Appropriate of Participation Solid Waste Management Model for Students in Suburban Schools

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Abstract. This research study the purposes were study solid waste management behavior, the participation solid waste management and develop model appropriate for solid waste management of high school students in suburban schools. The sample size were 591 of high school students. Multi- stage random sampling was performed. The research in sturment was the questionnaires. Using Cronbach's alpha coefficient tested the reliability of the assessment tool was 0.96 level and KR 20 was 0.95 level. Data analysis was done by computer program. Statistics were to acquire frequencies, percentage, means, standard deviation, minimum, and maximum. The result revealed that: knowledge level about solid waste management of high school students in suburban schools almost of was moderate level 53.1%, attitude level about solid waste management was moderate level 68.9%, behavioral level about solid waste management was moderate level 69.0%, and overall the participation solid waste management of high school students almost of was moderate level were 67.6%. When separated by aspects, it were found that score were moderate level 3 steps; by participating in the development initiation phase were 57.0%, participation in the planning phase of development were 77.5%, participation in the development process were 52.3%, and score were high level 2 steps; by participation in the process to benefit from development were 43.7%, and participation in the development evaluation stage were 36.5%.

Keywords: Solid Waste Management, Student, Suburban Schools

1 Introduction

Environmental toxicity is one of the major problems at the national level.At present, Thailand has given great importance to environmental issuesbecause it affects the quality of lifeand the living conditions of the people, both directly and indirectly. There are many environments in Thailandsuch as various pollutants, solid waste and sewage lavish use of resources,especially the things that cause major environmental pollution are solid waste.It is the closest thing that has been overlooked that is a big problem in the consumerist society this is a problem that both the government and local governments are interested in and urgently need to fix itbecause it is an object left behind from consumption daily human consumption. The amount of solid waste

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will increase as a shadow of the bodyby the rate of population growth and technological advancement whether in developed countries or a developing country like Thailand. The big problem with solid waste is its ineffective management.The big problem with solid waste is its ineffective management the problem of environmental pollution from solid waste has increased more serious.In which Thailand has an increasing amount of solid waste every year from the situation of community solid waste occurring in Thailand in 2021found that there were 24.98 million tons of solid waste or 68,434 tons/day, it was found that the incidence of solid waste was 1.03 kg/person/day, it was found that 7.89 million tons of solid waste or 32 percent of the amount of solid waste generated,were sorted and brought back to use new uses at the source or waste separationto be sold within the waste disposal facility. The remaining solid waste is 17.09 million tons, will be handled in the household or will be collected and disposed of at 2,137 community solid waste disposal sites that operate nationwide and waste disposal improperly according to sanitation principles by dumping outdoor incineration and incinerator without air pollution treatment system, about 7.81 million tons or 31 percent of the amount of solid waste generated.[1]

The problem of solid waste is considered an important problem of the community, especially in large communities with large populations, the violence continues to escalate day by daydirectly affecting society and ecosystems, especially at present there has been a leaping economic expansion.resulting in the production of products and packaging in different formatsto attract and meet the needs of more consumers. Most of the packaging has a complicated manufacturing process use materials that naturally decay slowly and are difficult to dispose. [2]Another big problem with solid waste is the collection is inefficient.Most importantly, there is very little hygienic disposal of waste disposal systems cause environmental problemsand affecting the health of the people,as well as causing nuisance and unsightly. The eliminating solid waste in the community as part of the local government organization or the Subdistrict Administrative Organizationmust be responsible for the implementation of the B.E. 2540Constitution, subject: Opportunity for people to participate in the prevention and suppression of acts that destroy natural resourcesand cause pollution. Including the enactment of the Act Prescribing Plans and Procedures for Decentralization of Powers to Local Administrative Organizations, B.E. 2542from this Act, a plan has been developed to decentralize powers to local administrative organizations,by the scope of mission transfers to local government organizations. There are important parts related to solid waste management, including:environmental and pollution management work, tracking tasks, and checks related to the environment and pollution. The disposing of solid waste in the community as part of the local government or municipality must be responsible for the operation clearly, since the compilation process storage, transportation, sorting and disposal of solid waste, etc.[3]

Research objectives

1. To study solid waste management behavior of secondary school students in suburban schools.

2. To study the participation in solid waste management of secondary school students in suburban schools.

3. To develop an appropriate model of solid waste management of secondary school students in suburban schools.

Methodology

The sample size were 591 of high school students. Multi- stage random sampling was performed. The research insturment was the questionnaires. The content validity was improved and adjusted by the suggestion of the experts. Using Cronbach's alpha coefficient tested the reliability of the assessment tool was 0.96 level and KR 20 was 0.95 level. Data analysis was done by computer program. Statistics were to acquire frequencies, percentage, means, standard deviation, minimum, and maximum.

Research results

Part 1 Personal characteristics and general information of students in suburban schools

Personal characteristics and general information in secondary school students in 7 suburban schools. A sample of 591 students in grades 1 - 6, most of them studying in the lower secondary level of 471 (80.2%).Result was found that the majority of 299 were male (50.6%), with a mean age of 14.52 years (S.D. = 1.6), the lowest age was 12 and the highest was 19 years.The state of trash bins or garbage collection accommodation provided by the school in various places have dirty periods: 49.6% of the garbage bins that the school provide is insufficient, 19.1%, no separate garbage bins, 28.4% garbage bins or garbage collection accommodation. that the school has arranged to cause trouble and annoyance, most of which will cause a foul smell, 24.2 percent. Resources and frequency of receiving information about solid waste management most in every aspect will receive information once in a while, details are shown in Table 1.

Table 1 Number and percentage of personal characteristics and general informationof students in suburban schools.

Personal characteristics		Number (person)	Percentage
1. School			
	School 1	146	24.7
	School 2	119	20.1
	School 3	75	12.7
	School 4	54	9.1
	School 5	40	6.8
	School 6	81	13.7
	School 7	76	12.9
	Total	591	100
2. Sex			
Man		299	50.6
Female		292	49.4
3. Age			
$\overline{X}$= 14.52S.D= 1.6	Min= 12 Max=19		
4. Education level			
junior high school		471	80.2

Personal characteristics	Number (person)	Percentage
high school	117	19.8
5. The state of trash or garbage collection accommodation that the school has prepared in various places		
Good condition	331	52.6
Dirty	293	49.6
Damaged, cracked, or leaked	128	21.7
The container is made of unstable/unhealthy material	44	7.4
The appearance of the container is difficult to clean	67	11.3
There is no cover or it does not close completely	133	22.5
Other (not enough small enough to accommodate garbage)	9	1.5
6. Trash bins or garbage collection accommodation provided by the school causing trouble and nuisance		
- Stench disturbing	143	24.2
- Nuisance caused by animals and insects such as flies, rats, etc.	44	7.4
- Other (garbage flowing along the floor)	5	0.8
7. Separation by type of trash or existing waste collection		
- Have	423	71.6
- Not have	168	28.4
8. The adequacy of existing waste bins or containers to accommodate waste		
- Enough	319	54.0
- Not enough	113	19.1
- Don't know	159	26.9
9. Frequency of garbage collection that occurs in schools		
- Enough	276	46.7
- Not enough	92	15.6
- Don't know	221	37.4
10. Sources and frequency of receiving information about solid waste management		
- **Placard**		
often	173	29.3
once in a while	329	55.7
never received	89	15.1
- **Television/radio**		
often	171	28.9
once in a while	312	52.8
never received	108	18.3
- **Academic guidance documents**		
often	124	21.0
once in a while	303	51.3
never received	164	27.7
- **Newspapers and publications**		
often	102	17.3
once in a while	313	53.0
never received	176	29.8

Personal characteristics	Number (person)	Percentage
- **Voices on the line in school**		
often	176	29.8
once in a while	286	48.4
never received	129	21.8
- **Posting announcements in schools**		
often	158	26.7
once in a while	332	56.2
never received	101	17.1
- **School website**		
often	159	21.5
once in a while	305	51.6
never received	127	21.5
- **Teachers**		
often	440	74.5
once in a while	122	20.6
never received	29	4.9

Part 2 Solid Waste ManagementKnowledge of Students in Suburban Schools

Knowledge of solid waste management for secondary school students in suburban schools. It was found that most of the students had knowledge about solid waste management at a moderate level of 314 students (53.1 %), followed by a knowledge of solid waste management at a low level of 268 students and 45.3% had knowledge. About the management of solid waste at a high level, 9 people, 1.5%details are shown in Table 2.

Table 2 Number and percentage of knowledge scores about solid waste management

Score level of knowledge	Number (person)	Percentage
High (Score 16 or more)	9	1.5
Moderate (scores between 10-16 points)	314	53.1
Low (less than 10 points)	268	45.3
$\overline{X}$= 9.53 S.D.= 3.15 Min.= 0 Max.=17		
Total	**591**	**100**

Part 3 Solid Waste ManagementAttitudes of Students in Suburban Schools

Attitudes ofwaste management insecondary school students in suburban s chools this was found that the majority of students had 407 attitudes about solid waste management at a moderate level (68.9%), followed by 114 students (19.3%) with a high level of attitude towards solid waste management, andattitudes about solid waste management were at a low level, 70 students (11.8%)details are shown in Table 3.

Table 3 Number and percentage of attitudes scores about solid waste management

Score level of attitude	Number (person)	Percentage
Very high (score more than 73.79 or more)	114	19.3
Moderate (scores between 55.75-73.79 points)	407	68.9
Low (score less than 55.75 down)	70	11.8
$\overline{X}$= 64.77 S.D.= 9.02 Min.= 44 Max.=92		
Total	591	100

Attitudes ofwaste management of secondary school students in suburban schools

this was found that the students had the attitude of categorizing them by item with the highest score, which was the sorting of solid waste before throwing it into the bin, indicating their participation in social responsibility,the mean was 3.99, the S.D. was 1.19. Secondly, schools should have a policy to force restaurants and shops in the school to use environmentally safe food packaging instead of using foam, the mean was 3.89, the S.D. was 1.15, and the campaign uses cloth bags or baskets to put products instead,use large quantities of plastic bags. it's good the mean was 3.89, the S.D. was 1.23.

Part 4 Solid Waste Management Behavior of Students in Suburban Schools

Solid waste management behavior of secondary school students in suburban schools this was found that the majority of students had solid waste management behaviors at a moderate level of 408 (69.0 %), followed by 92 students (15.6 %) of solid waste management behaviors,solid waste was at a low level of 91 students (15.4 %)details are shown in Table 4.

Table 4 Number and percentage of behavior scores about solid waste management

Score level of behavior	Number (person)	Percentage
Very high (score more than 79.02 or more)	92	15.6
Moderate (between 59.96-79.02 points)	408	69.0
Low (score less than 59.96 down)	91	15.4
$\overline{X}$= 69.49 S.D.= 9.53 Min.= 36 Max.=98		
Total	**591**	**100**

Solid waste management behavior of secondary school students in suburban schools classified by item, it was found that the students' solid waste management behaviors had the highest score, which was to separate wet and dry waste before disposing and changing their use according to the trend,when it's not popular, it's thrown away,the mean was 3.94, the S.D. was 1.11, followed by the separation of plastic drinking water bottles from other waste or throw it in the recycling bin,,the mean was 3.83, the S.D. was 1.03.

Part 5 Participation in Solid Waste Management of Students in Suburban Schools

The participation in solid waste management of secondary school students in suburban schools found that the students were the most involved in solid waste management overall. was moderate, of 399 students (67.6 %)details are shown in Table 5.

Table 5 Number and percentage of participation scores about solid waste management

Score level of participation	Number (person)	Percentage
High level (over **55.54** score)	96	16.2
Moderate level (scores between **44.20-55.54)**	399	67.6
Low level (less than **44.20** scores)	96	16.2
$\overline{X}$= 49.87 S.D.= 5.67 Min.= 23 Max.=60		
Total	**591**	**100**

The level of participation in solid waste management by aspect of secondary school students in suburban schools. Most of them are moderate in 3 stages.Participants in the development initiation phase were 337students (57.0%), 458 students (77.5%) were involved in the development planning phase,there were 309 students (52.3%), and there will be two high levels of participation: participation in the process of receiving benefits from development, with 258 students (43.7%) and 216 students (36.5%)participated in the development evaluation stagedetails are shown in Table 6.

Table 6 Number and percentage of participation scores classify by item

Score level of participation	Number (person)	Percentage
1. Participation in development initiatives		
High level (score above 11.96)	171	28.9
Moderate (scores between 8.5.4-11.96)	337	57.0
Low level (score less than 8.54)	83	14.0
$\overline{X}$= 10.25 S.D.= 1.71 Min.= 3 Max.=12		
2. Participation in the planning phase of development		
High level (score more than 12.19 or above)	0	0
Moderate (scores between 9.36-12.19)	458	77.5
Low level (score less than 9.36)	133	22.5
$\overline{X}$= 10.53 S.D.= 1.66 Min.= 3 Max.=12		
3. Participation in the development process		
High level (score greater than 11.02 or higher)	157	26.6
Moderate (scores between 8.68-11.02)	309	52.3
Low level (score less than 8.68)	125	21.2
$\overline{X}$= 9.82 S.D.= 1.97 Min.= 3 Max.=12		

Score level of participation	Number (person)	Percentage
4. Participation in the process of benefiting from development		
High level (scoring more than 10.59 and above)	258	43.7
Moderate (scores between 8.29-10.59)	225	38.1
Low level (score less than 8.29)	108	18.3
$\overline{X}$= 9.99 S.D.= 1.58 Min.= 4	Max.=12	
5.Participation in the development evaluation stage		
High level (scoring more than 10.59 and above)	216	36.5
Moderate (scores between 8.30-10.59)	177	29.9
Low level (score less than 8.30)	198	33.5
$\overline{X}$= 9.28 S.D.= 2.13 Min.= 3	Max.=12	

Conclusion

The result revealed that: knowledge level about solid waste management of high school students in suburban schools almost of was moderate level 53.1%, attitude level about solid waste management was moderate level 68.9%, behavioral level about solid waste management was moderate level 69.0%, and overall the participation solid waste management of high school students almost of was moderate level were 67.6%. When separated by aspects, it were found that score were moderate level 3 steps; by participating in the development initiation phase were 57.0%, participation in the planning phase of development were 77.5%, participation in the development process were 52.3%, and score were high level 2 steps; by participation in the process to benefit from development were 43.7%, and participation in the development evaluation stage were 36.5%. It was found that all 5 steps the level of participation is at a high level there were percentage less than 50 percentage which indicates that relevant agencies and including the teachers should promote and encourage students in high schools enter to the participation solid waste management at appropriate and student's potential is developed to operate in solid waste management at appropriate by bringing the curriculum to learn about environmental education for waste management for students be used in development the participation solid waste management at appropriate of people in community.

Discussion the results

The level of participation in solid waste management of secondary school students in suburban schools most of them were at the moderate level in 3 stages: the level of participation in the development initiative stage,participation in the planning phase of development participation in the development implementation process and at a high level were two: participation in the process of receiving benefits from the development. Participation in the development evaluation stage and overall participation was moderate. The results of this study are consistent with the study of Chompoonut Songklang .(2014)[4]. On title solid waste management behavior of students at Ban Na Dee - Sang Bong School, Phasuk Sub-district, Kumphawapi District. Udon Thani Province. The results showed that articles that students have behavior in every practice concerning solid waste management,the largest number is students throw garbage in the trash every time (55.56%).The target group's behavior in solid waste management was at a very

desirable level ($\bar{x}$ = 3.63). The students put the solid waste into the trash every time ($\bar{x}$ = 4.38). The item with the least desirable behavior was when students buy groceries or snacks at school and tell the seller not to put plastic bags for them ($\bar{x}$ = 3.17).

Corresponding to the study of Jirarak Boonyod. (2014) [5]. The study of waste management guidelines in schools using the A-I-C process: a case study of Boonlue Wittayanusorn School, Nakhon Ratchasima Province. The results of the study revealed that most of the sample groups had a low level of knowledge and understanding about solid waste, with the meanwas 6.10.The attitudes towards solid waste management of the sample group were at a moderate level,the mean was 2.76,the overall solid waste management behavior was at a moderate level,the mean was 1.67. The school rules for waste management were followed. is low,promoting the participation of teachers/staff, students and restaurant operators using the A-I-C process to find a solution for solid waste management in Boonluea Wittayanusorn School. Nakhon Ratchasima Province found that the participants in the A-I-C process, participate in problem analysis in particular, the students were the most involved,this was also involved in planning. participate in the benefits by joining together to propose guidelines for the use of waste and participate in the improvement of project activities plan consultation was conducted with fellow members to revise the project's operational model as appropriate.

Corresponding to the study of Thanongsak Padsin.(2018)[6]. On the participation of the people in the management of solid waste in the community of Kung Sawan Subdistrict Kosum Phisai District Maha Sarakham Province The results showed that the participation of the people in the management of solid waste in Kung Sawan sub-district community. overall and in all 4 aspects were to participate in decision making,participation in operations , participation in the evaluation moderate in accordance with the study of Salimar Keidklinhorm. (2019)[7]. Guidelines for people's participation in community solid waste management: Nakhon Si Thammarat Municipality the results showed that the level of public participation in solid waste management was moderate.This was in line with the study of Songsak Walaijai (2021)[8]. on the solid waste management process with community participation Wiang Phrao Subdistrict Municipality, Phrao District, Chiang Mai Province that uses the waste management process with community participation there were 7 operational strategies, transfer knowledge and technology that will be used in each type of solid waste management by using the 3R principles (Reduce, Reuse, Recycle) integration between communities and units local jobs.

Inconsistent with the study of PaniphanThepsorn. (2017)[9]. Regarding the implementation of waste management policies of educational institutions in Chonburi Province. The results showed that the implementation of waste management policies of educational institutions in Chonburi province Overall, it's at a good level. When considering each aspect, it was found that the cultivation of consciousness. Reduction of waste disposal was the highest average, followed by cultivating awareness of waste classification, while cultivating a proper waste management awareness was ranked last. As for the results of the comparison of the implementation of the waste management policy of educational institutions in Chonburi province, it was found thateducational institutions in Chonburi province with different educational areas and types of educational institutions operate in accordance with the policy of organizing Garbage is no different as for educational institutions with different affiliations, they operate in accordance with the policy on organizing. Garbage differed at the statistical significance level of .05.

Inconsistent with the study ofNinraphat Phromrit, Kanokrat Ratanaphan, Suwit Jitphakdee and Umaporn Muneenam. (2021)[10]. On titledeveloping environmental education curriculum for solid waste managementfor high school students, year 1: A case study of Sametjuan Wittayakhom School Thung Yai District Nakhon Si Thammarat Province.This study was to study the effectiveness of the environmental education curriculum for waste management for Grade 1 students. The instrument used in the study was the environmental education learning management curriculum garbage for Grade 1 students The results showed that the school had a total waste volume of between 47.6-54.5 kg. per day or an average of 51.7 kg. per day.Consists of recycled waste with an average volume of 20.00 kg. per day or 38.68 percent, which is the largest amount. Next was general waste with an average volume of 16.20 kg. per day or 31.34 percent, organic waste with an average volume of 15 kg. per day or 29.01 percent, and hazardous waste with an average volume of 0.50 kg. per day, or 0.97% per day respectively. The results of the curriculum construction revealed that the curriculum consisted of 7 learning units, namely 1) Samet Kuan of the mouse 2) Recognizing garbage 3) Analyzing the relationship 4) Selectively determine 5) exhaustive management 6) cooperate to develop and 7) share learning. The results of the study on the effectiveness of the curriculum showed that the students in the experimental group had a statistically significantly higher score than the control group at the 0.05 level,and the students in the experimental group had a high level of satisfaction with the curriculum (= 4.49, S.D. = ± 0.54), and the school had a 19.07 percent reduction in waste.

Inconsistent with the study of Kittima Netbukkana.(2019)[11].On title the development of waste management processes of Koh Phangan Suksa School, Koh Phangan District. Surat Thani Province. This was the development of waste management processes in the first cycle with workshop activities to enhance knowledge of waste management and lead to operations in waste management activities. Continuing development in the second cycle, paper reduction with paperless office workshops and paperless office activities. Assessing the results of the development of waste management processes of Koh Phangan Educational Schools, it was found that in the first cycle, the amount of waste decreased by 118.93 kilograms, representing 65.02%. The satisfaction level was at a high level. Development in the second cycle, the amount of waste decreased from the first cycle by 20.57 kilograms or 47.43 percent,the satisfaction level was at a high level.When comparing the results of both cycles, it was found that government teachers and educational personnel at Koh Phangan School had a higher understanding of waste management can be used to continuously reduce the amount of waste. Waste management comparatively higher results in all aspects including reduction of use, reuse and recycling at a high level and the level of satisfaction towards the development of waste management was at a high level.

Overall participation in appropriate waste management of secondary in suburban school students. It was found that it was at a moderate level. Separated by aspects, it was found that the scores were at a moderate level in 3 stages by participating in the development initiative stage,participation in the planning phase of development,participation in the development processand a high score of 2 steps by participating in the development benefit process,participation in the development evaluation stage, it was found that in all 5 stages, the level of participation was high have a percentage less than 50 percent, indicating that related agencies including teachers students should be encouraged to participate in proper waste management,and to develop the potential of students in educational institutions to operate on solid waste management.

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