

ENVIRONMENTAL AWARENESS OF RECYCLING AT HIGHER EDUCATIONAL LEVEL: YARMOUK UNIVERSITY/JORDAN AS A CASE STUDY

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ABSTRACT

Sustainability and restoration of the natural conditions always have been a major concern of the decision makers. The main objective of this study is to assess the environmental awareness of students in regard to recycling. To collect data, the researcher used a questionnaire administrated on 1151 students from Yarmouk University in Jordan. The questionnaire was designed initially to measure the level of awareness and sources of knowledge about solid waste recycling. It's also was designed to identify the willingness of students for joining future recycling projects. Results of the study indicated that students have basic knowledge about recycling but, what, how or where to recycle is still immature. This weakness is due to the non-existence of effective recycling programs in Jordan yet and the limited exposure of students to recycling programs in the region. The study indicates also that students have positive attitude toward participation, contribution and attending different programs deal with recycling, where 88.6% of students show an interest to participate and about 72% agree to attend. Total means for "Measuring individuals" attitudes toward environmental issues reached (3.74 out of 5) which is considered as a high agreement degree, whereas, the total means for "Measuring behaviors toward environment and its issues" reached to (2.72 out of 5) which in turn is a medium agreement. This study suggested that Yarmouk university could organize campaigns, seminars and workshops to increase the level of awareness of the students and to motive them to recycle.

KEYWORD: Environmental Awareness, Recycling, Yarmouk University, Jordan

INTRODUCTION

Sustainability focuses on how used materials can feedstocks for the future manufacture of new products (Selke, 1990). Recycling is one of these concepts which incredibly became at top of focus interest in the societies due to its assistance in reduction of the waste material in one hand, and reduce its negative impact on the environment, human health and safety in the other hand (Tucci *et al.*, 2006). In the last decades, recycling took the priority in modern waste management as recycling is one of the three components of the waste hierarchy "Reduce, Reuse, Recycle". Basically, recycling is a sustainable process which reduces the amount of waste by turning the recyclable material

into new products based on its types.

A rapid modernization in Jordan encountered by growing in population which resulted in increasing volume of solid wastes and associated logistical difficulties, the steady growth in the cost of waste management and the risk to human health. A national waste management plan is a main demand especially with the fact that less than 5% of Jordan's solid waste being recycled. This plan is essential to be set up in order to reduce waste and encourage recycling. Generally speaking, solid wastes in Jordan is dominated by organic content, with minors of combustible matter (consisting of plastic and paper comprising 90% of the total waste (METAP, 2004). The daily generation of municipal solid waste in Jordan is estimated around 3800

tons/day (Daradki, 2008) with 0.9 kg/capita/day. Solid wastes in Jordan are disposed in 20 sites (Alfayez, 2008) allocated as follows: The northern governorates of Jordan (Irbid, Jerash, Mafraq and Ajlun) contribute about 780 tons/day, the central governorates (Amman, Zarqa, Balqa, ...) produce about 2620 tons/day, and the southern governorates (Aqaba, Maan, Karak and Tfila) contribute about 400 tons/day, (Manoj Chopra, 2001; Daradki 2008; METAP, 2008).

Universities are perfect places to test the awareness's and willingness of the society to help in the recycling processes. For instance, Yarmouk University (YU) is one of the largest and most prestigious state-supported educational institutions in Jordan with more than 30,000 students coming from a wide spectrum of cultures and backgrounds.

Gathering information through questionnaires from the campus students is the key in this study to assess the level of environmental awareness among university community and their perspective of recycling. The results of the questionnaire will be helpful to establish an awareness program that is oriented toward raising the attention of students to solid waste management and eventually laying the ground for a recycling project on-campus.. Additionally, the results will be a guide to understand the possible future development of students to achieve the best results in the recycling program.

METHODOLOGY

Data collection

Data were collected from questionnaires distributed both online and in paper to March 2015. A total of 1151 students were randomly surveyed using these questionnaires. The questionnaire composed of 31 questions which measured by a 5-point Likert type scale in ascending order (1. Strongly Disagree, 2. Disagree, 3. Slightly Agree, 4. Agree, 5. Strongly Agree). This method followed the standard methods of Vining and Ebreo, 1992; Huang, Zhang *et al.*, 2006; Vicente and Reis, 2007; V. Femia 2009.

The questionnaire was divided into three parts. The first part, collected personal information with main focus on age, gender, faculty, and specialization. Part two was designed to measure the awareness's about recycling (practices, benefits, responsibilities) and testing the availability of the facilities and requirements for recycling. The third

part was performed to study the willingness for recycling in university, and the willingness for attending and participating in recycling programs.

Data Analysis

All matters of this research is going for explanation and understanding of the collected data. The collected data in this paper is one of two; qualitative and quantitative. It means that the data have been analyzed either by the descriptive methods or by multivariate analysis techniques (Blaxter *et al.*, 2001). The descriptive methods of analysis were used to define precisely the demographic variables and to understand the characteristics of the acquired data and sample. The SPSS statistical software was used in the analysis, to provide descriptive analysis including statistical measures and graphs..

Respondents

A total of 1251 students filled out the questionnaire. There were 1151 valid responses and 100 questionnaires were excluded from the analysis because of incompleteness or randomness in the answers.

Reliability

The reliability of the questionnaire has been measured by the Cronbach's Alpha which is defined mathematically by the equation :

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k S_i^2}{S_T^2} \right)$$

Where k is the number of items, S_i^2 is the variance of the i - item and S_T^2 is the variance of the total score. The possible values of α is between 0 and 1, where "zero" of refers to non-reliable questionnaire while "one" refers to reliable questionnaire. A value of between 0.70 and 0.80 is considered as an acceptable value, while values below 0.70 are to be questionable values. In this study the Cronbach's Alpha is =0.839, which above the largest accepted values. Furthermore, the Cronbach's Alpha was calculated using the split-half method the Part 1 (0.801, N1=16), Part 2 (0.817, N2=15). The Cronbach's Alpha's when item is deleted are minimum= 0.83 and maximum= 0.842.

RESULTS AND DISCUSSION

Demographics

Data of eight variables were obtained; gender, age,

study level, faculty, major, smoking, living place, and studying environmental courses (Table 1). The largest interval that have been tested by questionnaires is females, youth, from the first year study, widely distributed in the faculties, most of students live villages, non-smokers, and finally most of students never been attended any course regarding environmental issues.

In details, the highest value of "gender" goes for Female by frequency (784) and percentage (68.1%), on the other hand, the lowest goes for male by frequency (367) and percentage (31.9%). The age, the second variance, shows that the highest value is given for youth (less than 25) by frequency (1134) and percentage (98.5%), whereas the lowest value is less than or equal to 25 by frequency (17) and percentage (1.5%). When study level variance is

obtained, the result shows that the highest value goes for the First year students by frequency (717) and percentage (62.3%), while the lowest is for the last year students (Fifth year and more) by frequency (36) and percentage (3.1%). Next variable is Faculty, Dispersion is shown where the category (Other) is dominated by frequency (354) and percentage (30.8%), in the time that the lowest belongs to Sports Faculty by frequency (95) percentage (8.3%). Major is another criteria and shown as same as faculty represents, the highest is (Other) by frequency (1007) percentage (87.5%), but the lowest is (Earth and Environment Sciences) by frequency (20) percentage (1.7%). Students in Science Faculty feel more responsible for recycling, where their knowledge for recycling appears more than other faculties. The questionnaire shoed that

Table 1. The demographic composition of the survey

variables	Categories	Frequency	percent
Gender	male	367	31.9
	Female	784	68.1
	Total	1151	100.0
Age	Less than 25	1134	98.5
	Less than or equal to 25	17	1.5
	Total	1151	100.0
Study level	First year	717	62.3
	Second year	193	16.8
	Third year	97	8.4
	Fourth year	108	9.4
	Fifth year and more	36	3.1
	Total	1151	100.0
Faculty	Science	125	10.9
	Arts	224	19.5
	Economics	189	16.4
	Sharia	164	14.2
	Sports	95	8.3
	Other	354	30.8
	Total	1151	100.0
Major	Chemistry	30	2.6
	Life Sciences	67	5.8
	Physics	27	2.3
	Earth and Environment Sciences	20	1.7
	Other	1007	87.5
	Total	1151	100.0
Are you smoker?	Yes	205	17.8
	No	946	82.2
	Total	1151	100.0
Place of living	City	556	48.3
	Village	595	51.7
	Total	1151	100.0
Have you ever studied a course specialized for environment and its issues?	Yes	277	24.1
	No	874	75.9
	Total	1151	100.0

82.2% of the respondents do not smoke. More than half of students (51.7%), are living in the rural areas rather the main cities. The results showed that more than 75% of the students did not study a specialized course related to the environment and its issues.

Background knowledge of recycling

It is found from the current study that most participants (87%) have high to moderate level of knowledge and good background concerning the recycling (Table 2). It was quite a surprise to have only 13% of the participants with low levels of recycling-related information.

Table 2. The distribution of recycling related information

Information level	Number	%
Low	130	13
Moderate	730	73
High	140	14
Total	1000	100

It is notable that the majority of students have never attended any course deals with environmental issues, but they have basic information on recycling which may shed light on sources of recycling-related knowledge. The survey showed that mass media plays a vital role in this regard. 45.4% of the participants indicated that they rely on TV programs to get recycling-related information on regular basis (Table 3), whereas 41.4% of the participants rely on TV programs as a secondary source with a mean reached 3.52 Radio programs as other important source, but with less degree. The seminars and scientific lectures are taken to considerations, where about 57.3% of students rely on them permanently and only 20.3% of them affected in part. This is due to the fact that the majority of respondents were young and well

educated. There are other sources such as the Internet and scientific books, newspapers and magazines, it seems these tools became neglected in effect. These results confirm that such media like TV and radio communication have of a large force, if properly used, in the provision of environmental information and change people's behavior towards dealing with the various components of the ecosystem and the environmental elements.

The total means for "Measuring individuals' attitudes toward environmental issues" reached (3.74) by high agreement degree. Table (4) shows that the highest means reached (4.33) out of (5) for item (4) states "It is my responsibility to maintain a safe and clean environment" by high agreement degree, then for item (2) "Concerning about environmental issues locally, regionally and globally is one of the fundamental responsibilities of everyone on the planet.", by high agreement degree too (means 4.19). In the meanwhile, the lowest mean was (2.83) for item (10) that states "I received instructions related to recycling process during my study at the university" by medium agreement degree indicating that university, which is the educational institute, not taken to it consideration the basic dealings with the environment.

When practical steps toward recycling and solving environmental problems was under test, the total means for "Measuring behaviors toward environment and its issues" domain reached (2.72) by medium agreement, which is relatively low. Table (5) shows that the highest means reached (3.17) out of (5) for item (4) "I am interested in calls that aim to protect the environment from pollution" by Medium agreement degree, then for item (7) "I sort waste in an allocated wastebasket", by Medium agreement degree (means 3.05), And the lowest means was (2.42) for item (12) "We conduct scientific experiments, workshops or lectures related

Table 3. Sources of recycling related information among participants and their reliance level

Information source	Dependence degree						means
	Always		Sometimes		Rarely		
	Number	%	Number	%	Number	%	
TV programs	523	45.4	476	41.4	152	13.2	3.52
Radio programs	725	63	184	16	242	21	2.81
Seminars and lectures	659	57.3	234	20.3	258	22.4	2.97
The internet	603	52.4	256	22.2	292	25.4	2.19
Scientific books	521	45.3	398	34.5	232	20.2	1.38
Magazines and newspapers	501	43.5	446	38.7	204	17.8	1,27

"Measuring individuals' attitudes toward environmental issues" domains

to recycling process at the university" by medium agreement degree. These results send us to the same point that shortage of lectures, workshops and scientific experiments can be a diagnostic for less

interesting in recycling.

The Willing for Recycling

Answering if you would contribute to separate

Table 4. Means and standard deviation for each domain of "Measuring individuals' attitudes toward environmental issues" and total means of them (n= 1151)

No	Items	Mean	Standard. Deviation	Rank	Agreement Degree
1	My responsibility for the environment is to engage effectively in environmental issues and participate in finding solutions for environmental problems and reducing their aggravation.	3.98	0.95	6	High
2	Concerning about environmental issues locally, regionally and globally is one of the fundamental responsibilities of everyone on the planet.	4.19	0.93	2	High
3	I can make a change in my surrounding community and participate with others in protecting and preserving the environment.	4.01	0.92	4	High
4	It is my responsibility to maintain a safe and clean environment.	4.33	0.93	1	High
5	It is my duty to participate in awareness campaigns about the necessity of waste recycling in campus.	3.88	0.93	8	High
6	I encourage the idea of collecting and recycling used paper, glass and cans.	4.15	0.94	3	High
7	Universities should reorient their educational and teaching programs to serve environmental issues and ways of eliminating solid waste, and focus on recycling process is one of universities' duties.	4.00	1.00	5	High
8	Academic courses that you have studied do not care about environmental issues and recycling requirements.	3.56	1.05	15	Medium
9	The role of university in studies, research and activities that are concerned with the reduction of solid waste and methods of recycling is not at the required level.	3.64	1.04	14	Medium
10	I received instructions related to recycling process during my study at the university.	2.83	1.21	19	Medium
11	Universities focus on research that is concerned with protecting environment, reducing the amount of solid waste and waste disposal methods.	3.15	1.16	18	Medium
12	The courses that you have studied are insufficient to raise awareness about waste disposal and recycling.	3.51	1.09	16	Medium
13	Introducing of environmental concepts in university courses helps reducing environmental pollution.	3.90	1.03	7	High
14	I am interested in recycling	3.83	1.01	10	High
15	I prefer using paper bags for shopping rather than plastic bags.	3.88	1.09	8	High
16	My family has sufficient awareness and knowledge about recycling.	3.66	1.08	12	Medium
17	Audiovisual and readable media in Jordan help to promote environmental awareness among community individuals.	3.65	1.13	13	Medium
18	The problem of solid waste in the university is not urgent.	3.17	1.20	17	Medium
19	Waste has a commercial and industrial importance.	3.71	1.17	11	High
	Total Means	3.74	0.56	-	High

"Measuring behaviors toward environment and its issues" domain

recyclable from non-recyclable waste programs was 81.3% agree, where 18.7% think it is the responsibility of the University. On the other hand 88.6% of students agree to participate and 72% of them agree to attend program for recycling awareness. This high percentage reflects the high willingness of students to be involved in the environmental issues.

Statistically, two hypotheses have been tested; first one is the attitude of Yarmouk University students toward the environment and its issues may vary according to gender, study level, or place of living. The second hypothesis is how the behavior of Yarmouk University students can be different

from the environment according to (gender, study level, Place of living).

To test the first hypothesis the 3Way- ANOVA test was used and the results are shown in Tables 6-7.

There are no statistically significant differences between attitudes of Yarmouk University students towards the environment and its issues vary according to study level at ($\alpha \leq 0.05$).

There are statistically significant differences between the attitudes of Yarmouk University students towards the environment and its issues vary and their Variable (Gender) at ($\alpha \leq 0.05$), where (F) value reach (12.396) and sig (0.000), and in favor of (female) where mean was reach (3.78).

Table 5. Means and standard deviation for "Measuring behaviors toward environment and its issues" domain items and total means of them (n= 1151)

No	Items	Mean	Stan. Dev.	Rank	Agreement Degree
1	I dispose spent batteries by throwing them in non-populated areas.	2.60	1.35	6	Medium
2	I collect used papers and reuse them.	2.50	1.24	10	Medium
3	I use plastic or paper cups more than using my cup of coffee or tea at work or home.	2.94	1.25	4	Medium
4	I am interested in calls that aim to protect the environment from pollution.	3.17	1.16	1	Medium
5	I participate in finding appropriate solutions to reduce the problem of environmental pollution at my university.	2.96	1.22	3	Medium
6	I talk with my friends about environmental issues and remind them to practice environmentally friendly behaviors.	2.85	1.28	5	Medium
7	I sort waste in an allocated wastebasket.	3.05	1.38	2	Medium
8	I benefit from household waste.	2.55	1.26	9	Medium
9	I buy recycled products.	2.60	1.17	6	Medium
10	I look for an environmental topic about recycling process to discuss it during my study at the university.	2.56	1.22	8	Medium
11	I participate in scientific trips related to the issue of recycling during my study at the university.	2.46	1.27	11	Medium
12	We conduct scientific experiments, workshops or lectures related to recycling process at the university.	2.42	1.29	12	Medium
	Total Means	2.72	0.79	-	Medium

Table 6. Means and standard deviation for attitudes of Yarmouk University students towards the environment and its issues vary according to (gender, study level, Place of living)

Variable	Category	N	Mean	Standard. Deviation
Gender	Male	367	3.65	0.68
	Female	784	3.78	0.50
Study level	First year	717	3.77	0.52
	Second year	193	3.67	0.65
	Third year	97	3.71	0.54
	Fourth year	108	3.71	0.67
	Fifth year and more	36	3.66	0.58
Place of living	City	556	3.69	0.56
	Village	595	3.78	0.57

There are a statistically significant differences between the attitudes of Yarmouk University students towards the environment and its issues vary and their Variable (Place of living) at ($\alpha \leq 0.05$), where (F) value reach (5.192) and sig (0.023), and in favor of (Village) where mean was reach (3.78).

For the second hypothesis about the detection of how the behavior of Yarmouk University students can be differt toward the environment according to gender, study level, or place of living, the results are shown in Tables (8 and 9)..

There are no statistically significant differences between behaviors of Yarmouk University students are different from the environment according to study level at ($\alpha \leq 0.05$).

There are a statistically significant differences between the behavior of Yarmouk University students is different from the environment and their Variable (Gender) at ($\alpha \leq 0.05$), where (F) value

reach (6.244) and sig (0.013), and in favor of (male) where mean was reach (2.79).

There are a statistically significant difference between the behaviors of Yarmouk University students is different from the environment and their Variable (Place of living) at ($\alpha \leq 0.05$), where (F) value reach (8.013) and sig (0.005), and in favor of (Village) where mean was reach (2.78).

There are no statistically significant differences between behaviors of Yarmouk University students are different from the environment according to study level at ($\alpha \leq 0.05$).

There are a statistically significant differences between the behavior of Yarmouk University students is different from the environment and their Variable (Gender) at ($\alpha \leq 0.05$), where (F) value reach (6.244) and sig (0.013), and in favor of (male) where mean was reach (2.79).

There are a statistically significant differences

Table 7. Results of Analysis of Variance (3Way- ANOVA) for attitudes of Yarmouk University students towards the environment and its issues vary according to (gender, study level, Place of living)

Source	SS	DF	Mean Square	F- value	Pr
Gender	3.893	1	3.893	12.396	0.000
study level	1.742	4	0.435	1.387	0.236
Place of living	1.630	1	1.630	5.192	0.023
Error	359.261	1144	0.314		
Corrected Total	366.921	1150			

Table 8. Means and standard deviation for behavior of Yarmouk University students towards the environment and its issues vary according to (gender, study level, Place of living)

Variable	Category	N	Mean	Standard. Deviation
Gender	Male	367	2.79	0.87
	Female	784	2.69	0.75
Study level	First year	717	2.75	0.80
	Second year	193	2.72	0.86
	Third year	97	2.67	0.70
	Fourth year	108	2.67	0.73
	Fifth year and more	36	2.44	0.81
Place of living	City	556	2.66	0.76
	Village	595	2.78	0.82

Table 9. Results of Analysis of Variance (3 Way- ANOVA) for behavior of Yarmouk University students is different from the environment according to (gender, study level, Place of living)

Source	SS	DF	Mean Square	F- value	Pr
Gender	3.891	1	3.891	6.244	0.013
study level	5.044	4	1.261	2.023	0.089
Place of living	4.994	1	4.994	8.013	0.005
Error	712.989	1144	0.623		
Corrected Total	725.454	1150			

between the behaviors of Yarmouk University students is different from the environment and their Variable (Place of living) at ($\alpha \leq 0.05$), where (F) value reach (8.013) and sig (0.005), and in favor of (Village) where mean was reach (2.78).

CONCLUSION

This article assesses the awareness of students in universities and their willing for recycling. High levels of knowledge were observed among the students at Yarmouk University concerning recycling and its related issues. However, they hold a positive attitude toward the willing for learning more. More than 81% of the respondents have been strongly agreed that they would like the university to set up proper handling and recycling programs.

In this study, students of the Science Faculty feel more responsible for recycling, where their knowledge for recycling appears more than in other faculties. Finally, you cannot expect people to do recycling in the university, if you did not provide them with the basic facilities needed and without teaching them how to recycle. Many agreed that awareness program should be started to learn them about recycling benefits and to teach them how to recycle. It was found that mass media plays a vital role in providing participants with recycling related information.

Based on the results, the study recommends that Yarmouk University has to involve the topics of environmental sustainability including recycling in its curricula. Additionally, training students to recycle is highly recommended. The university could organize campaigns, seminars and workshops to increase the level of awareness of the students and to motive them to recycle.

REFERENCES

- Alfayez, E. K. 2008. Solid Waste Management in Jordan: Present Situation and Future Challenges. *Middle East Recycling, Waste and Environmental Management Exhibition & Congress*, Kempinski Hotel, Dead Sea - Jordan.
- Al Kofahi, E.A 2013. Recycling in Jordan "Recycling Programme at the Jordan Environment Society"
- Blaxter, Loraine, Christina Hughes and Malcolm Tight, 2001. *How to Research Second Edition*. Philadelphia: Open University Press.
- Daradki, G. A. 2008. The Jordanian experience in the management of solid waste, Corporation for Environmental Protection Arabic report.
- Femia, P. O. C. 2009. Waste and Recycling Behaviors - Do Domestic or Commercial Recycling Programs Raise Awareness and Cause Best Practice. Sardinia 2009, Twelfth International Waste Management and Landfill Symposium S. Margherita di Pula, Cagliari, Italy, CISA.
- Huang, P. and Zhang, X. 2006. Survey and analysis of public environmental awareness and performance in Ningbo, China: a case study on household electrical and electronic equipment. *Journal of Cleaner Production*. 14 (18) : 1635-1644.
<http://graduatestudies.yu.edu.jo/html>.
- Manoj Chopra, D. R. and Wail Abu-El-Shaar, 2001. US-Jordan Municipal Solid Waste Management Collaborative Research, The National Science Foundation. VA 22230.
- METAP 2004. Regional Solid Waste Management Project in Mashreq and Maghreb Countries, Jordan.
- METAP 2008. Development of Strategic Framework for Private Sector Participation in MSW Management report. Jordan, Ministry of Environment
- Selke, S. E. M. 1990. *Packaging and the Environment: Alternatives, Trends and Solutions*. Lancaster: Technomic Publishing AG.
- Tucci, A., Rambaldi, E. and Esposito, L. 2006. Use of Scrap Glass as Raw Material for orcelain Stoneware Tiles. *Advances in Applied Ceramics*. 105 (1) : 40-46.
- Vicente, P. and Reis, E. 2007. Segmenting households according to recycling attitudes in a Portuguese urban area. *Resources, Conservation and Recycling*. 52 (1) : 1-12.
- Vining, J. and Ebre, A.o 1992. Predicting Recycling Behavior from Global and Specific Environmental Attitudes and Changes in Recycling Opportunities. *Journal of Applied Social Psychology*. 22 (20) : 1580-1607.