that tackle environmental issues	.871		
EAitem4. I join environmental signature campaigns in the community	.845		
ECitem30. I participate in monthly sanitation projects sponsored by school organizations	.822		
ECitem18. I attend lectures and conferences about saving the environment in the community	.817		
EAitem5. I wear shirts that boldly promote eco-friendly logos and prints	.806		
ECitem22. I participate in environmental youth camps in the school	.793		
EAitem12. I write articles and poems about the environment	.786		
ECitem29. I participate in waste management activities in the community	.774		
ECitem20. I join youth environmental clubs in the school	.763		
EAitem7. I subscribe to online websites about environmental sustainability and proper waste disposal methods	.740		
ECitem26. I attend seminar-workshops about environmental protection in the school	.740		
EAitem10. I share social media posts about environmental sustainability and proper waste segregation	.727		
EAitem9. I follow social media pages about environmental sustainability and proper waste segregation	.718		
EAitem6. I share online movements for environmental sustainability and proper waste segregation	.714		
EAitem13. I share articles and poems about the environment	.712		
EAitem3. I join environmental signature campaigns in the school	.704		
ECitem19. I attend the school's Environmental Summit	.695		
ECitem25. I help pick up pieces of trash after events in the community	.682		
EAitem11. I celebrate Earth Day by joining environmental fun walk/ fun run events	.679		
ECitem17. I attend lectures and conferences about saving the environment in school	.645		
PSitem31. I donate financially to environmental youth groups in school	.601		
ECitem28. I participate in waste management activities in the school	.549		

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EAitem2. I encourage my peer groups to practice Reduce, Reuse, Recycle (3Rs)	.501	.300	
PSBitem54. I carry eco-bags when shopping		.779	
PSBitem52. I reuse plastic/paper bags in supermarket purchases		.760	
PSBitem55. I refuse bags from small purchases		.731	
PSBitem53. I ask myself if I really need the product before buying it		.708	
PSBitem51. I buy supermarket products packaged in recycled paper		.701	
PSBitem49. I reuse and recycle paper and old notebooks		.673	
PSBitem56. I bring a water bottle to school		.637	
PSBitem50. I use public transportation or carpools instead of driving alone		.614	
PSBitem60. I throw the trash into the appropriate trash bin		.564	-.360
PSitem37. I support school leaders who promote proper waste segregation			-.796
PSitem41. I ask school officers about their plans for the environment			-.736
PSitem40. I ask barangay youth officials about their plans for the environment			-.730
PSitem38. I take note of new environmental policies announced during school events			-.714
PSitem33. I support the development of an environmental policy for my school			-.689
PSitem39. I take note of new environmental policies in our barangay or community			-.670
PSitem45. I vote for school officers who have concrete plans for the environment			-.643
PSitem42. I read solid waste segregation policies posted on school bulletin boards			-.636
PSitem34. I follow Legazpi city's 'No Segregation, No Collection' policy			-.610
PSitem43. I read solid waste segregation slogans posted in our community	.304		-.605
PSitem44. I vote for barangay youth leaders who have concrete plans for the environment	.399		-.578
PSitem36. I follow the school's policy on waste segregation		.389	-.558
PSitem35. I follow Legazpi city's 'No Plastic' policy		.385	-.525

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

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APPENDIX H

Top 15 practices of Senior High School students using the initial 60-item questionnaire

Practices	Mean	Interpretation
I throw the trash into the appropriate trash bin	3.98	High level
I reuse plastic/paper bags in supermarket purchases	3.90	High level
I carry eco-bags when shopping	3.81	High level
I reuse and recycle paper and old notebooks	3.81	High level
I ask myself if I really need the product before buying it	3.79	High level
I follow Legazpi city's 'No Segregation, No Collection' policy	3.76	High level
I use public transportation or carpools instead of driving alone	3.74	High level
I follow the school's policy on waste segregation	3.74	High level
I bring a water bottle to school	3.74	High level
I support school leaders who promote proper waste segregation	3.72	High level
I encourage my family to practice Reduce, Reuse, Recycle (3Rs)	3.71	High level
I buy supermarket products packaged in recycled paper	3.71	High level
I recycle bottles and cans	3.66	High level
I follow Legazpi city's 'No Plastic' policy	3.65	High level
I refuse bags from small purchases	3.61	High level

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APPENDIX I

15 Least commonly exercised practices of SHS Students using the initial 60-item questionnaire

Practices	Mean	Interpretation
I join poetry reading events that tackle environmental issues	2.56	Low level
I join debates that tackle environmental issues	2.63	Moderate level
I donate financially to environmental youth groups in school	2.68	Moderate level
I attend seminar-workshops about environmental protection in the community	2.71	Moderate level
I participate in environmental youth camps in the community	2.72	Moderate level
I join youth environmental groups in the community	2.73	Moderate level
I join online forums that tackle environmental issues	2.79	Moderate level
I write articles and poems about the environment	2.89	Moderate level
I join environmental signature campaigns in the community	2.90	Moderate level
I wear shirts that boldly promote eco-friendly logos and prints	2.91	Moderate level
I participate in monthly sanitation projects sponsored by school organizations	2.93	Moderate level
I willingly pay higher prices for green-labeled products	2.93	Moderate level
I participate in waste management activities in the community	2.95	Moderate level
I attend seminar-workshops about environmental protection in the school	2.95	Moderate level
I attend lectures and conferences about saving the environment in the community	2.97	Moderate level