International Journal of Psychosocial Rehabilitation, Vol. 23, Issue 02, 2019
ISSN: 1475-7192

Recycling Efficiency and Waste Minimization through Students' Behaviour on the University of Leicester Campus

Rebeen Abdulkhaliq Abdullah[1], Zana Majed Sadq[2], Bestoon Othman[3*] and Dastan Tareq Faeq[4]

Abstract*---*Waste is generated from all materials placed on the market in different ways. The volumes of municipal waste in general and in the institutions of higher education in particular, one of which is a case study in this research, have been rising over the years almost everywhere in the world. This research is an investigation of recycling efficiency and waste minimisation through students' behaviour on the university of Leicester campus, conducted by a questionnaire and an interview survey. The purposes of the study are: first, to examine the students' environmental awareness and determine its impact on waste management system; second, to demonstrate the impacts of students' attitude and behaviour towards recycling and waste minimising in the campus; finally, to identify factors that affect students' recycling and waste minimising habits, such as demographic, external, and internal factors. The results show that the level of students' environmental awareness is low due to lack of knowledge about environmental sustainability. Another finding was students are willing to carry out recycling and pro-environmental behaviour; nevertheless, more facilities and more efforts are needed for students to gain a better understanding of environmental sustainability and waste management. Moreover, the main barriers preventing students from recycling are lack of information about environmental protection and lack of facilities on the campus.

Keyword: *Recycling, Waste Minimization, Behaviour, University of Leicester*

I. INTRODUCTION

Over the past century, since environmental issues have begun to occur, the concept of environmental sustainability has become more and more popular, and now it is prevalent in national and international policies, curriculum documents, and conservation strategies. For example, in England studying the environment is required in schools by the National Curriculum to develop pupils' awareness and respect of the environment [32]. Hundreds of studies have considered the question of why people do or do not recycle. Thomas and Sharp (2013) [40] determined many factors that have an influence on the decision to recycle, such as social-demographic, economic, attitudes, value, behaviour, parents and friends, communal norms, facilities, and knowledge. In addition, many authors [5, 39,22, 16] have studied specific behaviour that affect pro-environmental behaviours, and they found that one single

[1]Department of Tourism Foundation Administration, Koya Technical Institute, Erbil Polytechnic University, Kurdistan - Iraq.

[2]Department of Management and Accounting, Faculty of Humanities and social science, Koya University, Koya KOY45, Kurdistan Region – F.R. Iraq Department of Legal Administration, College of Business and Economics, Lebanese-French University, Kurdistan Region – F.R. Iraq

[3]*Department of Business Administration, Koya Technical Institute, Erbil Polytechnic University and Universiti Tun Hussein Onn, Malaysia. E-mail:Bestoon2011@yahoo.com

[4]Department of Radiology, Koya Technical Institute, Erbil Polytechnic University, Kurdistan - Iraq.

Received: 10 Feb 2019 | Revised: 09 Mar 2019 | Accepted: 30 Mar 2019

attitude can have an influence on pro-environmental behaviours. Other factors such as gender and culture play an important role in determining the behaviour and attitudes of those who recycle [27,30].

It is clear that the rapid growth in population and urbanisation has led to an increase in the volume of waste being generated. In contrast, this increase of population and waste generated is not equal with the income of the local municipalities for waste management [46].

In the UK, according to the Department for the Environment, Food and Rural Affairs [14] 177 million tonnes of waste (all types of waste) are generated per year in England alone and 15 million tonnes are recycled per year. Although, this costs businesses and households' money, it also causes environmental degradation, such as producing methane, which is a powerful greenhouses gas. Therefore, the "Waste Prevention Program for England" [14] was published encouraging businesses to build waste reduction into their design, suggesting alternative business models, and improving products. Another aim of the program is to encourage culture by making it easier for businesses and people to find out how to reduce their waste, and to use products with green labels, repair broken items, reuse items, and to prevent food waste, which is a priority under the "Review Waste Policy in England 2011" [11] and the "Waste Prevention Program for England 2013" [12].

The overall aims of these programs are to increase environmental awareness among the population, to protect the environment and to encourage businesses to produce items which are environmentally friendly at a low cost. In addition, the new update of Defra (2014) supports recycling, not just to increase the amount of recycling, but to improve the quality of recycling and create a stronger market for the recycled materials. Although, the UK government has some legislation that controls businesses regarding what they produce, the development of more voluntary responsibilities to ensure goods are recyclable to minimise waste in general is desirable. In addition, the UK government maintains a legal compliance from October 1st 2007 in that all organisations, institutions, and businesses are responsible for pre-treating their waste stream before it goes to landfill [2].

The current papers and environmental organisations in the UK have determined that the amount of waste generated has decreased compared with previous years [14]. For example, only 7% of municipal waste was recycled in 1997/8 in England, whereas, this figure had risen dramatically to 36.3% in 2007/8. Similarly, 52% of the commercial and industrial waste was recycled in 2009, compared with 42% in 2002/3 in England. Additionally, in 2002/3, 41% of commercial and industrial waste was sent to landfill, while this decreased significantly to 24% in 2009 in England.

Higher education institutions, as defined by Zhang (2011), are semi-autonomous institutions that define their own purposes. The waste management process in the higher educational institutions might be easier, because a high education level tends to increase the possibility of taking pro-environmental activities [30]. Therefore, over the last decades, these institutions have demanded an increased awareness among their societies. To achieve this goal, the higher education institutions should first improve the level of awareness of their students and staff, by carrying out research to increase societies' awareness towards environmental sustainability [47].

II. LITERATURE REVIEW

A. Key concepts

To gain a better understanding of the topic, a number of concepts are described include; waste, waste types, and waste management.

Waste and waste types

Waste is a dynamic concept that can be defined in different ways. It has been described as "an item, material or substance you as an individual consider useless at a given time and place" [43]. Furthermore, the Environmental Protection Act (1990) has a legal definition for waste, which includes anything that "the holder discards or intends or is required to discard" but the term "waste" is not used to describe items that can be reused or items that have been fully recycled.

Waste management

Waste management is the process of treating waste and in particular includes waste generation, prevention, monitoring, transportation, reuse, reduce, recycling and land filling [33].

B. Pro-environmental behaviour

When we talk about behaviour, it is important to differentiate between general behaviour and the behaviour of a particular individual from that which is described in environmental psychology papers. The environmental psychology authors [19,22,39,5,18] believe that it is better to ask questions about a specific behaviour rather than general behaviour towards the environment. Jensen (2002) and Mair and Laing (2013) [24] defines pro-environmental behaviour as a type of behaviour that reduces an individual's negative impact on the environment.

C. Waste management in the institutions of higher education

Although many studies have been conducted on the solid waste management of households or municipals, and a small number on the organisational sector, even fewer studies exist for solid waste management in the higher educational institutions, particularly on university campuses.

There are several ways to reduce the negative impacts of human activities on the environment through the institutions of higher education. Managing waste is one of the criteria of reducing the negative effects on environment. Most university campuses have proposed or participated in programs to reduce negative environmental effects [4]. There are differences in waste management between the academic organisations, which depend on the environmental legislations in each country. For example, the UK government has a legal compliance since October 1st 2007 that all organizations and businesses should be responsible for pre-treatment of their waste stream before it goes to landfill [2]. As a result, all the universities now have competition to reduce their waste on their campuses.

To achieve this goal on university campuses, implementing solid waste management programs are one of the best options for enhancing sustainability and reducing the volume of waste. Armijo et al (2008) believe that determining the sources of waste is highly important because the organisations can easily find the reasons of waste

generation and look for a solution. To indicate the amount of waste, some authors have used different methods such as “revising waste management records and visual waste valuation” [38,25, 42].

Smyth et al (2010) highlight that waste characterization studies offer a great incentive for evaluating waste generated from different ways and can easily identify the opportunities for reducing waste, waste composting, reusing and recycling. In the same way, other studies [10,6] indicate that waste characterization studies have an environmental value and can lead to environmental therapy, which makes people feel better in the green areas on the university campuses. Consequently, they assume that it is a cost-effective process if carefully planned.

D. University waste management programs

There are different programs to reduce the amount of waste that have been considered by the universities. The University of Idaho has an explicit program called Recycling, Surplus, and Solid Waste (RSSW) that has a great effect on minimising waste on the university campus. This program is a branch of the university facilities services, and it is responsible for management programs that relate to waste stream. Additionally, the program includes some partial waste programs, for example, “solid waste program, surplus program, hazardous waste/ universal waste program, recycling program, and lost and found program” [31, 3].

Espinosa (2008) [17] demonstrated another program in the Azcapotzalco campus of the Universidad AutonomaMetropolitana (UAM-A) called “Separacciónporun major UAMbiente”. “Segregation for a better UAM Environment” is the slogan of the program. The results of the program had a great value in separating different types of waste. Therefore, the Mexican law required execution of a similar program in municipal waste management. Smyth et al (2010) reported another program on the Prince George campus at the University of Northern British Colombia. The program is weather “reducing solid waste in higher education: The first step towards greening a university campus”. In this program, there are more green and sustainable activities on the campus. The aim of the program is to improve the general sustainability of the campus and the waste management program. The program is determining the amount of waste generated, increasing recycling and reducing waste through improving student and staff awareness.

In some universities in the United States of America (USA), another strategy implemented to reduce the amount of organic waste. For example, both Rutgers University and Brown University offer their food waste to local farmers, those who have animals to feed them[2]. Armijo used a different strategy for measuring and estimated waste on the campuses of the Autonomous University of Baja California (UABC). He used three common places in campuses namely buildings, gardens, and community centres such as cafeterias and dining rooms. All the data collected on the amount of waste generated in these three types of areas were based on three stages, firstly “daily projection of solid waste generation”, secondly “sampling of solid waste”, and thirdly “analysis of the amount of waste and types of waste” that was generated from the campus. The overall aim of this strategy was to increase recycling, minimise waste on the campuses and to improve awareness in the university community.

Received: 10 Feb 2019 | Revised: 09 Mar 2019 | Accepted: 30 Mar 2019

E. Waste hierarchy

Waste hierarchy is a method that has been implemented by organisations to manage the waste generated in the most accurate way. Waste reduction, recycling, and composting are the top three priority planning areas [7]. There are several processes in waste management systems, which start at waste generation and end at landfill. Waste generation: this is produce waste and involves production and distribution of products; Waste collection: in this stage, waste is collected in variety methods and sources and different materials; Recycling: all materials that can be recycled. Waste treatment: treating hazardous waste, such as thermal treatment and chemical treatment; Reuse: includes all the operation options of waste such as, composting waste for agricultural applications; landfilling: the amount of waste that cannot be reuse, recovered and recycled goes to landfill [36].

III. METHODOLOGY

The University of Leicester Campus was the study area for this research. For data collection, both quantitative and qualitative methods were used. Quantitative data was generated from questionnaires aimed at post-graduate students (primary data collection), and collection of data from the waste management office was secondary data. Qualitative data was obtained from interviews conducted with different people in different positions, for example, the waste manager, carbon and energy manager, PhD students of psychology and MSc students of different nationalities. A carefully-designed questionnaire was sent to most of the post-graduate students through different ways, firstly through social media such as Facebook. Secondly, the questionnaire was sent to students' university accounts. University email addresses were kindly supplied to the researcher by the library. Although the survey was sent to more than 200 students within two weeks, only 71 students participated in this survey. For the statistical measurement, particularly for collecting and analysing data from the questionnaire, the numbering system was used, for example, strongly agree (5), and strongly disagree (1).

In this paper, interview is another tool for collecting data, which is usually used as a method for social and educational research. However, there are different types of interviews, but the most common and main types of interviews are structured interview, semi-structured interview, and unstructured interview, also known as in-depth interview [8]. The semi-structured interview is the most commonly used type of interview used in qualitative research. All the participants in this interview had different positions and included two managers in the environment team, two PhD students, three MSc students from different countries, and the library café manger. All the candidates received the participant's consent form before starting the interview.

This enabled the data to be analysed using the Excel Software Program which was used to display results graphically. Additionally, SPSS version 20 was used to collect the data from the website and analyse the data to find the differences (correlation) between behaviour among males and females, and UK- and Non-UK- students as well.

IV. RESULTS

A variety of results were obtained from the questionnaire and interviews which are described in the following sections.

Received: 10 Feb 2019 | Revised: 09 Mar 2019 | Accepted: 30 Mar 2019

A. The response rate of UK and Non-UK students and males and females

The international students had the highest response rate of 65% compared with the local students which had a response rate of 35% (figure, 1 Left). Among these students, the difference between male and female participation is almost equal, which is 55% for males and 45% for females (figure, 1 Right). However, from the interview, there is an indication that participants' nationality, and thus culture, affects behaviour. According to the carbon and energy manager, "Most of the students contributing to the environment team programs are international students and mostly are female, because most of them do not have background information about environmental protection and waste management. In addition, he indicated that UK students participate in these programs less, because they studied the environment in schools".

At the same time, gender was not considered in the interview, and the residency variable was not further sub-divided into gender due to a small sample size.

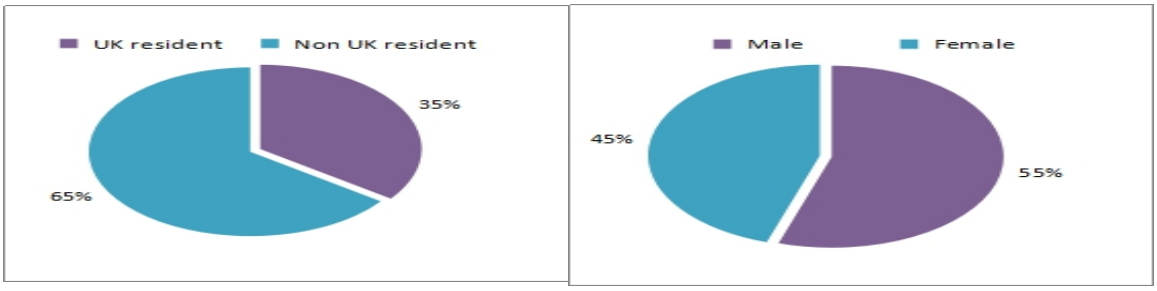

Figure 1: Comparisons between Nationality (left) and Gender (right) among Respondents (N=65).

B. Student's general knowledge about environmental sustainability

To evaluate students' general knowledge, some questions asked began with "to what extent do you agree with the following statements" (see appendix A). In addition, five options were given for all questions, which were strongly agreed, agree, neutral, disagree, and strongly disagree. This set of questions tested students' general knowledge and their attitudes toward environmental conservation. Simple statistical analysis was used to determine the results.

More than half of the students 56.9%, (N=65) strongly believed that recycling helps to conserve the environment, a result which was similar to the response to the question regarding recycling reducing the amount of waste going to landfill. Additionally, for both questions above there were no disagree and strongly disagree responses, which was unique to these questions. As many as 49.2% said that they did not know whether waste incineration discourages recycling. The same question demonstrated the differences between both male and female responses. For example, 41.3% (N = 29) of females did not believe that incineration is a good way to produce more energy whereas only 8.3 % (N = 36) of males had the same idea and 38.8% (N = 36) of them agreed with this argument.

Table 1: The Percentage of Students' Response to the Questions of Students' Background Knowledge of Waste and Environment (N = 65)

To what extent do you agree with the following statements?	*Strongly agree*	*Agree*	*Neutral*	*Disagree*	*Strongly disagree*
Disposing of waste in a landfill harms the environment	33.8%	43.1%	16.9%	4.6%	1.5%
Recycling helps to conserve the environment	56.9%	38.5%	4.6%	0.0%	0.0%
Recycling reduces the amount of waste that goes to landfill	52.3%	40.0%	7.7%	0.0%	0.0%
Waste burning is a good way to produce additional energy	15.4%	30.8%	27.7%	21.5%	4.6%
Waste incineration discourages recycling	9.2%	33.8%	49.2%	7.7%	0.0%

C. Students' approach to facilities on the campus

All equipment such as bins and dumpsters are very important in the process of waste management in general and in this study in particular, because the survey shows that they have an impact on students' attitudes to recycling. However, more than half of respondents (53.8%, N=65) were satisfied with the number of recycling bins on the campus, although as many as 16.9% of students felt dissatisfied with the facilities and 6.2% of them were very dissatisfied (Table 2).

Table 2: The percentage of respondents feeling satisfied or dissatisfied with bins (N=65)

How were you satisfied with	*Very satisfied*	*Satisfied*	*Neither*	*Dissatisfied*	*Very dissatisfied*
Number of recyclable bins on the campus	15.4%	53.8%	7.7%	16.9%	6.2%
Location of the bins	7.7%	55.4%	20.0%	12.3%	4.6%
Labels on recycling bins	13.8%	55.4%	13.8%	12.3%	4.6%
Shape of the bin	15.4%	41.5%	24.6%	13.8%	4.6%
Emptying of bins	9.2%	46.2%	27.7%	15.4%	1.5%

This result is almost the same for the location and label of the bins as both the library café manager and waste manger confirmed that; "There are not enough bins in some places on the campus and some bins are not suitable, for example even though there are recycling bins in the café, they are unlabelled" .

Received: 10 Feb 2019 | Revised: 09 Mar 2019 | Accepted: 30 Mar 2019

It is the same in the clients' part of the postgraduate library. This is a problem for students, because they do not know which bin is for paper, plastic or landfill students are lead to ignore their perceptions. Although nearly half of the respondents are satisfied with the shape of the bins and cleaning of bins, another issue indicated by the waste manager is, "Most of the bins particularly indoor bins are cleaned by cleaning staff before getting full".

This has led to an increase in the number of bags in containers, because sometimes the plastic bags take up more room than the amount of rubbish in them.

D. Examination of students' knowledge about preventing and minimising waste

There are different ways of minimising waste, such as prevention, reuse and recycling. In our survey, some questions were asked about prevention of waste production and knowledge about minimisation of waste in their daily life.

In general, approximately 80% (N=65) of the respondents agreed or strongly agreed with the ordered statements as can be seen clearly in Table 3. The highest percentage of respondents agreed that improving environmental awareness of students is a good way to minimise waste on the campus, with 49.2% of students agreeing and 43.1% strongly agreeing. It was noticed that not one of students strongly disagreed with the statements, but a few students disagreed, particularly with using glass cups instead of paper cups which had the highest disagreement rate of 9.2%. It should be considered that 33.8% of students were neutral about using products with green labels to minimise waste. Likewise, the library café manager stated that: "Students and staff usually use paper cups more than glass cups, which lead to production of more waste".

Then she suggested that a solution would be to charge extra for the take-away cups of around 10 to 20 pence more.

Table 3: Evaluating the respondents' opinions of the statements of waste minimisation (N=65)

Statements	*Strongly agree*	*Agree*	*Neutral*	*Disagree*	*Strongly disagree*
Reuse items that can be used for another purpose	20.0%	64.6%	12.3%	3.1%	0.0%
Choose products with green labels	12.3%	50.8%	33.8%	3.1%	0.0%
Print papers on both sides	38.5%	46.2%	13.8%	0.0%	1.5%
Use glass cup instead of paper cup	38.5%	36.9%	15.4%	9.2%	0.0%
Improving environmental awareness of student	43.1%	49.2%	7.7%	0.0%	0.0%
Organising environmental exhibition by the university	21.5%	58.5%	18.5%	1.5%	0.0%

Figure seven shows how each statement mentioned above is important to prevent and minimise waste on the campus. The percentage for each statement in this figure is a representation of the results in Table 3 using values from individuals that agreed and strongly agreed. Improving environmental awareness is at the top of the pyramid (92.3%) and the lowest one is choosing products with green labels (63%). Printing paper on both sides and reuse of

items for another purpose is almost equal (above 84%). After that, organisation and presentation of exhibitions by the university to raise students' awareness is important, because nearly 80% of participants corroborated this statement (Figure 2).

E. Self-reported recycling behaviour

Self-reported recycling

In this section, there were two types of questions. The first four questions related to students' knowledge about recycling and waste management. This is show by the responsibility of students to the environment. The second part tried to indicate barriers to obtaining information. Even though half of the respondents (50.8%, N=65) know where to dispose their rubbish and know how to use certain types of bins correctly, surprisingly more than two-thirds (64.6%) of students do not have background information about waste management (Table 4). It means that self-reported recycling by them is low. In addition, it shows that norms have affected them, because even though they do not have enough information on recycling, they still recycle [35].

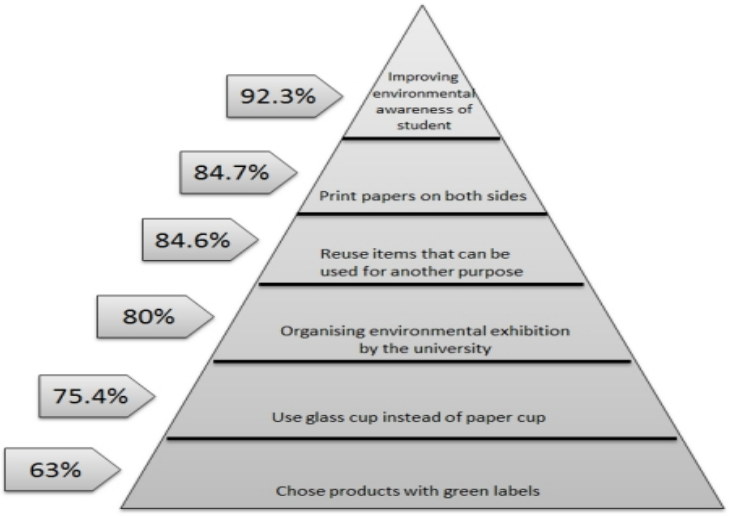

Figure 2: Waste minimisation hierarchy according to the survey result (N = 65).

Most of the students (64.6%, N=65) at the University of Leicester do not have background knowledge due to two main reasons. Firstly, there is insufficient information available at the university, and the method of delivery of information to students is not good. For example, the students that participated in the interview did not take any courses about environmental sustainability and waste management during their degree and a similar result was obtained from the students' responses in the questionnaire. Secondly, students did not try to get information, even though there is waste management guideline for students and staff on the environment team website. For example, in answer to the questions "did you hear about the environment team at the University of Leicester?" and "have you visited the website of the environmental team?" more than three-fourths of respondents said no (table 4). Therefore, the way of presenting information is not sufficient. In contrast, the carbon and energy manager supposed that; "The participation of students is very low in those programs that are organised by the environment team".

It means that students have not tried to get information about environmental sustainability even if they believe that environmental sustainability is important for them (in section 4.2).

Table 4: An evaluation of students' personal knowledge and their attitude (N = 65).

Statements	*Yes*		*No*	
Do you have background information about solid waste management?	23	35.4 %	42	64.6 %
Are you familiar with where to dispose of certain types of waste on the campus?	33	50.8 %	32	49.2 %
Can you recognise different types of bins on the campus?	54	83.1 %	11	16.9 %
Would you be willing to separate out your food waste for a separate kerbside collection?	54	83.1 %	11	16.9 %
Did you study any course about environmental sustainability and waste management during your degree at the University of Leicester?	14	21.5 %	51	78.5 %
Have you heard of the environment team at the University of Leicester?	15	23.1 %	50	76.9 %
Have you visited the website of environment team?	12	18.5 %	53	81.5 %

Despite the above argument, a huge number (83.1%, N=65) of participants were willing to separate out their food waste for a separate kerbside collection (Table 4). In addition, the differences between local and overseas students are highlighted in Table 5. Despite the fact that most of the students did not hear about the environment team at the University of Leicester, this rate is very high among the international students. For example, 83.3% (N = 42) of the international students had not heard that there is an environment team, compared with nearly half of UK students (47.8 %, N = 23). A similar result was obtained from asking the question "have you visited the environment team website?"(Table 5).

Table 5: The comparison between UK and Non-UK students with regards to obtaining environmental knowledge

statements	*UK and Non-UK*	*Yes*	*No*
Did you hear the environment team in the University of Leicester?	UK resident	12	11
	Non-UK resident	7	35
	TOTAL	15	50
Have you visited the environment team website?	UK resident	6	17
	Non-UK resident	6	36
	TOTAL	12	53

Personal attitude and behaviour towards recycling

One-third of the respondents (N = 65) claimed that they would recycle more if they had more information about how to do it. Over half of the students (58%) indicated that more indoor bins and all types of recycling bins would

encourage them to recycle more. Moreover, only 9% of them believed that information about what happens to waste after it is sorted and disposed of will affect them (Figure, 3A).

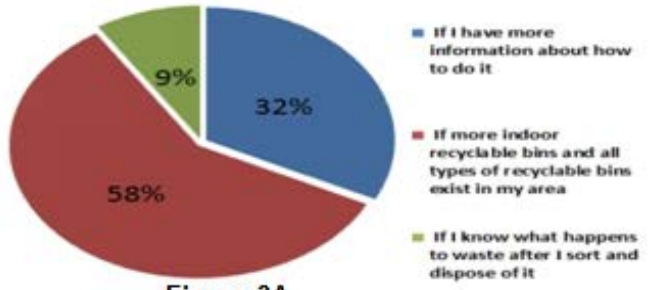

Figure 3A

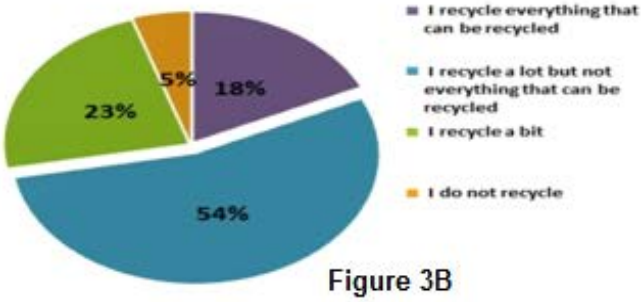

Figure 3B

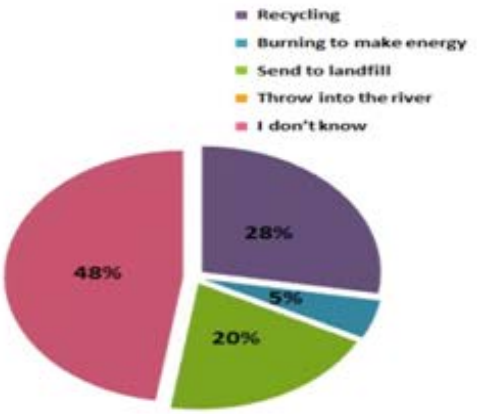

Figure 3C

Figure 3: A: Students´ attitude toward recycling. B: students´ behaviour regarding recycling. C: students´ knowledge about destiny of waste after collection from bins (N=65).

Some statements were investigated to better understand how students recycle on the campus. Over half of the respondents (54%, N=65) supposed that they recycle a lot but not everything can be recycled. Unfortunately, twenty three percent of them recycle partially and five percent of participants do not recycle at all. It can be said that most of this number (54%) are international students, compared with only 3% being UK residents. Furthermore, only 18% of the students said they recycled everything that could be recycled (Figure 3B). Additionally, there is a difference between male and female students. For instance, 8.3% (N = 36) of males claimed they did not recycle at all compared with 0 % of females. This shows that women care more about environmental issues than men.

Even though information on what happens to waste after collection from the bins has not affected the students' behaviour as mentioned above, here again approximately half of respondents (48%, N=65) do not know what happens after collection of waste. At the same time, nearly one-third of respondents said it would be recycled, and only 5% believed that it would be burned to produce energy (Figure 3C).

To examine students' opinion about environmental protection, the question of who should be responsible for protecting the environment was asked. Even though this question seems general, it tests students' self-reports of awareness of environmental protection. A huge number of respondents (80%, N=65) believed that everybody should be responsible and nobody said they did not know. A small number (11%) think that the government should be responsible and an even fewer (9%), non-governmental organisations (Figure 4). This shows that students know that they should be responsible for the environment but some of them do not put that into practise in their daily life.

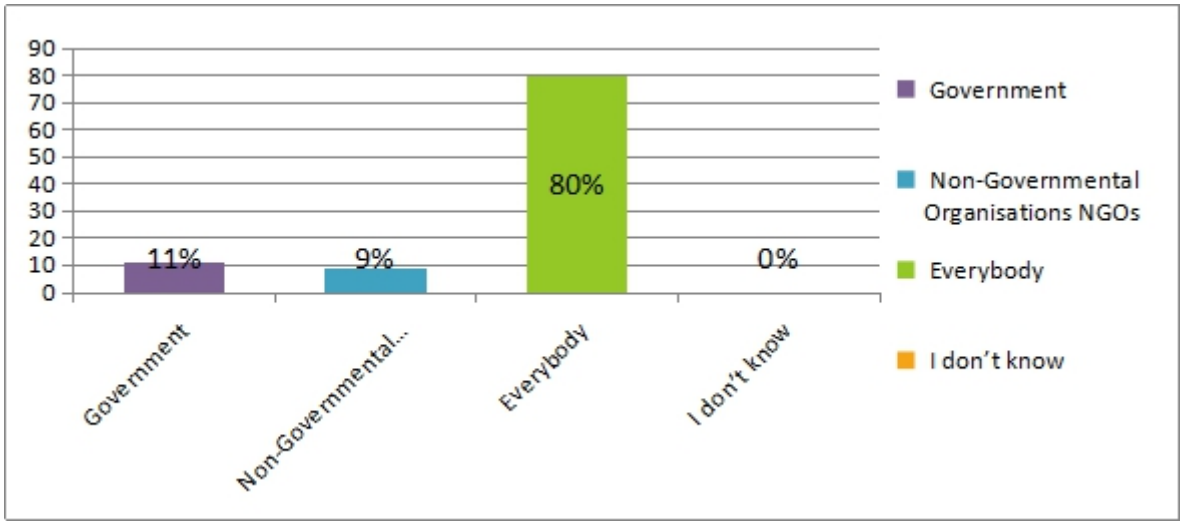

Figure 4: Students' opinions about environmental protection (N=65).

F. Students' past behaviour

Although all the participants answered in this part of the questionnaire, its focus was more on the international students because it is clear that UK has an adequate recycling system although it is uncertain how many of the international students have similar systems in their home countries. Consequently, there was an indication of culture effects on recycling behaviour and attitudes. One-third of all participants did not have recycling systems in their countries. This means that this number of students did not have enough recycling knowledge. In contrast, 70% of respondents had recycling systems in their countries. Therefore, in these cases, another question was asked about how often participants recycle in their countries. Figure 5 show that 18% of them never recycled, and one-fourth recycled rarely. On the other hand, the highest percentage of respondents recycled sometimes, 34%, compared with 17% that recycled often in their home town. Unfortunately, only 6% of students always recycled.

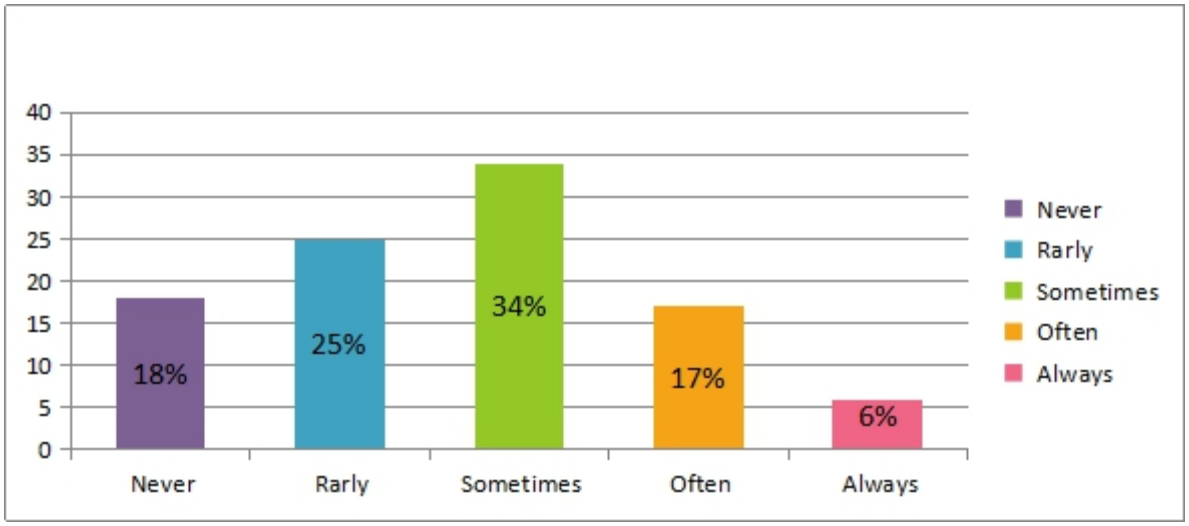

Figure 5: An evaluation of students' past behaviour (N=65).

The above figure shows that approximately half of participants have never or rarely recycled in their home countries and only one-third of them do not have a recycling system in their country. It shows that culture and social marketing had a great impact on their attitude and behaviour with regards to recycling.

V. DISCUSSION

A. Environmental education

According to the interview, the waste manager indicated that there are many resources at the University of Leicester that students can use to find news and information, for instance, the university guidelines for waste management, environment team newspaper, and plenty of information on the environment team website. Besides, students in some departments (such as in Geography and Environment departments) have studied environmental sustainability. The Carbon and Energy Manager determined some green projects on the campus, such as "Green Week and Leicester Award for Sustainability" (Environment team, 2014) and it can be said that these programs are very important to increase students' awareness of sustainability on the campus. According to the literature, and as discussed in the introduction, similar programs are implemented on some university campuses in different countries. As many as 78% of the participants (N = 65) claimed they did not taken any courses about the environment and waste management at the University of Leicester and a considerable number of them did not visit the environment team website. This shows that, firstly the methods of presenting information are not adequate and existing resources are not enough for educating students and increasing their awareness of environmental protection, and secondly the students did not try to get information on this area as confirmed by the Carbon and Energy department.

At the University of Leicester, most of the information is delivered and/or shared via internet, such as by email and the university website. Internet plays an important role in increasing awareness, and its effects are high on children and adults [20]. Although computer literacy among today's university students is high and there is easy access to these resources, a very low percentage of the students tried to access the information about environmental protection. As the results show, only 18.5% (N = 65) of students visited the environment team website. University students usually use the internet for searching academic sources in their area and to find information that is directly related to their specialism.

The methods of presenting information are very important, because different ways of presenting information have different impacts on students' knowledge about environment. Mai, (2016)[23] suppose that the lack information among students is attributed to the ways of presenting information. They suggested some alternative methods of presenting the information easily such as through the university radio, television, posters, and newspapers. The authors believe that a lack of practical experience in environmental education is a reason for a perceived poor environmental education.

Therefore, the university should be considering how to improve the provision of information and delivery by the internet to students. Chan and Fang (2007) [9] suggested some alternative methods of presenting information, such as university radio, television, and newspaper. Furthermore, they reported that watching television is one of the most popular categories of media use, particularly in industrial societies. Additionally, McLaren, (2015) [28] determined that, nowadays mass media is a very significant source of knowledge for students and for public awareness as well

[37]. Moreover, the most important requisite for environmentally-responsible behaviour is personal connection with nature [34,43].

It is clear that most of the students did not take any environmental courses, and this should be a requirement for a huge number of respondents, because it would help them to increase their awareness of pro-environmental behaviour. According to Tonglet, Philips and Beates (2004) [41], Eco-Literacy can influence behaviour directly.

B. Environmental psychology

Several authors [22] have described three main factors that have negative and positive impacts on pro-environmental behaviour. These are namely demographic factors, external factors including social and cultural factors, and internal factors such as awareness and attitude. According to the Theory of Planned Behaviour (TPB) [1] in the study of "developing sustainable waste management at UK higher educational institutions" at the University of Southampton, there are two variables that affect students' recycling behaviour, which are defined as "norm" and "intention". Additionally, situational and psychological factors play important roles in individuals' recycling behaviour [42]. According to the survey, norm has more influence on students' behaviour than intention, because there are a high percentage of students that did not recycle before coming to the UK, but have done so since coming to the UK. This means that norm has affected them because they learn habits from their classmates or perhaps by observation.

"Intention, attitude, norms and behaviour are the psychological factors that will affect others. For example, someone may not have planned to recycle, but by looking at others' behaviour, he/she will think about doing this as well; this is called attitude. Then he/she will have a plan for recycling; this is intention. After that, when he/she starts recycling, changing behaviour will directly occur; this is behaviour. At the same time, norms will appear, because it is usual and it is expected that he/she has learned from his/her surrounds".

Furthermore, Tonglet et al. (2004) believe that TPB is a useful model to explore the factors that influence householders' recycling decisions. Other studies [45,35] support the notion that intention to recycle has an impact on both attitude and norms of students' recycling behaviour. Additionally, Kelly et al. (2006) [21] indicated a relationship between self-reported recycling and attitudes toward recycling.

C. Culture effects

Culture is one of the important variables that have an influence over pro-environmental behaviour [40]. In the survey of this study there were some questions examining students' past behaviour. The results endorsed the finding in the literature that culture has a great impact on behaviour. For example, a great number of the international students did not recycle in their home town, but only one-third of them did not have recycling systems in their countries. There are many reasons why students could not recycle in their countries, for instance, in the author's home town of Kurdistan in Iraq, there is no recycling system. Another reason is that there may not be energy recovery practices from waste incineration in their home towns. Bao (2011) indicated that it is hard for students from Asian countries to say that things are not good in their countries. This cultural factor may have had an

Received: 10 Feb 2019 | Revised: 09 Mar 2019 | Accepted: 30 Mar 2019

influence on some participants' perception of recycling practices at the university, and may have influenced some of the results reported in the current study.

The results demonstrated that understanding students' past behaviour is important, because it influences recycling behaviour. This is supported by other studies [41]. It is true that individuals who have established recycling habits at home are likely to contribute to recycling schemes at university. Maibach, Roser and Leiserowitz (2008) believe that culture influences personal attitude because different cultures produce different behaviour and it is clear that waste management systems are different among countries.

According to Laroche et al., (1996), "collectivists pay more attention to norms than to attitudes, whereas individualists pay more attention to attitudes than to norms". Similarly, there are other studies (Bontempo and Rivera 1992; Kashima et al. 1992; Lee and Green 1990) that confirm these findings. However, Warner (1998) [44] believes that there is no direct cause-effect relationship between attitude and behaviour.

D. Gender effects

Gender is a relevant variable that shows the differences in recycling behaviour between males and females. Melgar and Rossi (2012) [29] present gender as an important variable to explain pro-environmental behaviour, because it influences personal attitudes. The survey result shows that females are more emotional in their thinking and/or dealing with reality. For example, in more academic questions such as whether incineration is a good way to produce additional energy, 18 out of 29 females disagreed and did not appear to have any idea about how the process works. Only eight of them agreed with incineration being a good approach. At the same time, for questions belonging to the social category, such as organising environmental exhibitions to increase students' awareness and minimise waste on the campus, most of them (23 out of 29) agreed.

Dupont (2004) [15] supports the idea that women are more compassionate and cooperative than men regarding environmental issues. Additionally, Melgar and Rossi (2012) point out that women seem to be more concerned about environmental problems than men and believe that females are more likely to take pro-environmental acts than men [44]. For example, in the survey result, 8.3 % of males do not recycle compared with 0% of women.

E. Recycling barriers

On the University of Leicester campus, there are some difficulties that students face in waste management and recycling behaviour. These lead them to do some negative acts. The availability, or a limited number, of bins on the campus hindered the students' ability to recycle. The waste manger mentioned that: "Even if sufficient recycling bins are provided in all the buildings, there are not enough recycling bins in some places especially outside of the buildings".

In addition, most of the students from both survey questionnaires and interviews stated they required more bins. Upon observation, it was noticed that not all types of recycling bins such as paper, plastic, metal, and landfill, were present in the buildings. In the postgraduate section of the library which is more crowded than other areas, there are no metal and glass bins. However, in the Maurice Shock Medical Sciences and Benet buildings there are sufficient bins. Besides, the labels on some bins are absent or unclear, which lead students to use wrong bins, and it is the

same in the library café. Additionally, the waste officer confirmed that: “Even though there are 4000 bins on the campus, there are no glass bins on the campus except one main glass container in the Nixon Court, because separating glass is difficult and it is costly”. Moreover, there are no cardboard bins in the students’ study area and cafes. Therefore, students put cardboard boxes in the paper bins.

The second barrier is lack of information for students. As explained in the results, a high percentage of students (64.6%) (N = 65) do not have enough specific knowledge about waste management. This would be the main issue in the waste management process, because knowledge has the greatest effect on behaviour [26].

Additionally, the waste officer determined some more barriers which were “Lack of workers in waste management process, lack of double side printers in most of the offices, and low the level of behaviour and performances of students in the University of Leicester”

VI. CONCLUSION

This study has demonstrated the level of students’ environmental awareness at the University of Leicester about waste management and recycling. Additionally, the research determined the factors that affect the waste management system, and factors governing the students’ behaviour and attitude.

Although there are a number of students that have adequate knowledge about environmental sustainability especially those from the UK, in general, the level of student awareness is low at the University of Leicester, because most did not have enough information about waste management and environmental protection. The results of this thesis indicate students are willing to recycle and conform to pro-environmental behaviour. Nevertheless, more facilities are needed.

Among many factors affecting solid waste management, three main factors were identified. First, gender is one of the factors that influenced environmental attitudes and actions. The results found that females are more willing to take pro-environmental actions than males and women usually care more about the environment than men. Secondly, the culture or nationality factor also impacted on waste management. This is shown by the differences between international and home students. Most of the international students do not have sufficient knowledge about recycling. In addition, culture had impacts on students’ attitudes to pro-environmental behaviour. For example, students from European societies are more pro-environmentally active than the students from Asian countries. This is might be related to the education systems in their countries. For instance, students from the UK had perhaps already studied environmental concerns at school, while the environment is not particularly considered in schools in the Asian countries. The results of this study show that more than half of the respondents did not have knowledge about environmental protection and waste management and their awareness of environmental sustainability was low.

Finally, the internal factors such as attitude, norms, environmental knowledge, and awareness, potentially impact on the decisions of students to be involved with pro-environmental behaviour. The major finding in this area was that norms clearly affected international students. For example, most of them did not recycle in their home town, while they do in Leicester.

REFERENCES

[1] Ajzen, I. 1991. The theory of planned behavior. *Organizational behavior and human decision processes,* 50, 179-211.

[2] Armijo dega, C., Ojeda benítez, S. &Ramírezbarreto, M. E. 2008. Solid waste characterization and recycling potential for a university campus. *Waste management,* 28**,** S21-S26.

[3] Awasthi, M. K., Zhao, J., Soundari, P. G., Kumar, S., Chen, H., Awasthi, S. K., ...& Zhang, Z. (2019). Sustainable Management of Solid Waste. In Sustainable Resource Recovery and Zero Waste Approaches (pp. 79-99). Elsevier.

[4] Bao, R. 2011. *Waste and recycling attitudes and behavior of students in Turku*. *University of Turku*. 40 ECTS.

[5] Berenguer, J. M. &Corraliza, J. A. 2000. Preocupaciónambiental y comportamientosecológicos. *Psicothema,* 12, 325-329.

[6] Beringer, A., Wright, T. & Malone, L. 2008. Sustainability in higher education in Atlantic Canada. *International Journal of Sustainability in Higher Education,* 9**,** 48-67.

[7] Biggar J. 2009. Report on Green Day feedback; online available at: http://www.unbc.ca/assets/green/unbcgreendayreport.pdf. [Accessed at August 8, 2014].

[8] Britten, N. 1995. Qualitative research: qualitative interviews in medical research. *Bmj,* 311, 251-253.

[9] Chan, K. & Fang, W. 2007. Use of the internet and traditional media among young people. *Young Consumers: Insight and Ideas for Responsible Marketers,* 8**,** 244-256.

[10] Creighton, S. H. 1998. *Greening the ivory tower: Improving the environmental track record of universities, colleges and other institutions*, MIT Press.

[11] Defra. 2011. Government Review of policy in England. *Department for Environment.* Online available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69401/pb13540-waste-policy-review110614.pdf. [Accessed at August 12, 2014].

[12] Defra. 2013. Waste management plan for England. Online available at: https://consult.defra.gov.uk/waste/https-consult-defra-gov-uk-waste/supporting_documents/20130711%20%20Consultation%20Plan.pdf. [Accessed at August 11, 2014].

[13] Defra. 2013. Waste Prevention Programme for England. Online available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/264902/pb14092-wpp-measures-evaluation-20131211.pdf. [Accessed at August 12, 2014].

[14] Defra. 2014. Reducing and managing waste. Online available at: https://www.gov.uk/government/policies/reducing-and-managing-waste. [Accessed at August 10, 2014].

[15] Dupont, D. P. 2004. Do children matter? An examination of gender differences in environmental valuation. *Ecological Economics,* 49, 273-286.

[16] Eppel, S., Sharp, V. & Davies, L. 2013. A review of Defra's approach to building an evidence base for influencing sustainable behaviour. *Resources, Conservation and Recycling,* 79**,** 30-42.

[17] Espinosa, R., Turpin, S., Polanco, G., De Latorre, A., Delfín, I. &Raygoza, I. 2008. Integral urban solid waste management program in a Mexican university. *Waste Management,* 28**,** S27-S32.

[18] Jensen, B. B. 2002. Knowledge, action and pro-environmental behaviour. *Environmental Education Research,* 8, 325-334.

[19] Kaiser, F. G. &Shimoda, T. A. 1999. Responsibility as a predictor of ecological behaviour. *Journal of Environmental Psychology,* 19, 243-253.

[20] Katona, I., Kárász, I., Leskó, G., Kosáros, A. &Lakatos, G. 2008. Role of Media in Students' Life and Their Environmental Education: A Survey of Students Aged 13 to 17. *Journal of Teacher Education for Sustainability,* 10**,** 79-90.

[21] Kelly, T., Mason, I., Leiss, M. & Ganesh, S. 2006. University community responses to on-campus resource recycling. *Resources, Conservation and Recycling,* 47, 42-55.

[22] Kollmuss, A., &Agyeman, J. 2002. Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior?.*Environmental education research*, *8*(3), 239-260.

[23] Mai, J. E. (2016). *Looking for information: A survey of research on information seeking, needs, and behavior*. Emerald Group Publishing.

[24] Mair, J., & Laing, J. H. 2013. Encouraging pro-environmental behaviour: the role of sustainability-focused events. *Journal of Sustainable Tourism, 21*(8), 1113-1128.

[25] Makarichi, L., Kan, R., Jutidamrongphan, W., &Techato, K. A. (2019). Suitability of municipal solid waste in African cities for thermochemical waste-to-energy conversion: The case of Harare Metropolitan City, Zimbabwe. Waste Management & Research, 37(1), 83-94.

[26] Makki, M. H., Abd-el-Khalick, F. &Boujaoude, S. 2003. Lebanese secondary school students' environmental knowledge and attitudes. *Environmental Education Research*, 9, 21-33.

[27] Marshall, R. E., &Farahbakhsh, K. (2013). *Systems approaches to integrated solid waste management in developing countries.* Waste management, 33(4), 988-1003.

[28] McLaren, P. (2015). *Life in schools: An introduction to critical pedagogy in the foundations of education*. Routledge.

[29] Melgar, N. & Rossi, M. 2012. A Cross-Country Analysis of the Risk Factors for Depression at the Micro and Macro Levels. *American Journal of Economics and Sociology*, 71, 354-376.

[30] Melgar, N., Mussio, I., & Rossi, M. 2013. Environmental concern and behavior: Do personal attitudes matter?.*Documentos de Trabajo*. DECON. Document No, 01/13. ISSN 0797-7484.

[31] Nagawiecki, T. 2009. University of Idaho Waste Characterization. Moscow: University of Idaho

[32] National Curriculum. 2010. *Primary curriculum key stage 1 & key stage 2.*

[33] Papageorgiou, A., Barton, J. &Karagiannidis, A. 2009. Assessment of the greenhouse effect impact of technologies used for energy recovery from municipal waste: a case for England. *Journal of environmental management*, 90, 2999-3012.

[34] Poudel, S., &Nyaupane, G. P. (2017). Understanding environmentally responsible behaviour of ecotourists: The Reasoned Action Approach. *Tourism Planning & Development*, *14*(3), 337-352.

[35] Rise, J., Thompson, M. &Verplanken, B. 2003. Measuring implementation intentions in the context of the theory of planned behavior. *Scandinavian Journal of Psychology*, 44, 87-95.

[36] Sabbas, T., Polettini, A., Pomi, R., Astrup, T., Hjelmar, O., Mostbauer, P., Cappai, G., Magel, G., Salhofer, S. &Speiser, C. 2003. Management of municipal solid waste incineration residues. *Waste Management*, 23**,** 61-88.

[37] Sampei, Y. & Aoyagi-usui, M. 2009. Mass-media coverage, its influence on public awareness of climate-change issues, and implications for Japan's national campaign to reduce greenhouse gas emissions. *Global Environmental Change*, 19**,** 203-212.

[38] Smyth, D. P., Fredeen, A. L. & Booth, A. L. 2010. Reducing solid waste in higher education: The first step towards 'greening'a university campus. *Resources, Conservation and Recycling*, 54**,** 1007-1016.

[39] Stern, P. C. 2000. New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of social issues*, 56, 407-424.

[40] Thomas, C., & Sharp, V. 2013. Understanding the normalisation of recycling behaviour and its implications for other pro-environmental behaviours: a review of social norms and recycling. *Resources, Conservation and Recycling*, *79*, 11-20.

[41] Tonglet, M., Phillips, P. S. & Bates, M. P. 2004. Determining the drivers for householder pro-environmental behaviour: waste minimisation compared to recycling. *Resources, Conservation and Recycling*, 42, 27-48.

[42] University of Leicester. Environment Team. 2014. Waste and recycling. Online available at: http://www2.le.ac.uk/offices/estates/environment/wasteandrecycling. [Accessed at August 28, 2014].

[43] Unsworth, K. L., Dmitrieva, A. &Adriasola, E. 2013. Changing behaviour: Increasing the effectiveness of workplace interventions in creating pro-environmental behaviour change. *Journal of Organizational Behavior*, 34**,** 211-229.

[44] Warner, W. S. 1998. Cultural Influences that affect the acceptance of compost toilets: Psychology, religion and gender. *International Composting Toilet News [online] September*.

[45] Varela-Candamio, L., Novo-Corti, I., &García-Álvarez, M. T. (2018). The importance of environmental education in the determinants of green behavior: A meta-analysis approach. *Journal of Cleaner Production*, *170*, 1565-1578.

[46] Vassanadumrongdee, S., &Kittipongvises, S. (2018). *Factors influencing source separation intention and willingness to pay for improving waste management in Bangkok*, Thailand. Sustainable Environment Research, 28(2), 90-99.

[47] Zhang, N. 2011. *Greening academia: developing sustainable waste management at UK higher educational institutions.* University of Southampton.