

## Factors Influencing to Behavior in Solid Waste Management by 3Rs Technique of Undergraduate Student Difference Groups

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### ABSTRACT

The objectives of this research were to 1) study the perception about the environmental news, motivation to reduce solid waste, solid waste segregation and reuse of solid waste, attitude and behavior in solid waste management by 3Rs technique, 2) compare the behavior in solid waste management by 3Rs technique, and 3) study the correlations between of perception of environmental news, motivation to reduce waste, segregation and reuse of solid waste and attitudes towards waste management with behavior of waste management by 3Rs technique of undergraduate student in education and engineering and technology groups, Vongchavalitkul University. The sample groups were 237 persons which size of sample was calculated by Taro Yamane method at the 95% confidence level. Data collecting used the online questionnaire created with Google Form@vu.ac.th; Retrieved from <https://goo.gl/Lucs4G>. A questionnaire was used to collect the data is divided into five parts: 1) the collected for the undergraduate student's demographics data, 2) the perception about the environmental news, 3) the motivation to reduce solid waste, solid waste segregation and reuse of solid waste, 4) the attitude in solid waste management, and 5) the behavior in solid waste management by 3Rs technique. Data were collected by Google Classroom system, Vongchavalitkul University; who can answer the questionnaire will have a Google account only for limit to 1 response. The data were analyzed by percentage, mean, standard deviation, independent samples t-test, One-way ANOVA and Pearson correlation coefficient.

The results found that the perception about the environmental news of students, showed a moderate level, motivation to reduce solid waste, solid waste segregation and reuse of solid waste showed high level, the attitude in solid waste management of students, showed a moderate level, and the behavior in solid waste management by 3Rs technique of students,

showed a high level. The students with different age and years of study showed differences in behavior in solid waste management by 3Rs technique at the significance level of 0.05. Moreover, the perception about the environmental news, motivation to reduce solid waste, solid waste segregation and reuse of solid waste, and attitude in solid waste management of students were positive correlations to behavior in solid waste management by 3Rs technique of students at the significance also.

**KEYWORDS:** Solid Waste, 3Rs Technique, Undergraduate Student, Behavior, Factors

## Introduction

Nowadays, the problem of waste in Thailand is in crisis may be cause to lack of good management system, lack of space for waste and lack of conscious mind for waste disposal behavior (not waste separation, not reuse of waste). Especially in urban areas have increase of waste (Tatong, 2017). At this time, 1 person/garbage 1.11 kilograms, average garbage 27 million tons/year, but only 8 million tons can be disposed hygienic (Hfocus, 2017). In 2016, total amount of solid waste 26.85 million tons of Nationwide, while solid waste has been disposed hygienic 7.2 million tons. The amount of solid waste that not cause residual waste collection in the area of 7.6 million tons and the amount of solid waste disposed of reused 5.1 million tons, resulting in amount of solid waste 19.9 million tons (Pollution Control Department, Ministry of Natural Resources and Environment, 2016).

So, the pollution control department ministry of natural resources and environment established a comprehensive waste

management approach, focusing on the most efficient waste management model with Reduce, Reuse, and Recycle (3Rs) technique for reduce the amount of waste that must be disposed of various systems, reuse and recycle, as well as the removal of by-products such as organic fertilizer or energy. (Pollution Control Department, Ministry of Natural Resources and Environment, 2010). The problem of garbage will dissipated or lightened if the waste management process is ineffective (United Nations Environment Programme, 2005). It is necessary to resolve the problem of garbage and start cultivating from childhood to take responsibility for participation. Separation of garbage is methods of waste management, the people are involved in preventing and correcting waste sorting at their source, thus reducing waste before disposal in final step (important in dealing with garbage). In addition, the waste generated from the separation of materials can also be sold. The awareness of waste management is good way to cultivate the

waste that will result. The change of behavior is permanent, which will effectively solve the problem of rubbish (Sutthiphapa, Yuenyong, & Ukham, 2016).

Vongchavalitkul University is institution that values conservation of natural resources and environment. It is one of major missions, that plays an important role in creating awareness among students and interested in the problem of waste management both inside and outside the university, because the students have the potential to develop or promote their activities in the field of waste management and learn about the problem of waste, should focus on the target group as a youth or student to make a good consciousness of waste management that affect the change behavior. For that reason, researchers recognize the importance of waste management. The objective of research are study environmental awareness, motivation to reduce, sorting and reuse of solid waste, attitudes towards waste management and behavior of waste management with 3Rs technique in student of education and engineering and technology. Furthermore the comparison to behavior of waste management by 3Rs technique and study on correlations between perception and motivation to reduce, sorting and reuse of solid waste, attitudes towards waste management by 3Rs technique in accordance with Thailand 4.0 policy because the main

problem of garbage is “people” (Hfocus, 2017). Therefore, it is useful to study on factors influencing to behavior in solid waste management by 3Rs technique for the students about guideline to change the behavior of waste management accurate and appropriate for good waste management.

### **Research Objectives**

The objectives of the study are specified as follows:

- 1) To study the perception about the environmental news, motivation to reduce solid waste, solid waste segregation and reuse of solid waste, attitude and behavior in solid waste management by 3Rs technique of students.
- 2) To compare the behavior in solid waste management by 3Rs technique between students of education and engineering and technology.
- 3) To study the correlations between of perception of environmental news, motivation to reduce waste, segregation and reuse of solid waste and attitudes towards waste management with behavior of waste management by 3Rs technique of students.

### **Expected Benefits**

The results of this research were the important ways about guideline to change the behavior of waste management by 3Rs technique. Moreover, to change the

behavior of waste management accurate and appropriate for good waste management to consistent with the reduction of waste in accordance with Thailand 4.0 policy; Practice on “people” reduces the “waste”.

### Literature Review

Pollution control department, ministry of natural resources and environment, establish a comprehensive waste management approach by focus on plan of solid waste management the most effectively, reduce the amount of solid waste is minimize by destroy in system and utilization of solid waste (Reuse & Recycle) such as organic fertilizer, energy, etc.

In addition, Waste Management with 3Rs to reduces waste, reduce environmental problems and reduce global warming. At present, solid waste disposal in the local government is responsible for disposal by sanitary landfill properly and the rest is poured midfielder stated that impact on the environment and public health in near area. These issues, concepts and practices for cost-effective use of resources, causing the waste to a minimum. The applications of reduction approach by 3Rs technique (Pollution Control Department, Ministry of Natural Resources and Environment, 2010). The 3Rs technique can be described as the figure 1.

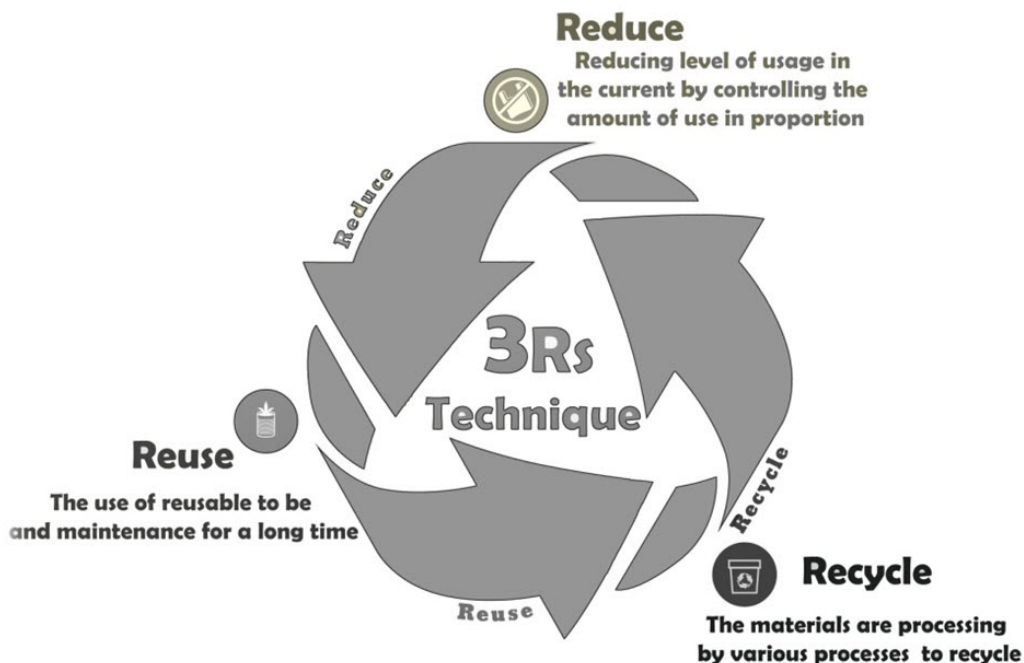


Figure 1 3Rs technique

Source: Applied from Kraphix (n.d.)

So, the best way to solve problem of solid waste is prevent waste or reduce amount of waste by focus on changing attitudes of consumers to change lifestyle. As well as production and consumption patterns (Muligaman, 1999). The emphasizing the involvement addition to reducing solid waste, but also reduces to use of natural materials and reduce environmental pollution (Pumpinyo & Koojaroenprasit, 2017). The study of solid waste management in developing nation for instance Williams and Stanley (2007) which study on waste management follow by 3Rs. The results found that in developing nation around the world recycling rates are 3-5% based on total waste. The amount of recyclable waste was derived from sorting of waste by various methods such as garbage collectors separated from garbage dumps and use of simple waste sorting by technology or waste separators. However, in developing nation event encourages people to participate in waste separation from source found that the recycling rate has increased around 10% (Most of waste management activities are effective in moderate to good level) consistent with Chaisayan (n.d.) said that the benefits of 3Rs are: save budget and space for solid waste management, save energy and natural resources.

In production process, the use of recycled materials as raw material for production of the product, helps the

operator reduce associated costs and reduce the release of carbon dioxide (CO<sub>2</sub>) compared to landfill or burner in furnace. In addition, contributes of increased career and employment found that the waste management approach is different and used truly depended on whether it applied at any stage. If separating waste from source, it will have not contaminated resources that can to recycle in new processes, reducing the use of natural resources or reusable products that other benefit, In addition, increased revenue for producers but also a reuse and value and the economic development of country is based on the concept of sufficiency economy. When solid waste is reduced, it will affect the cleanliness of city, healthy people and good mental health. So, everyone should help to separation for back to use or donate. Delivered to the garbage collector separately to properly manage the way together create new cultural by separating waste before disposing.

Do not put waste in same tank. Help reduce waste and environmental problems of city for help reduce global warming. Effective and efficient waste disposal from past to present will result in compliance (Boonhoom, 2011). Norm of society and personal habits are configuration that causes behavior. In addition, Kaewprayoon, Sawatkaew and Thepvarin (2018) found that factors to behavior of different solid waste

management consist of personal factors and support factors. This is variable in the conceptual framework of this study.

### Conceptual Framework

This research was based on the following conceptual framework:

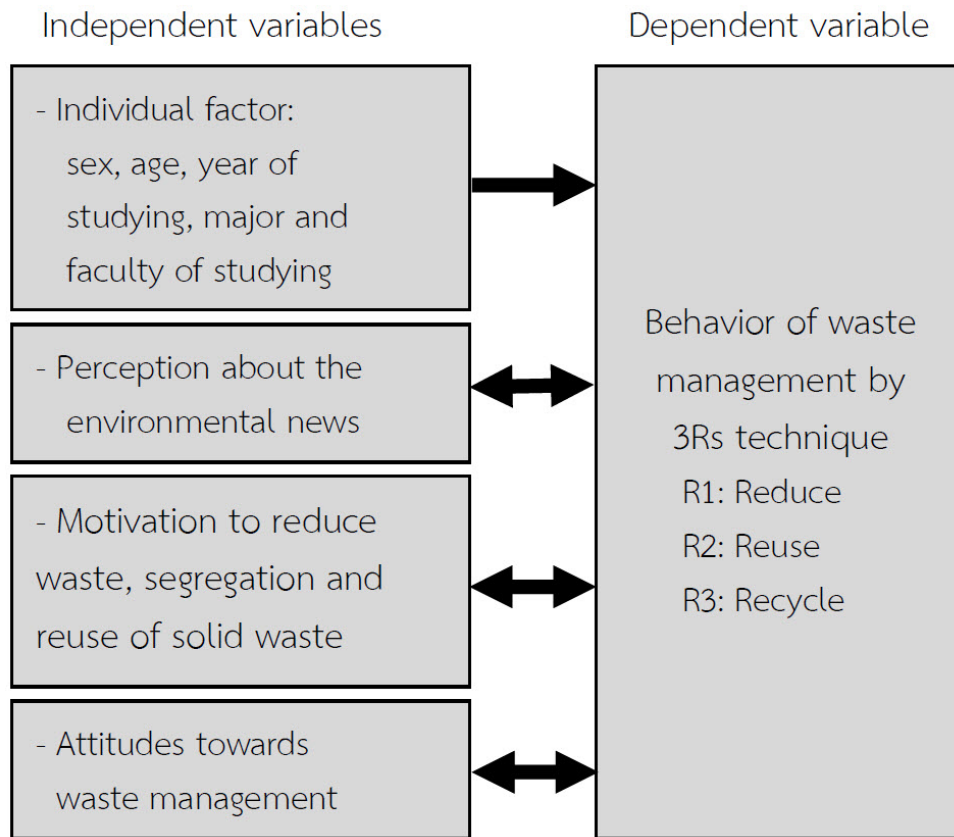


Figure 2 Conceptual framework of this research

### Research Methodology

#### Population and Sampling

This research aims to study on factors influencing to behavior in solid waste management by 3Rs technique of undergraduate student pass the course in subjects of environmental two group of Vongchavalitkul University (N = 530), group

of education (N = 307, department of early childhood, general science teaching, educational technology and computer) and group of engineering and technology (N = 223, department of electrical, mechanical, civil and computer science) 2<sup>nd</sup> semester of academic year, 2017 (Educational Services Offices, 2017).

Sample group (N = 237), student of education (N = 137) and engineering and technology (N= 100). Size of sample was calculated by Taro Yamane method

(Yamane, 1973) at the 95% confidence level. This research was used stratified random for random sampling following in figure 3.

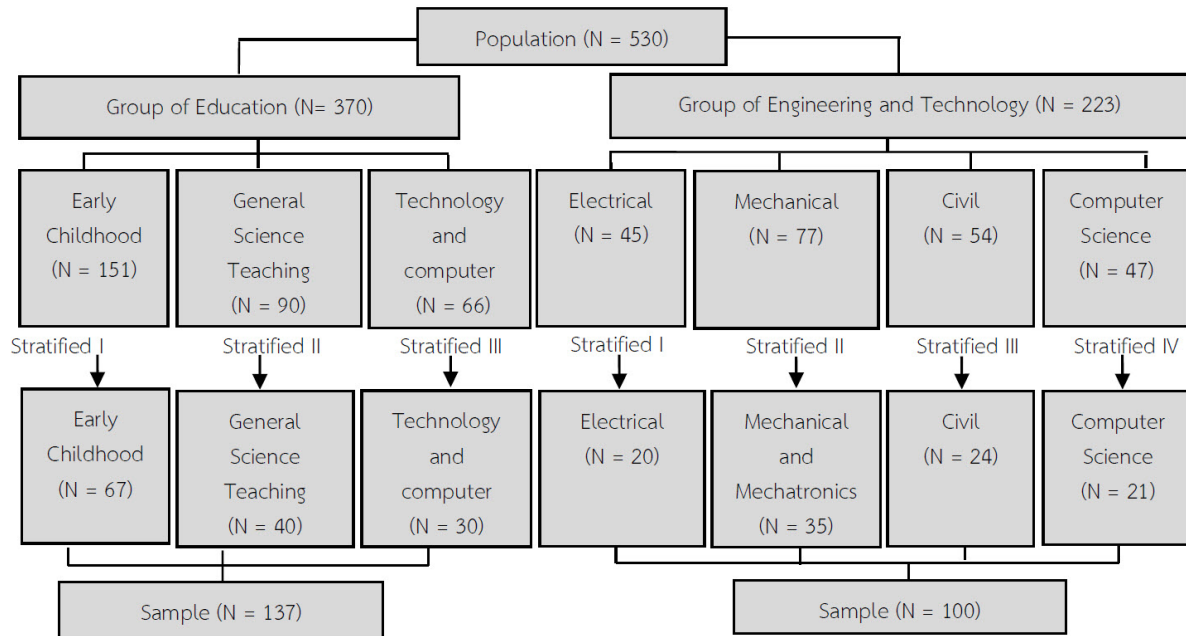


Figure 3 Stratified Sampling

### Data Collection

This research was created online questionnaire by Google Form@vu.ac.th; <https://goo.gl/Lucs4G> and computer programs that applied to create online questionnaire because save time and increase convenience data collection via Internet. Data analysis and presentation of results with structure of the questionnaire divided into 5 parts as following:

1) Demographics data of undergraduate student (sex, age, year of studying, major and faculty of studying)

2) Perception about the environmental news 12 items

3) Motivation to reduce waste, segregation and reuse of solid waste 32 items

4) Attitude in solid waste management 12 items

5) Behavior in solid waste management by 3Rs technique 25 items.

The questionnaires were based on review of documents, concept, theory, literature review and determine quality by content validity and reliability. The

questionnaire (part 1-5) is estimation scale. The content validity was determined by the IOC is 0.92. (Hambleton, 1980). Then apply the tool to the students (N = 50) of faculty of Public health, Vongchavalitkul University in 2017 for determine efficiency of tool found that the reliability of questionnaire was very reliable using Cronbach (1990) is 0.89 (Vanichbuncha, 2009). Data were collected by Google Classroom system, Vongchavalitkul University which the researcher has determined that those who can answer the questionnaire will need to have a Google account to collect the account information that the respondents have all responded to the questionnaire (Limit to 1 response) and then analyze by statistical program.

### Data Analysis from Questionnaire

Score in questionnaire follow by Likert (1967) and defined interpretation of questionnaire score by Kaiwan (2000) aggregated mean scores as 4.50-5.00 = Most, 3.50-4.49 = More, 2.50-3.49 = Moderate, 1.50-2.49 = Low, 1.00-1.49 = Very low, respectively.

### The Statistics used for Analyzing the Data

The researcher collected data and analysis the descriptive statistics were percentage, mean, standard deviation and inferential statistics were independent samples t-test, one-way ANOVA, and Pearson correlation coefficient.

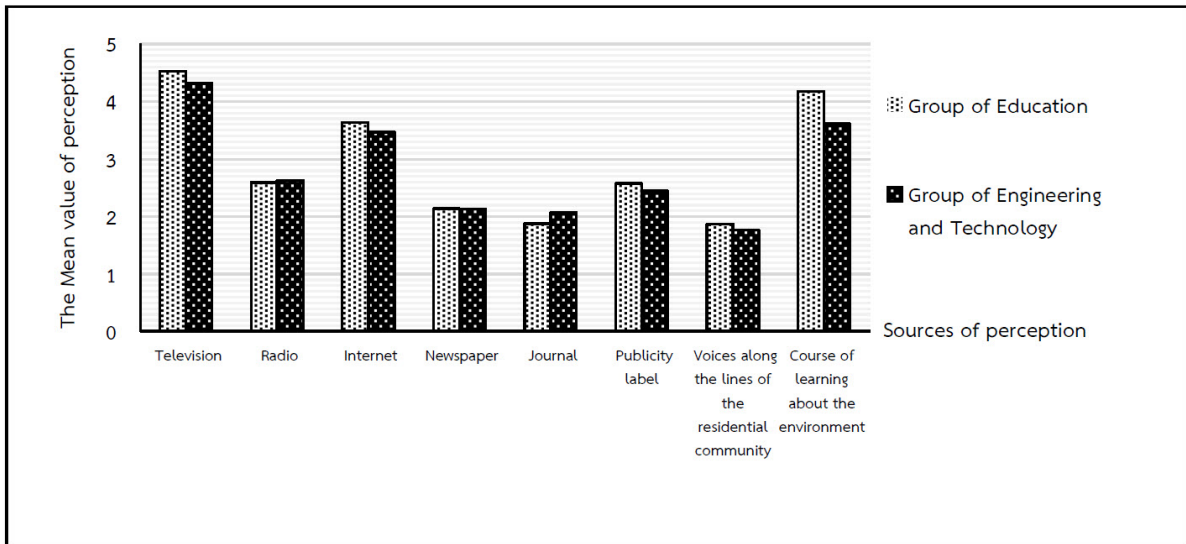
### Result of the Study

The results found that:

1) Demographics data of undergraduate student found that female (55.70%) and male (44.30%), 19-22 years old. They were studying in fourth-year at 27.43%, followed by third-year at 26.58%, first-year at 24.47%, and second-year at 21.52%, respectively. Education: Early childhood (48.90%), General science teaching (29.20%) and Educational technology and computer (21.90%). Engineering and technology: Mechanical (35.00%), Civil (24.00%), Computer science (21.00%) and Electrical (20.00%), respectively.

2) Perception about the environmental news found that average of perception about the environmental news, knowledge and facts about method of separation solid waste into solid waste, wet waste and hazardous waste. Disposing of garbage, prevention of poisoning from garbage (hazardous waste) to people and animals from various sources found that average form perception about the environmental news of student in education and engineering and technology at moderate level ( $\bar{x} = 2.92$ , S.D. = 0.983 and  $\bar{x} = 2.80$ , S.D. = 0.848), respectively. The both sample has perception about the environmental news are much level via Television, Internet, Courses of learning about the environment and perception about the environmental news via Radio, Newspaper, journal, voices along the lines of the residential community, respectively. The results show that figure 4.





**Figure 4** The mean value for the perception of environmental news

3) Motivation to reduce waste, segregation and reuse of solid waste found that the both sample was motivation to reduce, sorting and reuse of solid waste the overall level are more ( $\bar{x} = 3.74$ , S.D. = 0.748 and  $\bar{x} = 3.61$ , S.D. = 0.686). The both sample was motivation to reduce waste because they can to protect environment ( $\bar{x} = 4.54$ , S.D. = 0.498), motivation to reduce waste because use of natural resources are limited ( $\bar{x} = 4.54$ , S.D. = 0.553 and  $\bar{x} = 4.01$ , S.D. = 0.742), respectively and motivation to sorting because recognized by the people in community limited ( $\bar{x} = 1.82$ , S.D. = 0.578 and  $\bar{x} = 1.88$ , S.D. = 0.453), respectively. The results were in table 1.

4) The attitudes towards waste management showed that the both samples were attitudes towards waste management the overall level are moderate ( $\bar{x} = 3.49$ , S.D. = 0.279 and  $\bar{x} = 3.41$ , S.D. = 0.237) and attitudes towards waste in solid waste disposal at more level ( $\bar{x} = 3.84$ , S.D. = 1.080 and  $\bar{x} = 3.72$ , S.D. = 0.995), attitudes towards waste in solid waste management, refuse collection and separation of solid waste at moderate level ( $\bar{x} = 3.48$ , S.D. = 1.281 and  $\bar{x} = 3.36$ , S.D. = 1.171), respectively. When compare the attitudes towards waste management of both samples in the overall by statistics were independent samples t-test. The results showed that the mean as attitudes towards waste management of both samples was not significant (p-value > 0.05). The results show in table 2.

**Table 1** The mean value, standard deviation and level of motivation to reduce waste, segregation and reuse of solid waste

Motivation to Reduce, Sorting and Reuse of Solid Waste	Group of Sample				Level
	Education (n = 137)		Engineering and Technology (n = 100)		
	$\bar{x}$	S.D.	$\bar{x}$	S.D.	
1) Students reduce and sorting waste in various method without expect reward or receive compensation	4.36	0.626	4.11	0.631	More
2) Students reduce waste because they can to protect environment	4.54	0.498	4.51	0.500	Most
3) Students reduce unnecessary purchases for reduce costs	4.02	0.661	3.91	0.750	More
4) Students reduce waste because reduce the use of natural resources are limited	4.54	0.553	4.01	0.742	More
5) Students sort waste because help reduce the workload of the garbage collector	4.05	0.665	3.84	0.758	More
6) Students sort waste because recognized by the people in community	1.82	0.578	1.88	0.453	Low
7) Students sort waste because reduce source of germ, affect to health of people in the community	4.12	0.699	4.11	0.733	More
8) Students sort waste because reduce amount and type of waste	4.08	0.651	4.02	0.678	More
9) Students sort waste by right method and suggest and represent for people in the community	3.12	0.768	3.14	0.775	Moderate
10) Students repairs materials for recycle	3.16	0.917	3.08	0.770	Moderate
11) Students use glass bottles for recycled	3.28	0.764	3.01	0.685	Moderate
12) Paper boxes waste, bottles of water and Newspapers students keep for sell or reuse	3.79	0.726	3.70	0.806	More
<b>Total</b>	<b>3.74</b>	<b>0.748</b>	<b>3.61</b>	<b>0.686</b>	<b>More</b>

**Table 2** The mean value, standard deviation and comparison in attitudes towards waste management

Attitudes Towards Waste Management	Group of Sample				t	p-value
	Education (n = 137)		Engineering and Technology (n = 100)			
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
1) Solid waste disposal	3.48	1.281	3.36	1.171	0.176	0.221
2) Refuse collection and separation of solid waste	3.15	1.342	3.14	1.280	0.018	0.152
3) Solid Waste Management	3.84	1.080	3.72	0.995	0.232	0.380
<b>Total</b>	<b>3.49</b>	<b>0.279</b>	<b>3.41</b>	<b>0.237</b>	<b>0.142</b>	<b>0.203</b>

Note: \* Significant level at 0.05

**Table 3** The mean value, standard deviation and comparison in behavior of waste management

Behavior of Waste Management with 3Rs Technique	Group of Sample				t	p-value
	Education (n = 137)		Engineering and Technology (n = 100)			
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
R1: Reduce	3.73	0.534	3.66	0.511	0.156	0.283
R2: Reuse	3.76	0.427	3.61	0.505	0.404	0.402
R3: Recycle	4.09	0.279	3.93	0.347	0.710	0.536
<b>Total</b>	<b>3.86</b>	<b>0.164</b>	<b>3.73</b>	<b>0.140</b>	<b>0.423</b>	<b>0.415</b>

Note: \* Significant level at 0.05

5) The behavior of waste management with 3Rs technique found that the both samples were behavior of waste management with 3Rs technique the overall level are more ( $\bar{x} = 3.86$ , S.D. = 0.164 and  $\bar{x} = 3.73$ , S.D. = 0.140). The student of education was behavior of waste management with Recycle, Reuse and Reduce ( $\bar{x} = 4.09$ , S.D. = 0.279,  $\bar{x} = 3.76$ , S.D. = 0.427 and  $\bar{x} = 3.73$ , S.D. = 0.534) and the student of engineering and technology

was behavior of waste management with Recycle, Reduce and Reuse ( $\bar{x} = 3.93$ , S.D. = 0.347,  $\bar{x} = 3.66$ , S.D. = 0.511 and  $\bar{x} = 3.61$ , S.D. = 0.505), respectively. Then compare mean of the behavior of waste management with 3Rs technique of both samples in the overall were independent samples t-test. The results indicated that student of both was not significant (p-value > 0.05). The results were in table 3.

**Table 4** The comparison of mean differences of behavior of waste management and consider with sex differentials

Behavior of Reduce Waste	Sex	n	$\bar{x}$	S.D.	d.f.	t	p-value
Education	Male	42	3.89	0.514	28.000	0.203	0.489
	Female	95	3.85	0.464	27.715		
Engineering and Technology	Male	63	3.77	0.481	28.000	0.440	0.768
	Female	37	3.69	0.538	27.664		

**Note:** \* Significant level at 0.05

The table 4 showed that student (male and female) of sample was not significant in waste reduction behavior (p-value > 0.05).

**Table 5** The comparison of mean differences of behavior of waste management and consider with age, Faculty, Major and Year of studying differentials

Variable	Source of Variance	SS	d.f.	MS	F	p-value
Age	Between groups	0.437	2	0.261	0.745	0.000*
	Within group	78.635	234	0.333		
Faculty of studying	Between groups	0.053	1	0.053	0.156	0.693
	Within group	79.019	235	0.336		
Major of studying	Between groups	2.631	6	1.569	5.831	0.426
	Within group	76.441	230	0.321		
Year of studying	Between groups	0.915	3	0.469	0.862	0.000*
	Within group	78.157	233	0.330		

**Note:** \* Significant level at 0.05

The table above showed that factors of age and year of studying was significant in behavior of waste management with 3Rs technique (p-value < 0.05). When the sample were age and year of studying differentials. The sample were 22 years old and was

studying in the fourth year were more behavior of waste management with 3Rs technique. The factor of major and faculty of studying was not significant in behavior of waste management with 3Rs technique (p-value > 0.05).

**Table 6** The comparison of correlations between of perception of environmental news, motivation to reduce waste, segregation and reuse of solid waste and attitudes towards waste management with behavior of waste management

Group of Sample	Behavior of Waste Management	Perception of Environmental News		Motivation to Reduce Waste		Attitudes Towards Waste Management	
		r	p-value	r	p-value	r	p-value
Education	3Rs	0.684*	0.000*	0.679*	0.000*	0.691*	0.000*
Engineering and Technology	3Rs	0.552*	0.000*	0.621*	0.000*	0.677*	0.000*

**Note:** \* Significant level at 0.05

The table 6 showed that perception about the environmental news, motivation to reduce, sorting and reuse of solid waste and attitudes towards waste management at the significance level of 0.05. Moreover, the above variables were positive correlations to behavior in solid waste management by 3Rs technique of students at the significance also.

## Discussion

The study on effective factors to behavior in solid waste management by 3Rs technique of the students in education and engineering and technology group, Vongchavalitkul University found that

1) Perception about the environmental news of students, showed average score at moderate level. The both sample has perception about the environmental news were much level via television, internet, courses of learning about the environment and perception about the environmental news via radio, publicity label, newspaper, journal,

voices along the lines of the residential community, respectively. Which consistent with Sutthiphapa, Yuenyong, and Ukham (2016) found that the samples was perception very high frequency of environmental news had higher behavior of solid waste management than the samples was less perception because attention and follow up especially news on television, newspapers, internet, publicity and journals related to the environment. In addition, consistent with Pumpinyo and Koojaroenprasit (2017) by interviewing stakeholders in the municipal waste management sector in Pranakorn Sri Ayutthaya municipality the results found that the perception of information with yourself about garbage separation and reuse waste on the media such as television, internet or newspaper. The majority of households are sorting waste up to 83.8% also.

2) Attitudes towards waste management was moderate level. The both sample was attitudes towards waste

in solid waste management was good level. In solid waste disposal, refuse collection and separation of solid waste, consistent with Niammanee and Puntura (2006) found that the samples was different perception of information had different the behavior of solid waste management (waste reduction, recycle and waste separation). The people was good perception of information, more behavior of solid waste management than the people was less perception of information. This is consistent with theory of relationships of knowledge, attitude and behavior, It was change continuous. If the recipient is exposed, it will cause knowledge after that it will result in vision and behavior.

3) Motivation to reduce waste, segregation and reuse of solid waste was good level. The both sample was motivation to reduce waste because help to keep environment from degrading the fastest, incentive to reduce natural resources and motivation to separate waste, consistent with Wittayathaworawong and Khumdet (2011) found that the knowledge about sorting of solid waste (Environmental issues are important and affect the motivation for waste separation) Pollution Control Department, Ministry of Natural Resources and Environment (2015) found that at present reduction and utilization of waste is not effective, causes of waste sorting (the public relations campaign for consumers to separate waste not enough and discontinued.

Relevant agencies must find the ways to motivate such as facilitating the separation of waste by supplying individual household utensils, or rewards individuals will receive from waste sorting, because expression of behavior depend on internal and external factors such as motivation.

4) Behavior of waste management with 3Rs technique was good level. The sample of education was behavior of waste management in Recycle, Reuse and Reduce, respectively. The sample of engineering and technology was behavior of waste management in Recycle, Reduce and Reuse, respectively consistent with theory of Bloom, Hastings, and Modaus (1971) and Gisele (2010) found that behavior was expression based on attitudes toward a situation. The results showed that the sample had attitude toward waste management in solid waste at the good level. As a result, the behavior of solid waste management was good level.

A comparison of gender factor affect to behavior of waste management found that female and male students in both groups was behavior of waste management not different consistent research with Rujasiri (2012) and Rattanawibul (2000) study on behavior of waste management of students and people in the community found that gender factors not relationship with behavior of solid waste management. Age and year of studying factors found that the student was different age and year of study had different behavior of

waste management. Faculty and major of studying factor found that the student was different faculty and major of studying had not different behavior of waste management consistent research with Ninchat (2002) study on practice on reducing solid waste of students of Srinakharinwirot University found that the sample was different year of study had not different practice on reducing solid waste.

5) The study on correlations between perception of environmental news, motivation to reduce waste, sorting and reuse of solid waste and attitudes towards waste management with behavior of waste management by 3Rs technique found that positive relationship in sample group of good perception of environmental news affect to behavior of waste management in good level more than sample group of less perception of environmental news because the students receive of environmental news via television, newspaper, internet, radio, journal, voices along the lines of the residential community effect to knowledge, motivation, attitude, and good behavior or expression consistent research with Kaewprayoon, Sawatkaew, and Thepvarin (2018) found that knowledge, receive of environmental news and attitudes towards solid waste management in Kuanlang Municipality, HatYai District, Songkhla province, had positive relationship with behavior of waste management significant level (0.05) and

consistent research with Klinhom (2010) study on knowledge, attitude and behavior of waste management found that behavior is very desirable. It shows that the norms of society and personal habits that causes behavior and Songklang (2014) found that the schools should more support about environmental education and waste management for students. Raising awareness of students about waste management in various methods such as less use, reuse, recycle and should be educated on how to properly dispose of waste for the students will manage a waste accurate and sustainable follow by Pumpinyo and Koojaroenprasit (2017) found that participation reduce solid waste and reduces the use of raw materials and reduces environmental problems consistent mission of Vongchavalitkul University (2017) in conservation of natural resources and environment, Environmental awareness will be a driving force for international and national societies must to work together on concrete measures to preserve environmental quality. Therefore, the curriculum should include subjects of environmental in the curriculum for students will study about environmental knowledge. The main mechanism to create knowledge and understanding of people as well as to develop new knowledge and consistent with 3Rs + Re-Think (3Rs+1) theory, in accordance with Thailand 4.0 policy, at present and in future.

## Conclusion

In conclusion, factors influencing to behavior in solid waste management by 3Rs technique of undergraduate student in education and engineering and technology groups, Vongchavalitkul University include personal factors (sex, age, faculty, major and year of studying), the perception about the environmental news of students, motivation to reduce waste, segregation, reuse of solid waste and the attitude in solid waste management of students. The students with different age and years of study showed differences in behavior in solid waste management by 3Rs technique at the significance level of 0.05. Moreover, the perception about the environmental news, motivation to reduce solid waste, solid waste segregation and reuse of solid waste, and attitude in solid waste management of students were positive relation to behavior in solid waste management by 3Rs technique of students at the significance level of 0.05.

## Suggestions and Recommendations

According to the study, the useful suggestions for further development and improvement were demonstrated as follows:

### 1) Recommendation for this study

From the results of the study, there should be promote and educate on solid waste management for students of all levels,

especially the reduction and utilization of solid waste. The campaign on solid waste management. Proper disposal of waste, if students get the right knowledge will result in good behavior.

### 2) Recommendation for further study

There should be a study of 3Rs+1 theory based on the principles of waste management in Thailand 4.0 policy, stresses that main problem in propel is “man” because man dump garbage “R is Re-Think” so, think is idea that if people do not think it's propel not.

## Acknowledgements

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