



ASSESSMENT OF THE LEVEL OF KNOWLEDGE, ATTITUDE, AND PRACTICE AMONG UPM STUDENTS TOWARD FOOD WASTE GENERATION AND INTERVENTION.

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Abstract

Over the last decade, the impact of food waste has increasingly become a vital topic in the global aspect and it has attracted the attention of academicians. Statistics from the Solid Waste Corporation of Malaysia showed that in 2015, food waste in Malaysia had reached 15,000 tons daily, including 3,000 tons that was still fit for consumption and should not have been discarded. When food is disposed in a landfill, it rots and becomes a significant source of methane. Food wastage has influenced global warming, water consumption, natural biodiversity and land use. When related to domestic aspect studies specifically, comparatively a little is known about food waste production in universities though food courts and dining halls. This study was conducted to assess the level of knowledge, attitude and practice among UPM students toward food waste generation and the intervention for this research was conducted using a primary data survey. A sample of 216 self-administered questionnaires was randomly distributed across all faculties in UPM SPSS (version 25.0) to analyze the result of the data. The results show that knowledge, attitudes, and practices among UPM students towards food waste generation and intervention. More than half of the respondents have good level of knowledge, attitude and practice regarding food waste generation and intervention of the research indicates that there are no significant differences in the level of knowledge, attitudes, and practices food waste generation and intervention between the socio demographic factors.

Keywords: *food waste, intervention, KAP study, UPM students.*

Introduction

Food waste can be expressed as all edible food substances produced for human utilization but left uneaten, either lost or dispatched throughout the food chain

supply, from farm to fork (Painter, Thondhlana, & Wei, 2016). In 2011 the FAO led a study surveying the world wide nourishment misfortunes and waste and it was discovered that every year around 33% of all sustenance delivered for human utilization on the planet is either lost or squandered. However the uneaten food puts colossal weight on the earth and conservative expenses. Global food waste is estimated to be 1.6 billion tons annually where 1.3 billion tones are edible with a value of \$750 billion (Pleissner, D., Kwan, T. H., & Lin, C. S. K. (2014). At the purchaser level, age is contrary correlated to food waste practice. Adults and young groups contribute the highest rate of wastage of food (Ellison & Lusk, 2018; al.). Since students consume one or two meals at school, there is high amount of food that's been misused and handled everyday as left over, which may result essential source of food wastage (Lazell, J al, 2016.). When specifically related to household level studies, comparatively, a little is known about food waste production in universities though food courts and dining halls, in the academic centers contribute potential significant source of food waste (wilkie et.al 2015). According to the Deputy Agriculture and Agro-based Industry Minister, Noge Gumbek, Malaysians' food waste is 15,000 tons of food daily including 3,000 tons that is still fit for consumption and should not be wasted. When food is disposed in a landfill, it rots and becomes a significant source of methane - a potential greenhouse gas with 21 times the global warming potential of carbon dioxide. Growing and transporting the food that goes to waste emits as much carbon pollution as 39 million passenger vehicles

Over the last decade, the impact of food waste has increasingly become a vital topic in the global aspect and it has attracted the attention of academicians. It has been estimated that by 2025, the percentage of food wastage will have an increase of 44% from that in 2005's (Macnaughton, et al. 2016). Statistics from the Solid Waste Corporation of Malaysia (SWCorp) showed that in 2015, the food waste in Malaysia exceeded 15,000 tons daily, including 3,000 tons that was still fit for consumption and should not have been discarded (N. F. A. B. R., & Ahmad, A. et al, 2018). When compared to a household level study, comparatively, a little is known about food waste production in universities though food courts and dining halls, in the academic centers contribute potential significant source of food waste (A., Graunke, R., & Cornejo, et. al, 2015). Most landfills in Malaysia are in not good conditions, and are operating without legitimate defensive measures, for example lining frame works, leach ate treatment and gas venting (Ghafar, S. W. A. (2017).). Food wastage has influences on global warming, water consumption, natural biodiversity and land use (FAO2013). In 2005, 7.34 million tons of wastes

were generated (Kovaleva, M. (2015)). It has been estimated that it will increase to 10.9 million. Land filling is the main method of waste disposal (80% usage) in Malaysia (Ghafar, S. W. A. (2017).), which has a potential to generate green house on the atmosphere. There is a growing number of Universitistudents and their contribution of food consumption to avoid food waste is literally very low, another vital opportunity is that universities have a community of practice of people with capacity of knowledge and expertise (Kua, H. W. (2016)). This is an opportunity that can only be found in academic centers and it can change the attitudes, behavior, and their habits toward waste on the environment during consumption. Previous studies have assessed the importance of knowledge, attitude and practices among food waste (De la Cruz, C. P. P. 2016).). This shows that the assessment is very crucial to provide sufficient data for further action.

The issues of food loss and waste are receiving increasing attention around the globe. Generally, around 1.3 billion tons of food that is fit for consumption is wasted per year (bin Ujang, Z. et al, 2014.) with industrialized countries producing high amounts of food waste, i.e. food that is discarded or not consumed in time being suitable for human consumption (Schmidt, K. et al., 2016). The nature and taste expectations, socio-economic status, shopping attitudes, insufficient knowledge often effect food waste. (Jalkanen, L et .al. 2012). While government agencies vary somewhat in how they define loss and waste. (Novak, L., & Rudi, J. et, al (2017).). Waste is generated and it has been estimated that it will increase to 10.9 million food waste. This shows that the assessment will play an important role to attract the interest to carry out further research at all stages both food loss and food waste result of a decline in the food supply that are intended for consumption (Ferrario, F., & Mofor, L. 2015).Environment knowledge enhances public awareness and attitude of environmental problems and challenges, this contributes to their understanding of individual actions on the environment which finally help them to acquire skills for becoming better equipped to make right decisions towards the environment (Hart, R. A. et. al. (2013). According to the United Nations, education is critical not only for achieving environmental and ethical awareness, but also for supporting values and attitudes, skills and behaviour in consistence. The objectives of this study were 1) to determine socio demographic factors among UPM students. 2) to determine knowledge, attitude and practise of food waste among UPM students toward food waste generation and intervention.

Methodology

Study Area

This study was conducted in Universiti Putra Malaysia Serdang, in central West Peninsular Malaysia, close to Kuala Lumpur and next to Putra Jaya, Malaysia's

administrative capital city. The main campus stands on 1108.103 hectares, having 15 faculties. All the faculties are located on the Main Campus. This analytical cross-sectional study began on August 2018 until April 2019. The target population of this study was the students of Universiti Putra Malaysia. The study population is the 15 faculties of Universiti Putra Malaysia.

Sampling methods

The result is calculated with the estimated sample size using the Morgan table. A sample size of 262 was obtained through the Morgan table and stratified random sampling was used in this study. A final sample was drawn from several faculties: (29) from the Faculty of Modern Languages and Communication, (16) from the Faculty of Engineering, (7) from the Faculty of Science, (47) from the Faculty of Economics and Management, (4) from the Faculty of Educational Studies, (25) from the Faculty of Agriculture, (12) from the Faculty of Medicine and Health Science, (4) from the Faculty of Ecology, (13) from the Faculty of Computer Science and Information Technology, (10) from the Faculty of Food Science and Technology, (9) from the Faculty of Biotechnology and Bimolecular Sciences, (13) from the Faculty of Veterinary Medicine, (3) from the Faculty of Forest, and (24) from the Faculty of Environmental Studies. Then, the students from each faculty were chosen by a random number generated until the desired sample size was achieved.

Data collection

The study used a quantitative research design; data was collected from the students through a structured questionnaire using the face-to-face interview in which the questionnaire has been validated by 3 field experts for both face and content validity 0.44 respondents were interviewed in the pre-test which was to assess the clarity of the items in the survey questions. 10% of the sample size was used to check the reliability of the results, before the final appropriate and relevant questions were given. Subsequently, there are three different sections in the survey, knowledge of food waste generation and intervention, (12 items) on a 3-point scale (Yes, No and Not sure) to measure students' knowledge and understanding, towards food waste generation and intervention. The second section was about attitude regarding food waste with 12 items on a 5-point scale of likert scale (Strongly disagree, Disagree, Not sure, Agree, and Strongly agree) to measure the student's feelings and expectation toward food waste generation and intervention, and finally the last section is practice of food and intervention using the Yes or No

scale. Internal consistencies of each of these actions were first tested and analyzed separately after which an overall measure was calculated. An overall coronbach's alpha of 0.747 was obtained, indicating a very strong internal consistency among the items and dimensions of stress.

Data Analysis

The data collected were analyzed using the Statistical Package for Social Sciences SPSS (Version 25.0). Descriptive statistics were used to analyze the data to assess the demographics characteristic and to determine using frequency table and percentage. The level of knowledge, attitude, and practices towards food waste generation and intervention among UPM students was determined by means percentage score of the respondents (0-50% = low level, and above 50%= high level). A T-test Analysis was conducted to investigate if there is a significant difference between the level of knowledge, attitudes, and practices towards food waste generation and intervention among UPM students in Universiti Putra Malaysia, regarding gender, both male and female on the significance level of 0.05.

Results

Socio -Demographic characteristics of the Respondents

A total of 262 questionnaires were administered, (96.77%) returned. Table 1 shows that the number of male respondents (58.3%) was much higher than that of the female respondents (41.7%). The table demonstrates that most of the respondents (78.2%) belong to the age group of 18–30 years old, while the lesser group or minority of the respondents (6.5%) belong to the age group of 40 years old and above.

The most respondent of the research were pursuing bachelor degrees in which they have contributed (46.3%) while the least contributors were diploma students and they have contributed (1.9%). The table shows that Master degrees respondents' were (39.8%) while PhD respondents' demonstrated during the study was (12.0%). The respondents whose monthly income ranges \leq 3000RM were of 73.6% while the table demonstrates that those whose income range is between RM3500 to RM4500 were of 26.4%. However there are no respondents that have more than RM4500 and above. In terms of faculties, most respondents are those studying in the Faculty of Economic and Management (21.8%) followed by Faculty of Modern Language (13.4%), Faculty of Agriculture (11.6%), Faculty of Environment Studies (11.1%), Faculty of Engineering (7.4%), Faculty of Computer Science (6.0%), Faculty of Veterinary medicine (6.0%), Faculty of Medicine and health

Science (5.6%), Faculty of Food science technology (4.6%), Faculty of Biotechnology (4.2%), Faculty of Science (3.2%), Faculty of Education (1.9%), Faculty of Ecology (1.9%), and finally Faculty of Forestry (1.4%).

Socio -Demographic characteristics of the Respondents

Variable	Frequency	Percentage
Gender		
Male	126	58.3%
Female	90	41.7%
Age level		
18-30	169	78.2%
30-40	33	15.3%
40 and above	14	6.5%
Educational status		
Diploma	4	1.9%
Bachelor	100	46.3
Master degree	86	39.8%
Household income		
≤3000RM	159	73.6%
RM3500RM-4500	57	26.4%
RM5000 and above	0	0%
Faculties		
Faculty of Modern Language	29	13.4%
Faculty of Education	4	1.9%
Faculty of Medicine and health Science	12	5.6%
Faculty of Veterinary medicine	13	6.0%
Faculty of Environment Studies	24	11.1%
Faculty of Food science technology	10	4.6%
Faculty of Agriculture	25	11.6%
Faculty of Forestry	3	1.4%
Faculty of Science	7	3.2%
Faculty of Ecology	4	1.9%
Faculty of Computer Science	13	6.0%
Faculty of Engineering	16	7.4%
Faculty of Biotechnology	9	4.2%

Faculty of design and architecture	0	0%
Faculty of Economic and Management	47	21.8%

Knowledge towards Food waste generation and intervention

The findings of this study show that the respondents have high knowledge toward food waste generation and the intervention as shown in the table. When the respondents were asked about how improper food waste removal affects the environment, they positively agreed (84.7%). The level of respondents were high when they were asked about how the 3Rs (Recycling, Reusing and Reducing) can significantly reduce food waste generation (87.5%). 81% of the respondents agree that food waste has a direct impact on the Ecosystem services (e.g. air purification, flood regulation, water cycle) and the respondents are aware that we waste about a third of all food produced for human consumption globally (80.0%). The respondents agreed that Redundant Leftover food can contaminate the environment (71.8%) and Production of food waste is harmful to the climate (74.5%). The respondents in general agreed that food waste is a trending environmental concern around the globe (79.2%). Furthermore, the respondents have a good awareness of how reusing of food is more likely to contribute reduction of food waste (72.2%). The table shows that the respondents agree that too much food cooked can lead to food waste (72.7%) and the amount of food waste depends on seasonal of production (74.1%).

Table: 4.2 Knowledge towards Food waste generation and intervention

Variable	Yes	No	Not sure
Improper food waste removal affects the Environment.	183(84.7%)	6(2.8%)	27(12.5%)
Preparation of food in advance is more likely to contribute to food waste.	149(69%)	19(8.8%)	48(22.2%)
Too much food cooked can lead food waste.	155(71.8%)	22(10.2%)	39(18.1%)
Amount of food waste depends on seasonal of production.	160(74.1%)	19(8.8%)	37(17.7%)
Improper storage of food may cause food waste.	157(72.7%)	16.(7.4%)	43(19.9%)

Redundant Leftover food can contaminate my environment.	155(71.8%)	13(6.0%)	46(21.3%)
Reuse of food is more likely to contribute reduction of food waste.	156(72.2%)	16(7.4%)	44(20.4%)
Production of food waste is harmful to climate change.	161(74.5%)	14(6.5%)	41(19.0%)
Food waste is a trending environmental concern around the globe.	171(79.2%)	12(5.6%)	33(15.3%)
Food waste has a direct impact on the Ecosystem services (e.g. air purification, flood regulation, water cycle)	175(81.0%)	9(4.2%)	32(14.8%)
The 3Rs (recycling, reusing and reducing) can significantly reduce food Waste generation	189(87.5%)	7(3.2%)	20(9.35%)
We waste about a third of all food produced for human consumption globally.	172(80.0%)	16(7.4%)	26(12.1%)

Attitudes

In this finding, this study demonstrates that generally, the respondents have a positive attitude about sustainable food generation of food waste and intervention and it also demonstrates that they have strong feeling about sustainable food waste free environment. When they were asked about whether or not good environmental behavior regarding sustainable consumption will tackle the food waste, 71.5% have strongly agreed and 69.2% agreed that buying a balanced diet food is best solution to avoid throwing out leftover ingredients while majority strongly believe that preparation of food in advance is more likely to contribute to food waste (63.8%). They also strongly agreed that proper food waste disposal is important (60.0%).

The respondents of this research strongly consider food waste as a threat to the environment (65.2%) and it has a great direct impact on the Ecosystem services (57.0%). The respondents have strong and good feelings toward their kitchens and they think that the kitchen area must be cleaned before use (60.6%). They also agree to not consume raw meals which can contribute to food waste (68.3%), to consider meal planning before and after cooking food (64%.3) while they agree that less

food waste should be generated by house hold for betterment of environment (56.6%).The respondents of this research strongly believe that proper food waste removal is important (40.3%) and they agree that streets should be free from food waste (33.9%).

Table 3.3 attitudes

Variables	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1. I feel the streets should be free from food waste.	9(4.2%)	1(0.5%)	73(33.0%)	75(33.9%)	58(26.2%)
2. I think that proper food waste removal is important.	1(0.5%)	4(1.8%)	49(22.2%)	73(33.0%)	89(40.3%)
3. I feel that Food waste has a direct impact on the Ecosystem services.	0(0%)	2(0.9%)	29(13.1%)	59(26.7%)	126(57.0%)
4. I feel that less food waste should be generated by house hold for betterment of environment.	0(0%)	2(0.9%)	26(11.8%)	63(28.5%)	125(56.6%)
5. I consider food waste as a threat to the environment.	0(0%)	1(0.5%)	19(8.6%)	52(23.5%)	144(65.2%)
6. I think that proper food waste disposal is important.	0(0%)	0(0%)	16(7.2%)	66(29.9%)	134(60.6%)
7. I believe Preparation of food in advance is more likely to contribute to food waste.	0(0%)	1(0.5%)	14(6.3%)	60(27.1%)	141(63.8%)

8.	I think Kitchen area must be cleaned before start using.	0(0%)	1(0.5%)	23(10.4%)	54(24.4%)	134(60.6%)
9.	It's good to consider meal planning before and after cooking food.	0(0%)	0(0%)	16(7.2%)	57(25.8%)	142(64.3%)
10.	Consumption of raw meals can contribute food waste.	0(0%)	0(0%)	21(9.5%)	41(18.6%)	151(68.3%)
11.	Buying a balanced diet food is best solution to avoid throwing out leftover ingredients.	0(0%)	0(0%)	14(6.3%)	48(21.7%)	153(69.2%)
12.	Good environmental behaviour regarding sustainable consumption will tackle the food waste.	0(0%)	1(0.5%)	13(5.9%)	43(19.5%)	158(71.5%)

Practice

The findings of this research show that the respondents have a high level of knowledge and awareness towards food waste generation and intervention. The study shows that some students do not do balanced diet food when they responded “No” forth question “I always do balanced diet food consumption in my meal” (25.8%). The respondents often throw away ingredients when cooking meal from scratch (72.9%) and finally the table shows that sometimes, students throw out leftover ingredients and this is all too common in their household(72.9%).The majority of the respondents agreed by choosing “Yes”where they said they don’t cook food that can lead to food waste (80.5%). A high percentage of respondents use shopping lists before going to the market (82.4%), practice recyclable food after purchasing (76.0%) and the respondents purchase food products that are environmental friendly(75.1%).75.1 % of the respondents agreed to the question“ I advise others (i.e. family, friends)”. For the items “Not to dispose food waste in our environment, 75.1% of the respondents agreed. They also dispose food waste in environmental friendly ways (i.e. garbage bin (76.5%) and the respondents practice recycle of food after purchasing (iemaaur) (76.0%). Besides that, the

respondents do not eat raw meals that can contribute to food waste (71.5%),and also the respondent don't eat raw meals that can contribute food waste (71.3%).

Table 3.4: Practice

Variables	Yes	No
I don't cook a food that can lead food waste.	178(80.5%)	30(13.6%)
I have participated in food waste awareness campaigns.	159(71.9%)	56(25.3%)
I use shopping list before going to the market.	182(82.4%)	34(15.4%)
I always do balanced diet food consumption in my meal.	158(71.5%)	57(25.8%)
I practice recycle of food after purchasing (iemaaur)	168(76.0%)	48(21.7%)
.	158(71.5%)	58(26.2%)
I do meal planning before and after cooking food.	163(73.8%)	53(24.0%)
Throwing out leftover ingredients is all too common in my house hold.	163(73.8%)	53(24.0%)
I dispose my food waste in environmental friendly way (i.e. garbage bin).	169(76.5%)	47(21.3%)
I buy a balanced diet food to avoid throwing out leftover ingredients.	160(72.4%)	56(25.3%)
I often throw away ingredients when cooking meal from scratch	161(72.9%)	55(24.95)
I purchase food products that are environmental friendly	166(75.1%)	49(22.2%)
I advise others (i.e. family, friends,) not to dispose food waste in our environment.	175(79.2%)	40(18.1%)
Independent Samples Test		

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
MeanK	Equal variances assumed	.543	.462	-.769	214	.443	-.02700	.03512	-.09622	.04222
	Equal variances not assumed			-.782	202.544	.435	-.02700	.03452	-.09507	.04108

There is no significance difference in mean knowledge between male and female (t =- 0.7, p= 0.443).

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
meanAQ	Equal variances assumed	2.603	.108	-1.235	214	.218	-.13468	.10907	-.34967	.08031
	Equal variances not assumed			-1.151	140.113	.252	-.13468	.11702	-.36602	.09666

There is no significance difference Mean attitude between female and male (t=- 1.23,p=0.218).

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PMEAN	Equal variances assumed	.598	.440	-1.827	214	.069	-.02991	.01637	-.06219	.00236
	Equal variances not assumed			-1.884	209.139	.061	-.02991	.01588	-.06121	.00138

There is no significance difference in mean practice between male and female ($t=1.827$, $p=0.06$).

Conclusion

The study surveyed and assessed the level of knowledge, attitude and practice among UPM students toward food waste generation and intervention which can credit to the constant exertion made by the legislature and educational institutions to advance manageable improvement. Overall, the findings from the study revealed a high level of knowledge, attitudes, and practices towards food waste generation and intervention. There is no significance difference in mean knowledge, attitude and practice between male and female. More specifically, the study reveals that knowledge has positive impacts on food waste generation and intervention. So far, there are studies that have examined the implications of knowledge toward food waste production and safety but only in the industrial level. However, for instance in Argentina, industrial workers have higher level of practical knowledge rather than attitudes and theoretical knowledge; the latter is significantly associated with the level of education, the amount of training and the attitudes (de Oliveira, C. A. F. 2013). A qualitative study of U.S. young adults' perceptions, beliefs and behavior focus groups indicated there is generally low awareness and knowledge of the issue among this age group, and many estimated they wasted little, often shifting focus and blame onto other entities. (S. M., & Ellison, B. 2018).. Another study of Profiling consumers' attitude to waste food in Italy states that there is significant amount of food waste occurring at household level, the study confirms that household size and composition (adults waste more in absolute terms than children and larger households waste less per person than smaller ones), household income (the lower the income, the lower the amount of food wasted) and household demographics (young people waste more than older people) matter as far as food waste behavior is concerned (Segrè, A., & Vittuari, M. 2018).. A study of food waste generation and potential interventions at Rhodes University, South Africa states that there is significant difference between socio-demographic factors among students. Male students should be further studied and this should be factored in food preparation, this is because female students seem to eat less and are unwilling to take second helpings (G., & Kua, H. W. 2016).. To that end, this study thus filled the gap. Moreover, the study implies that educational institutions likewise assume knowledge, attitudes, and practices as fundamental parts conveying environmental information. This study may apply to the broader community as well as policymakers and future leaders. This study may communicate information that

ensures the success of environmental education program. It may also help in the attainment of environmental sustainability at the grassroots and at large.

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References

- Abdul-Mutalib, N. A., Abdul-Rashid, M. F., Mustafa, S., Amin-Nordin, S., Hamat, R. A., & Osman, M. (2012). Knowledge, attitude and practices regarding food hygiene and sanitation of food handlers in Kuala Pilah, Malaysia. *Food control*, 27(2), 289-293.
- Barloa, E. P., Lapie, L. P., & de la Cruz, C. P. P. (2016). Knowledge, attitudes, and practices on solid waste management among undergraduate students in a Philippine state university. *JEES*, 6(6), 146-53.
- Bellemare, M. F., Çakir, M., Peterson, H. H., Novak, L., & Rudi, J. (2017). On the measurement of food waste. *American Journal of Agricultural Economics*, 99(5), 1148-1158.
- Cusato, S., Gameiro, A. H., Corassin, C. H., Sant'Ana, A. S., Cruz, A. G., Faria, J. D. A. F., & de Oliveira, C. A. F. (2013). Food safety systems in a small dairy factory: Implementation, major challenges, and assessment of systems' performances. *Foodborne pathogens and disease*, 10(1), 6-12.
- Ellison, B., & Lusk, J. L. (2018). Examining household food waste decisions: A vignette approach. *Applied Economic Perspectives and Policy*, 40(4), 613-631.
- Gaiani, S., Caldeira, S., Adorno, V., Segrè, A., & Vittuari, M. (2018). Food wasters: Profiling consumers' attitude to waste food in Italy. *Waste management*, 72, 17-24.
- Ghfar, S. W. A. (2017). Food Waste in Malaysia: Trends, Current Practices and Key Challenges.

- Ghafar, S. W. A. (2017). Food Waste in Malaysia: Trends, Current Practices and Key Challenges.
- Hart, R. A. (2013). *Children's participation: The theory and practice of involving young citizens in community development and environmental care*. Routledge.
- Koivupuro, H. K., Hartikainen, H., Silvennoinen, K., Katajajuuri, J. M., Heikintalo, N., Reinikainen, A., & Jalkanen, L. (2012). Influence of socio-demographical, behavioural and attitudinal factors on the amount of avoidable food waste generated in Finnish households. *International journal of consumer studies*, 36(2), 183-191.
- Kwan, T. H., Pleissner, D., Lau, K. Y., Venus, J., Pommeret, A., & Lin, C. S. K. (2015). Techno-economic analysis of a food waste valorization process via microalgae cultivation and co-production of plasticizer, lactic acid and animal feed from algal biomass and food waste. *Bioresource technology*, 198, 292-299.
- Lazell, J. (2016). Consumer food waste behaviour in universities: sharing as a means of prevention. *Journal of Consumer Behaviour*, 15(5), 430-439.
- Leal Filho, W., & Kovaleva, M. (2015). The State of the Problem of Food Waste in the Baltic Region Countries. In *Food Waste and Sustainable Food Waste Management in the Baltic Sea Region* (pp. 107-176). Springer, Cham.
- Moh, Y. C., & Manaf, L. A. (2014). Overview of household solid waste recycling policy status and challenges in Malaysia. *Resources, Conservation and Recycling*, 82, 50-61.
- Nikolaus, C. J., Nickols-Richardson, S. M., & Ellison, B. (2018). Wasted food: A qualitative study of US young adults' perceptions, beliefs and behaviors. *Appetite*, 130, 70-78.
- Painter, K., Thondhlana, G., & Kua, H. W. (2016). Food waste generation and potential interventions at Rhodes University, South Africa. *Waste management*, 56, 491-497.
- Painter, K., Thondhlana, G., & Kua, H. W. (2016). Food waste generation and potential interventions at Rhodes University, South Africa. *Waste management*, 56, 491-497.
- Painter, K., Thondhlana, G., & Kua, H. W. (2016). Food waste generation and potential interventions at Rhodes University, South Africa. *Waste management*, 56, 491-497.
- Papargyropoulou, E., Lozano, R., Steinberger, J. K., Wright, N., & bin Ujang, Z. (2014). The food waste hierarchy as a framework for the management of food surplus and food waste. *Journal of Cleaner Production*, 76, 106-115.

- Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical transactions of the royal society B: biological sciences*, 365(1554), 3065-3081.
- Scarlat, N., Motola, V., Dallemand, J. F., Monforti-Ferrario, F., & Mofor, L. (2015). Evaluation of energy potential of municipal solid waste from African urban areas. *Renewable and Sustainable Energy Reviews*, 50, 1269-1286.
- Schmidt, K. (2016). What a waste! Developing the food waste-preventing behaviors scale, A useful tool to promote household food waste-prevention. *International Journal of Food and Nutritional Science*, 3(3), 1-14.
- Sulaiman, N. F. A. B. R., & Ahmad, A. (2018). SAVE THE FOOD FOR A BETTER FUTURE: A DISCUSSION ON FOOD WASTAGE IN MALAYSIA. *International Journal*, 3(10), 12-21.
- Wilkie, A., Graunke, R., & Cornejo, C. (2015). Food waste auditing at three Florida schools. *Sustainability*, 7(2), 1370-1387.
- Wilkie, A., Graunke, R., & Cornejo, C. (2015). Food waste auditing at three Floridaschools. *Sustainability*, 7(2), 1370-1387.