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Challenges and Initiatives on Single-Use Plastics in Universities: A Meta Synthesis

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ABSTRACT

Single- Use Plastic manufacturing and use have risen steadily since its invention, spurred by the rising urbanization of the world. Ever since its introduction, and driven by rapid urbanization, there has been an increase of plastic production and consumption. The government, organizations, and other institutions should perform various investigations to explore the many limits, in any aspects, in order to address plastic waste and its underlying problems. It involves implementing many strategies and efforts throughout the entire community, including in institutions. A meta-synthesis of the challenges and initiatives faced by schools with relation to single-use plastics is essential to providing a complete awareness of the existing situation and development of sustainable practices in educational institutions. After extensive investigation of the synthesized articles the challenges were categorized into seven themes: manpower, equipment/facility and space, administrative support, financial, lack of information dissemination, attitude/behavior, and curriculum integration. Meanwhile, the initiatives were classified into six themes: environmental goals, rewards and motivation, disciplinary measures, knowledge and awareness, educational approach, and the equipment and facilities. This meta-synthesis concluded that the various difficulties faced by universities in managing single-use plastic hinder the implementation of those solutions as well as the various initiatives employed by universities to promote the spread of environmentally conscious and responsible people. School administration and teachers collaborate in integrating the reduction of plastic waste to the teaching instruction. In addition, incentives and disciplinary actions are among the finest ways to instill routines, practices, and habits in the reduction and generation of plastic trash. To lay a solid basis for environmental education and awareness, policies that set expectations for behavior and offer direction to faculty, staff, and students are established.

INTRODUCTION

Single-use plastics are disposable plastics which are discarded once used. Ever since its introduction, and driven by rapid urbanization, there has been an increase of plastic production and consumption. Plastic being lightweight, inexpensive, and durable undeniably provides a wide range

of applications (United Nations Environment Programme, 2018).

However, plastic as a material is not a problem; rather, the overuse and improper disposal of plastic accounts for the plastic waste that ends up in landfills and the environment, which eventually causes environmental issues (Geyer, et al., cited in UNEP, 2018). Hence, plastic pollution became one of the global problems. One of the key sources of plastic pollution are the single-use plastics (United Nations Environment Programme, 2018). To address this problem, a global transformative action is required (Borrelle et al., 2020).

In fact, the Organisation for Economic Co-operation and Development asserts that action and international cooperation are required to reduce plastic pollution mainly through innovation, better product design and developing environmentally friendly alternatives, as well as efforts to improve waste management and increase recycling. The step towards plastic regulation and reduction is commonly implemented through the plastic waste management policy and legislation among local communities. This introduces the realization of implementing the same policy in schools or universities as they are one of the consumers of resources hence produce waste given with their daily activities which produces an impact towards the environment (Nolasco et al., 2021) This meta-synthesis intends to emerge a synopsis through a framework which conveys the underlying challenges and initiatives of the universities towards the use of single-use plastics.

METHODS

Research Design

This study employs meta-synthesis for qualitative study. A systematic review and integrations of findings from qualitative studies of a particular phenomenon of interest (Chrastina, 2018). The protocol coheres to the Combined Model with the seven meta-synthetic stages by Chrastina (2018) as follows:Step 1. Deciding the phenomenon of interest - This meta-synthesis is contributed to the present state of knowledge by synthesizing results and findings from the related articles and designing a conceptual model for the challenges and initiatives of the universities towards single-use plastics. Step 2. Deciding what is relevant - This method combines focused and comprehensive search methods. To gather relevant studies, a variety of databases including ScienceDirect, Google Scholar, Science.gov, ERIC, Gale Academy, and Research Gate will be utilized. Step 3. Careful reading and re-reading - This will determine if the studies gathered meet the inclusion and exclusion criteria. This will further extract the more relevant studies before proceeding to the next step. The themes and details of the study will be critically observed.Step 4. Determining the relatedness of the study (Thematic Analysis Approach) - Following the classification and identification of the major themes, a thorough process involving the search for connections between all topics must be carried out. Before creating the final categories, this procedure will now employ a thematic analysis approach to merged recognized topics.

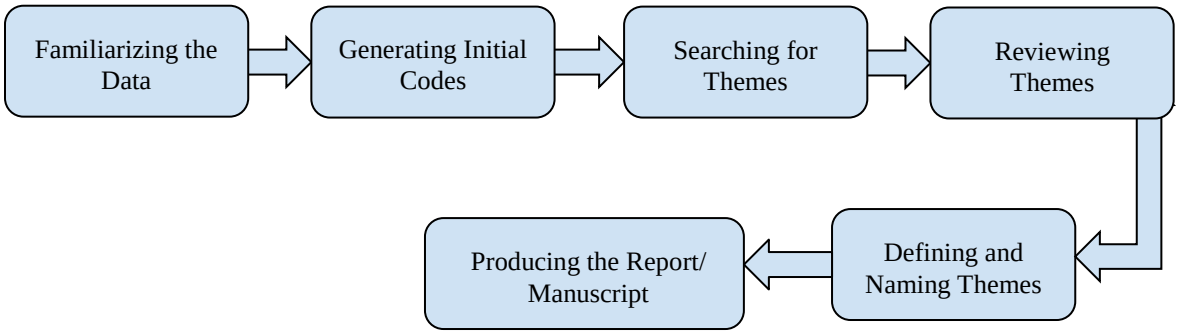

Figure 1: Thematic Analysis Approach (Braun and Clarke, 2017)

Step 5. Translating studies into one another - Recommended approaches at this level include

conceptual translation, refutational translation, and line of argument. The specifics of each study as a whole would be protected while being translated into terminology. Step 6. Synthesizing the translation - This step, which follows the thematically coded data, will combine the translated themes and mapping together to generate a synthesis and reflect the entire category, which is crucial for creating conceptual models. Reflections, interpretations, and conclusions from the previous phase will be included here. Step 7. Communicating the results through publication - It is the metasynthesis's last phase. In order to ensure efficient transmission of information, the findings (conclusions, interpretations, and conceptual model) are published in scientific journals and/or science publications.

Inclusion Criteria: (1) the research design is qualitative; (2) the journal is academic and peer-reviewed; (3) the article is about the single-use plastics in the university as well its challenges and initiatives or practices addressing single-use plastics; (4) the study used primary data; (5) qualitative data was collected using qualitative methods; (6) the paper was written in English and published from year 2015-2023. **Exclusion Criteria:** (1) studies with no research design or theoretical background; (2) studies that use quantitative methods (quantitative-based research analysis); (3) studies that uses close-ended survey questions as data collection tool; (4) qualitative data that does not organized into themes or findings that does not reflect challenges and initiatives or practices of the university towards single-use plastics; (5) using mixed method research in which the quantitative-qualitative data cannot be separated; (6) qualitative studies that focus outside the school or university as a setting.

3.0 Search Results

Seven search engines were utilized in the study all through database search. The total number of searched studies was 20, 210. The studies were screened by title considering the key terms for inclusion and it resulted in 86 studies. The remaining studies were examined continuously to identify duplicates. There were 10 duplicates excluded yielding 76 studies. The studies were reviewed and screened by abstract based on the inclusion criteria of this study resulting in 32 studies. All qualified abstracts were then examined through full-text screening including the accuracy of methodology which decreased the study to 12. Finally, for the studies to be qualified, a three point scale on the JBI Critical Appraisal Checklist for Qualitative Research (Joanna Briggs Institute, 2017) was utilized to evaluate the studies, resulting in 10 qualified studies included for metasynthesis

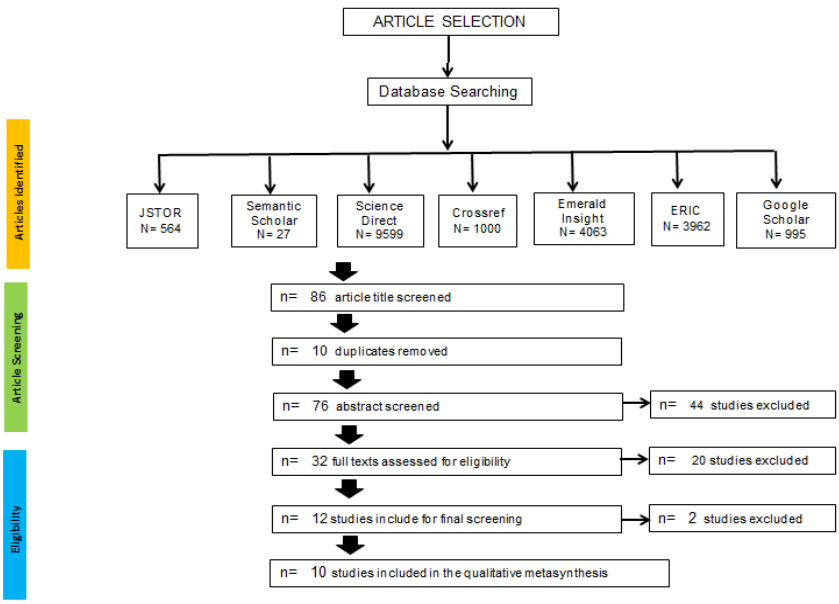

Figure 2: PRISMA flow for selecting studies

4.0 Results and Discussion

The 10 studies included in the study originated from Asia (7), North America (1), and South America (2). Table 1 outlines the characterization of final themes based on the first-order codes and quotation count. In this study, 7 key themes were generated describing the challenges of Universities in dealing with single-use plastics; while 6 themes were categorized pertaining to the initiatives or practices of the University addressing single-use plastics. There are a total of 135 quotes classified with 31 sub-themes in the challenges and 18 sub-themes in the initiatives of the Universities, respectively. Table 2 presents the organized themes and sub-themes in challenges. Table 3 shows the organized themes and sub-themes in initiatives.

Table 1
Summary Table of First-order codes and quotation count

Paper Code	Author of the Paper	First-Order Codes (Subcategories)	Quotation Count
1	(Moqbel et al., 2020)	C- Low Number of Manpower C- No/Low of Commitment Students/Staff C- Insufficient Waste Collection Vehicle C- Lack of Space C- Irregular Waste of Collection C- Lack of Communication C - Expensive equipment or material	8
2	(Baba-Nalikant et al., 2023)	I - Practices C - Availability of Facilities C - Poor Implementation C - Student's Lack of Awareness C - Financial- Expensive equipment or material C - Student's Lack of Awareness I - Campaign I - Penalty I - Incentives I - Alternatives I - Encouragement I - Information Dissemination I - Encouragements I - Social Influence	23
3	(Nolasco et al., 2020)	I - Practices I- Educational Approach- Research and Extension C - Attitude/Behavior- Lack of Motivation among students C - Administrative Support- Institutionalization of SWM in Extension C - Lack of Knowledge C - Not Segregating the Waste I - Engagement I - Information Dissemination	11

4	(Yeung et al., 2017)	I - Practices C - Availability of Facilities I - Educational Approach- Teaching Strategy C - Curriculum Integration- Inclusion in Instruction	6
5	(Das, D et al., 2022)	I - Campaign C - Poor Implementation I - Incentives I - Information Dissemination I - Encouragement I - Penalty	7
6	(Ebrahimi et al., 2016)	I - Practices I - Engagement I - Campaign I - Installation of Bins I - Information Dissemination I - Research and Extension I - Incentives I - Alternatives I - Policy I - Labeling of Bins C - Thoughtful purchasing strategies C - Lack of Space C - Need for tools and equipment C - Lack of Knowledge C - Lack of Communication C - Inadequate/insufficient waste separation facilities C - Lack of Baseline Data C - Poor Implementation C - More Reuse Opportunities C - Lack of Full Time SWM Worker C - Lack of Faculty/Staff Engagement C - Lack of Garbage Bins	30
7	(Siwaporn et al., 2017)	C - Poor Implementation C - Lack of Incentives C - Lack of Knowledge I - Practices C - Inadequate/insufficient waste separation facilities C - Gap Between Knowledge and Practice C - No/Low of Commitment Students/Staff I - Campaign I - Incentives I - Policy	12
8	(Suksant, 2019)	I - Incentives	5

		I - Alternatives I - Engagement	
9	(Moura et al., 2019)	I - Information Dissemination I - Campaign I - Curriculum Integration I - Research and Extension I - Centers or Laboratories I - Engagement I - Practices I - Teaching Strategy I - Training of Staff/Students	11
10	(Ali et al., 2021)	I - Installation of Bins C - Laziness C - Student's Lack of Awareness C - Lack of Policy C - Lack of Space C - Poor Implementation C - Inadequate/insufficient waste separation facilities C - Effort to promote waste reduction to community C - Informative Facilities to Introduce SWM C - Lack of Unit and Department I - Campaign I - Policy I- Enhancement of Waste Facilities I - Incentives	22
			Total Quotes: 135

Table 2
List of Themes, Sub-Themes, and Number of Codes in Challenges

	Categories/Sub-Themes	Grounded Code
Theme 1: Manpower		
1.	Low Number of Manpower	1
2.	Irregular Waste Collection	1
3.	Lack of Full Time SWM Worker	1
4.	Lack of Facility/Staff Engagement	1
Theme 2: Equipment/ Facility and Space		
5.	Availability of Facilities	2
6.	Need for tools and equipment	1
7.	Thoughtful purchasing strategies	1
8.	Insufficient waste collection vehicles	1
9.	Lack of space	3
10.	Lack of garbage bins	1

11.	Inadequate/insufficient waste separation facilities	3
Theme 3: Administrative Support		
12.	Poor implementation	
13.	Institutionalization of SWM in Extension	8
14.	Lack of policy	1
15.	Lack of incentives	1
16.	Lack of unit/department	1
17.	Lack of Communication	1
		2
Theme 4: Financial		
18.	Expensive Materials/Equipment	2
Theme 5: Lack of Information Dissemination		
19.	Students Lack of awareness	3
20.	Lack of knowledge	4
21.	Not segregating the waste	1
22.	Lack of baseline data/research	1
23.	Informative facilities to introduce SWM	1
Theme 6: Attitude/Behavior		
24.	Staff environmental attitude/Laziness of staff	2
25.	Lack of motivation among students	1
26.	More Reuse opportunities	1
27.	Gap between knowledge and practice	1
28.	No/low commitment students/staff	3
Theme 7: Curriculum Integration		
29.	Inclusion in instruction	2
30.	Teacher's knowledge	1
31.	Effort to promote waste reduction to community	1

Table 3
List of Themes, Sub-Themes, and Number of Codes in Initiatives

	Categories/Sub-Themes	Grounded Code
Theme 1: Environmental Goals		
1.	Programs and Campaigns	10
2.	Practices	9
3.	Policies	3
4.	Alternatives	5
Theme 2: Rewards and Motivation		
5.	Incentives	7
6.	Encouragements	4
Theme 3:Disciplinary Measures		
7.	Fine/Penalty	4

Theme 4: Knowledge and Awareness		
8.	Information Dissemination	9
9.	Social Influence	1
10.	Training of Staffs/Students	1
Theme 5: Educational Approach		
11.	Research and Community Extension	5
12.	Sustainability Engagement	5
13.	Teaching Strategy	3
14.	Curriculum Integration	2
15.	Sustainability Centers	1
Theme 6: Equipment and Facilities		
16.	Installation of Bins	5
17.	Labeling of Bins	2
18.	Enhancement of Waste Facilities	2

A. Challenges of the university addressing single-use plastics

A total of seven themes were generated from the 10 synthesized studies to categorize the challenges evident in the university addressing the use and management of single-use plastics in the University.

Theme 1: Manpower

Manpower is the number of human resources inside the university that has the responsibility of the enforcements of the practices and policies. The data reflects the low number of services staff dispatched to the disposal of waste in the premises including the irregularity of waste collection and showing no interest of the staff towards the program of waste segregation were also the factor of the behavior of students towards proper segregation.

Low Number of Manpower

During the operation phase, the program faced several obstacles that required special attention. Under logistic support, a low number of services staff were dispatched for collecting wastes. In such conditions, the waste bin became full. In that case, the students would either put the trash next to the bin or move to the mixed bins. (Article 1, Logistic Support)

Irregular Waste Collection

Ambiguity in duties and responsibilities was noticed at two levels: staff worker and supporting services administration. The presence of original waste bins beside the segregation units caused irregularity of waste collection, where the services staff were unable to maintain their collection schedule. (Article 1, Role Clarity)

Lack of Full Time SWM Worker

A wide range of issues from contractors/agencies/vendors who are unfamiliar with the universities recycling programs and do not want to take part in them due to a lack of a full-time recycling coordinator and more staff dedicated to sustainable waste management were reported. (Article 6, Barrier against Efficiency)

Lack of Facility/Staff Engagement

A participant from a top-level university indicated that the largest barrier to increasing efficiency in their Institution's recycling program is convincing students, staff, and athletic fans that recycling is essential and worth the extra time, while another participant from a benchmark university highlighted a similar issue by suggesting that after 6 years of pursuing a recycling program, occupants of their campus have 'no idea what should be in each bin and do not want to learn'. Survey respondents also described a lack of faculty/staff engagement in the recycling process. (Article 7, Top-level vs. Benchmark University Waste Management Survey)

The vignettes are the supporting evidence as to how low numbers of manpower serve as a factor to the implementation of programs for sustainability in the university. A shortage of staff and janitors to facilitate the management of single-use plastic along with their low commitment towards sustainability programs indicates a decrease of efficiency in handling single-use plastics as no one is responsible for the operation. This supports the study of Moqbel et al. (2020), the acquisition of any designed waste separation system mainly depends on the operative participation of the waste generators.

Theme 2: Equipment/ Facility and Space

The equipment, facility, and space refers to the availability of the facilities and equipment used with regards to the waste management in the university. The data shows the availability of facilities, the need for tools and materials, the insufficiency of waste collection vehicles, insufficiency of waste collection facilities and the lack of space as the identified challenges in the University concerning the equipment, facility and space availability.

Availability of facilities

Insufficient facility is one of the challenges that caused the failure of waste segregation by the campus community. (Article 14, Facility improvement)

Need for tools and equipment

There has been a need to supply more facilities and tools in order to handle waste. Handling waste would need equipment and tools for easy and efficient waste services. The lack of supplies and tools may result in staff's disengaged services to the targeted goals of the program, policy or plan. (Article 6, Western Kentucky University (WKU))

Thoughtful purchasing strategies

Data collected suggest a university should implement an Environmentally Preferable Purchasing Program (EPP) to commit a university to purchase products that have a reduced impact on human health and the environment when compared to competing products. (Article 6, Environmentally Preferable Purchasing Program)

Insufficient waste collection vehicles

Another obstacle was the insufficient and unsuitable waste collection vehicles that were provided by the administration to collect the segregated wastes. The mixed waste is usually collected by a waste collection truck provided by the Municipality of Amman city. (Article 1, Operation and Administrative support)

Lack of space

Another obstacle was the space limitations for segregated waste disposal. Recyclable wastes needed to be stored in a single appropriate and safe place to enable the recycling companies to collect the segregated waste.(Article 1, Operation and administrative support)

Inadequate/ insufficient waste separation facilities

People opined that "inadequate waste separation facilities" and "inconvenience" were the main hindrances to their practice of waste separation. Most respondents who answered open-ended questions raised technical issues and requested for an increase in the number and location of easily accessible waste separation bins. (Article 9, Effect of 3R solid waste campus initiatives on people's behavior)

Equipment, facility, and material are one of the factors that controls waste separation and promotes waste reduction, specifically single-use plastics. The shortage of the equipment and waste facilities, such as bins, waste vehicles, waste equipment and tools, and waste separation facilities hinders the students and staff to perform proper waste collection and management, and consequently affects the behavior and attitude of the staff towards the purpose of the policy and programs. Moreover, the failure of providing enough tools and materials affects the duty of the workers to carry out and follow the proper procedures of segregating waste. Based on the study of Ebrahimi et al. (2016), it is indicated that the primary and unavoidable investment to any effective waste

implementation is the supplying of the facilities and equipment inside the University. Therefore, the University must address the common technical issues that hinders the success of the implementation, such as the insufficiency of the bins for the students to use, and the facilities for the workers and staff to work on. Upon the implementation, the installation of the bins and other facilities should be the number one concern.

Theme 3: Administrative support

The improvement of school relies on continuous reform through policy and programs in the school system by which the administration controls and manages. The school administration is perceived as the backbone of the university. The administrations' support for sustainability goals in the university is required for effective implementation of practices. Based on the synthesized studies, the following vignettes affirmed that lack of administrative support is an obstacle in incorporating sustainability in the university.

Poor implementation

"For example, at the Desa Siswa in here, they said there is no straw, but there is still an option for the straws. So, it is hard to change the attitude. When we said no straws, it was supposed to be no straw at all. There is no option there. Rules, if there is no implementation-the way to implement it must be right." (Article 2, Participant 27)

Institutionalization of Solid Waste Management (SWM) in extension

This action will help reinforce the educational activities with the academic community (students arriving already educated on the issue) and expand knowledge on sustainable waste collection beyond the campus. (Article 3)

Lack of policy

In addition, the campus's authority does not have a well-planned framework for SWM, including the responsibilities of stakeholders, waste minimization and a systematic waste collection system. (Article 11)

Lack of incentives

The MSW market has no economic incentive for waste reduction. This is true for HEIs as well. AIT pays a fixed waste collection fee to the municipality of only 8,000 Baht a month (approximately US$250/month). This is an example of the lack of incentives to reduce waste according to the weight and volume. (Article 7, Existing situation of waste quantity and characteristics)

Lack of unit/department

Considered to be one of the existing limitations in achieving sustainable school, lacking of facilities and specified departments focusing to address the known global pandemic in all functioning schools

Environmental policies and programs in the university should be firmly stressed and implemented. Part of the administration's responsibility is to involve environmental education and plan environmental goals to practice in the university. The lack of administrative support contributes to the challenges of plastic waste and management within the academic community as administrators play a critical role in enforcing well-planned policies for school improvement, particularly in the aspect of single-use plastic waste management. This is similar to the study of Nalikant et al. (2023) which states that to encourage pro-environmental behavior, the university management should impose policies and practices that are widely and consistently applied in the campus to attain the goal of a zero-waste campus.

Theme 4: Financial

Higher educational institutions consider the finances as one major problem in the operation stage. The finances include the budget for waste facilities and the processes of the implementation. The solid waste management policies and programs require high-costs of supplies for the modification required for the facilities and equipment in managing solid waste including single-use plastics.

Expensive equipment/material

However, policy and cost were cited as obstacles for university management to provide the facilities as making policy itself is not easy as it involved many things such as legislation. Thus, it is costly to

provide the facilities and maintain the waste management itself. "There is no policy yet. Because making a policy is not easy, and it involves many things, such as legislation." (Article 2, Participant 14)

Financial support is one of the obstacles reported in achieving a green campus. The provision of facilities and materials requires finances to conduct and to maintain the practices inside the university. Wright and Horst, Coy et al. (2013) stated, the cost of making a policy was a challenge for it demands larger and enhancement of facilities. There is a decrease of effectiveness of policy and programs employed in the university such as the inadequate number of equipment and facilities as it requires financial allocation to proceed in the installation since the equipment are costly. Hence, the budget should be the primary concern in implementing programs, campaigns, and policy.

Theme 5: Lack of information

The lack of information refers to the community's awareness and knowledge towards the proper segregation of waste and the recycling method. The students' lack of awareness and knowledge, the low informative facilities to improve SWM, and the lack of baseline data for waste generation were found as challenges in the University with regards to the information dissemination.

Student's lack of awareness

In other words, they do not have a clear idea of the methods as well as the reasons to separate waste. (Article 9, Challenges faced in carrying out SWM on campus)

Lack of knowledge

The WKU Office of Sustainability and WKU Recycling and Surplus Department were indicated as recycling information sources by 41% of respondents, while 112 participants (15%) proclaimed that they had no information about recycling. (Article 6, Barriers against Efficiency)

Lack of baseline data/research

Yet, several gaps in waste management are currently not closely considered on a holistic, campus-wide scale while working towards the two aforementioned goals…waste generation stream analysis, and the need for supplying more facilities and tools to handle waste are lacking. (Article 6, Western Kentucky University Recycling and Surplus Department, 2015)

Informative facilities to improve SWM

Besides, no notice or information such as "what can be recycled?" or "how toseparate waste at source?" was observed in the campus compound. From the interviews with the contractors, it was reported that informative facilities should be introduced around the campus to educate and encourage waste reduction and recycling habits. (Article 9, 4.2. Challenges faced in carrying out SWM on campus)

The dissemination of information is the first-step towards the realization of the target goals of the waste reduction programs, projects, policy, and practices in the university. The university is the best setting to educate and promote awareness to students, staff, and teachers in the current status of environmental problems. The lack of information and awareness influence the negligence and ignorance towards such problems. As a consequence, there is a continuous disregardment from the students which becomes a reason to deny environmental responsibility. This is supported by the study of Ali et al. (2021), it states that educational institutions should educate students and impart information to mold them to become more environmentally conscious. On that account, the University must go hand in hand with regards to environmental awareness and teaching instruction.

Theme 6: Attitude/ behavior

Attitude and behavior refers to how the staff and students act and think towards the segregation of waste and the use of single-use plastics. The staff and students attitude and behavior conveys as one the challenges in the segregation of waste or in the usage of single-use plastics. The low commitment of the staff to collect and segregate the waste and the students' non-environmental behavior highlights the challenges on and during the implementation of the policy. Including the lack of motivation and the gap between the knowledge and practice of the students were also translated

as need to be addressed.

Staff environmental attitude/ Laziness of Staff

It was also found that the janitorial staff did not store recyclable waste separately. Instead, they mixed recyclable waste with general waste and disposed them at the final collection point. This situation shows that the awareness of the community on separating waste at the source is still very low. (Article 10, Figure 1)

Lack of motivation among students

This is why educational awareness actions must be continuous and permanent, directed at the personal motivation of individuals on campus. (Article 3, 3.4 Actions for solid waste management at Faculdade UnB Planaltina)

More reuse opportunities

Waste reduction through the development of thoughtful purchasing strategies, increasing reuse opportunities, and conducting comprehensive outreach and education services has been defined in the mission statement of the Recycling and Surplus Department (Western Kentucky University Recycling and Surplus Department, 2015b). (Article 7, Western Kentucky University (WKU)

Gap between knowledge and practice

3R related knowledge and environmental attitudes does not necessarily translate into practice, unless identified barriers are addressed. Also, appropriate policy instruments and correct mechanisms are required. (Article 7, *3.5 Effect of 3R solid waste campus initiatives on people's behavior*)

No/low commitment of students/staff/community

The service staff showed low commitment toward the program. On several occasions, the service staff ignored collecting waste from recycling units, where waste could stay in the bin for the next day. In such conditions, the waste bin became full.(Article 1, Operation and administrative support)

The attitude and behavior of staff and students towards plastic waste reduction is a significant contributor to the success of the implementation process. Their individual perspectives of the importance of the programs or policy influence their willingness to act and cooperate as part of the academic community. Weak environmental attitudes and behavior hinders the attainment of environmental goals within the university. This is similar to the study of Siwaporn et al. (2017) that the human's choice, awareness, attitude, and behavior constituted the achievement of sustainability. Therefore, environmental goals of the University shall be able to influence the students, including the staff, to change their actions and their way of thinking towards the environment.

Theme 7: Curriculum integration

The curriculum integration characterizes the inclusion of sustainability in the curriculum or in the teaching process. The challenges identified reflect the inclusion of sustainability development in the instruction and the proficiency of the teacher regarding the integration of sustainability, including the effort to promote waste reduction to the community.

Inclusion in instruction

There exist some challenges to teachers who adopt these two approaches. First, a great deal of effort is required to design the instructional content. Although GS does not require any computer programming techniques, the development of the plot with meaningful and engaging tasks underlying the GS could prove challenging and time-consuming. (Article 4, Implications for ESD teachers in higher education)

Teacher's knowledge

Another challenge is the change in teachers' roles. They are no longer the authoritative person in the classroom who may only focus on presenting the course materials clearly, but acting as facilitators with multiple sets of skill instead. These can present a major challenge for long-in-service teachers who are accustomed to the traditional lecturing style. (Article 4: Implications for ESD teachers in higher education)

Effort to promote waste reduction to community

The campus community finds this a nuisance as they are not ready to change their lifestyle to help

conserve the environment. This finding is supported by Desa, A (2017),who stated that even though the public professed the "correct" attitude towards the environment,many are still not ready to change their lifestyle in ways that might require sacrificing certain forms of leisure and comfort for the sake of the environment. (Article 9, 4.2 Challenges faced in carrying out SWM on campus)

Currently, some schools are slowly transitioning into a more sustainable learning environment. Time is one of the important factors to consider in the inclusion of sustainability in the curriculum as it is an additional responsibility to teachers. One of the challenges that contribute as to why teachers cannot take the role is the inability of teachers in integrating sustainability in the teaching instruction since it is time-consuming and requires the enhancement of teaching strategy. Similarly, these serve as challenges for teachers who are used to the traditional method of teaching (Moura et. al, 2019).

B. Initiatives and practices of the University in dealing with single-use plastics

A total of six themes were prompted upon the synthesis of 10 articles to break down the initiatives employed in the University towards the use and management of single-use plastics.

Theme 1: Environmental goals

Environmental goals are recognized as one of the characterized catalysts of change for waste management. It identifies the effectiveness in changing people's behavior and practices towards single-use plastics usage, through establishing lawful acts and policies, and recreating or changing people's ways through seeking effective alternatives aside from normally using single-use plastics, and consequently prevent loitering and pollution specifically in school premises.

Practices

"Zero-waste is the goal we are trying to achieve, so 3R is the mechanism we use. The Ways that we want to use. The main goal is zero waste. We try to achieve the goal, but how to do it? The way is 3R." Participant 14.

Campaigns/programs

Respondents' current zero-waste practices implied that they have been doing waste recycling, waste separation, waste reduction (3R), and supporting the no single-use plastic movement.They demonstrate their support by using alternative items such as their own food/drink containers and shopping bags. (Article 2, FGD Results and Findings)

Policy

In order to minimize the solid waste generated on campus, a set of written policies should be developed and enforced by the campus authority. In addition, it can serve as a term of reference for each stakeholder. (Article 10, Policy design and implementation)

Alternatives

They additionally mentioned that there are alternative measures that can be used to reduce the use of single-use plastic cups instead of providing the discount, such as changing to biodegradable cups. (Article 8, Short interview after the intervention)

Environmental goals in the university sets the foundation of adopting sustainable practices, programs, alternatives, and policy particularly in combating the increasing amount of single-use plastic usage and its accumulating impact to the environment. The environmental policy of a university could encourage responsible environmental management and practices towards zero-waste campus goals (Baba-Nalikant et.al, 2023). These goals may serve as an inspiration for students to practice the same goals outside school premises.

Theme 2: Rewards and Motivation

The rewards and motivation signifies the adequate way in igniting the people to work and act together wherein the beneficiaries are both the people and the environment as they appropriately take part in preventing the usage of single-use plastics through education with correlation to the environment and encouragement from different associations of environmentalists and/or receiving incentives as a reward for participation.

Incentives

Recycling activity through the cash-for-trash program had a positive effect on reducing the proportion of recyclable packaging remaining in the MSW stream, whereas the recyclable packaging-waste separation project did not. Financial incentives and consistent participation in the cash-for-trash program are possible explanations for this positive result. Those who participated earned money by selling recyclables. (Article 7)

Encouragement

Personal encouragements are valued as motivators for people to participate actively and effectively in waste management. It is found that personal awareness, supports, trends, and reinforcement motivate the respondents to be proactively involved in pro-environmental activities."As a student, I do not want to do this alone. So, I think what I should do and what other students should do is invite friends to do it together. Yes, both support and trends."Participant 29. (Article 2, FGD Results and Findings)

Incentives have a great impact on encouraging the students and staff to act collaboratively with the goal of the University to develop a sustainable learning environment. To integrate the habits and practices of waste segregation, declining the use of single-use plastics and supporting the programs, campaigns or policy implemented in the University is the main purpose of giving incentives to students and staff, not to to develop adaptive behavior on being reliant on the presence of the incentives. According to Das et al (2022), Incentivisation does not only encourage students' use for the incentivisation or promotional period, but more importantly, creates a habit, which pushes for the sustained use of the product. Besides inculcating the habits of use through incentivisation, it is also important that the initiative must also be seen as beneficial to the end-users.

Theme 3: Disciplinary measures

Disciplinary measures are the reprimand or apply corrective action in response to negligence of necessary and appropriate environmental practice including non-compliance to the school's plastic waste policy and will be conducted reasonable disciplinary measures such as penalty or monetary fine.

Fine/penalty

Corresponding to incentivisation, a de-incentivisation strategy was utilised targeting the use of single-use plastic bags—SGD 0.20 is charged per single-use plastic bag purchased on campus. (Article 5, Incentivising Initiatives)

The disciplinary measures towards the student and staff's uncooperative behavior creates a foundation to the establishment of programs and policy since it not only encourages them to work jointly with their objectives but also obligates them to foster environmental stewardship. Aside from providing incentives, schools employ the opposite strategy by giving penalties for non-compliance. This serves to motivate the academic community to be disciplined and for policies targeting plastic usage and management within the university to be strong and consistent. This is similar to the findings of Hao & Xu (2022) that the likelihood to follow mandatory waste separation policies is the high penalty for non-compliance. Hence, one of the initiatives that schools consider is providing penalties for policy violators.

Theme 4: Knowledge and Awareness

Knowledge and awareness refer to the importance of the acquisition of relevant information by any means and how it significantly reflects positive behavior towards the students. The following vignettes support that students' and staff's knowledge and awareness of waste segregation, plastic waste management, and recycling are one of the initiatives of schools that influence sustainable practices and behaviors within the university. It includes dissemination through any mediums, the social influence of the students; and the training of staff/students.

Information dissemination

"Information on the zero-waste issue needs to be disseminated from time to time through the mass

media such as television, radio, or social media platforms such as Facebook, WhatsApp, Instagram. Nowadays, most people are using them. Maybe the continuance of dissemination may touch their minds." Participant 12. (Article 2)

Social influence

"To educate by observation. For example, the students will follow the first act of their superiors." Participant D."As a student, I do not want to do this alone. So, I think what I should do and what other students should do is invite friends to do it together. Yes, both support and trends." (Article 2)

Training of staff/students

Thus, the main results show the possibility of aligning sustainable practices with educational objectives and values, as individuals committed to a more sustainable world play a vital role in the success of integrating sustainable practices with the university. This commitment comes through awareness of the whole university group. (Article 9)

The attainment of the devised plan for the implementation of policy, campaign, program and practices towards sustainable development is reliant on its major contributors which are the people in the University premises that continuously work and operate in preparing the learners to the real world. To better equip them with sufficient knowledge and skills, the university shall build in environmental education together with the instruction which will serve as both awareness and training.

Theme 5: Educational Approach

The educational approach involves integrating environmental education in the teaching process to increase environmental knowledge and awareness of single-use plastics and make informed decisions towards single-use plastic management and reduction in the university. The synthesized data revealed that research and community extension, engagement, teaching strategy, curriculum integration, and sustainability centers are the schools' initiatives and practices towards management of single-use plastics which are supported by the following vignettes.

Research and Community Extension

A group that develops university extension and research actions related to the theme of solid waste management and environmental awareness with the academic community of FUP. (Article 3, 3.4 Actions for solid waste management at Faculdade UnB Planaltina)

Engagement

The separation of waste correctly at the source is the most effective action to facilitate the entire waste management process. Therefore, engagement of the academic community and behavioral change towards a focus on socio-environmental responsibility is fundamental for the effectiveness of selective collection. (Article 3, 3.4 Actions for solid waste management at Faculdade UnB Planaltina)

Teaching strategy

This teaching will bring the necessary awareness to implement sustainable practices because with theoretical knowledge, there is a better chance to get to practice. (Article 9)

Curriculum integration

Thus, the main results show the possibility of aligning sustainable practices with educational objectives and values, as individuals committed to a more sustainable world play a vital role in the success of integrating sustainable practices with the university and this commitment comes through awareness of the whole university group. (Article 9)

Sustainability Centers

For the remaining 8 HEI, the main practices were identified, one of which is centers or labs to study and promote sustainability. (Article 9, Results and analysis)

There are several movements that the university enforces mainly focusing on incorporating environmental education in the teaching process and in the university's curriculum. As an educational institution, schools should educate and shape the academic community to increase the environmental

knowledge, consciousness, and awareness (Ali et. al, 2020).This supports the study of Moura (2019) that strong environmental policy, obtaining strategic resources, supporting leaders and individuals who work toward the idea of sustainability and environmental preservation are also identified as the factors necessary to enable universities to undertake and include a sustainable change in all areas of the institution. Further, considering also the university's education and awareness of the importance of environmental sustainability for future generations as this is a fundamental key for a successful sustainable strategy.

Theme 6: Equipment and Facilities

Equipment and facilities refer to the physical resources that are needed to manage single-use plastics in the university. The synthesized data reflects that the installation of bins, labeling of bins, and enhancement of waste facilities are found to be essential ways of managing and mitigating the use of single-use plastic waste.

Installation of bins

In the same year, a mini-bin system was deployed in academic and administrative offices, which increased recycling by 30 percent (Appalachian State University Office of University Sustainability, 2015). (Article 4)

Labeling of bins

Increased recycling is attributed to multiple efforts such as increasing the number of recycling bins on campus, relabeling all existing bins, providing composting bins at dining halls, replacing dining take-away packaging with compostable packaging, and improving and widely distributing recycling guidelines across the campus (Participant B, personal communication, 2015).(Article 4)

Enhancement of Waste Facilities

Furthermore, user-friendly waste separation facilities should be placed appropriately throughout the campus to encourage the recycling habit among the campus community. (Article 10)

Adequate and sufficient facilities fosters a sense of environmental responsibility to the students and staff as it abolishes the reasons for their inability to work and cooperate with the goal of the programs and policy. The complete emplacement of these equipment and facilities along with providing informative labels help administer the dissemination of information and encourage university individuals to practice appropriate management of single-use plastic waste, recyclables, and waste that can be recovered. This is supported by the study of Ali et. al (2021) that the use of facilities should be convenient and reachable and that in order to educate and encourage waste reduction and recycling behaviors, informative facilities should be installed around the campus.

5.0 Proposed Framework

The proposed framework emphasizes challenges and initiatives towards single-use plastics in the Universities, and the practices that can be applied in Cebu Normal University. The challenges were categorized into seven themes, labeled the manpower, equipment/facility and space, administrative support, financial, lack of information dissemination, attitude/behavior, and curriculum integration. These are the identified factors that the university faced with regards to the usage of single-use plastic and the solid waste management. These factors demand to be highly addressed to minimize the problem. Other than the challenges, the framework imposed several initiatives for the Universities to take advantage of in dealing with the plastic and management issues and these actions are subject to expansion and implementation. The initiatives were classified into six themes, these are the environmental goals, rewards and motivation, disciplinary measures, knowledge and awareness, educational approach, and the equipment and facilities**.** On the basis of the mentioned initiatives, there are practices that can be applied in the Cebu Normal University concerning the use of single-use plastics.

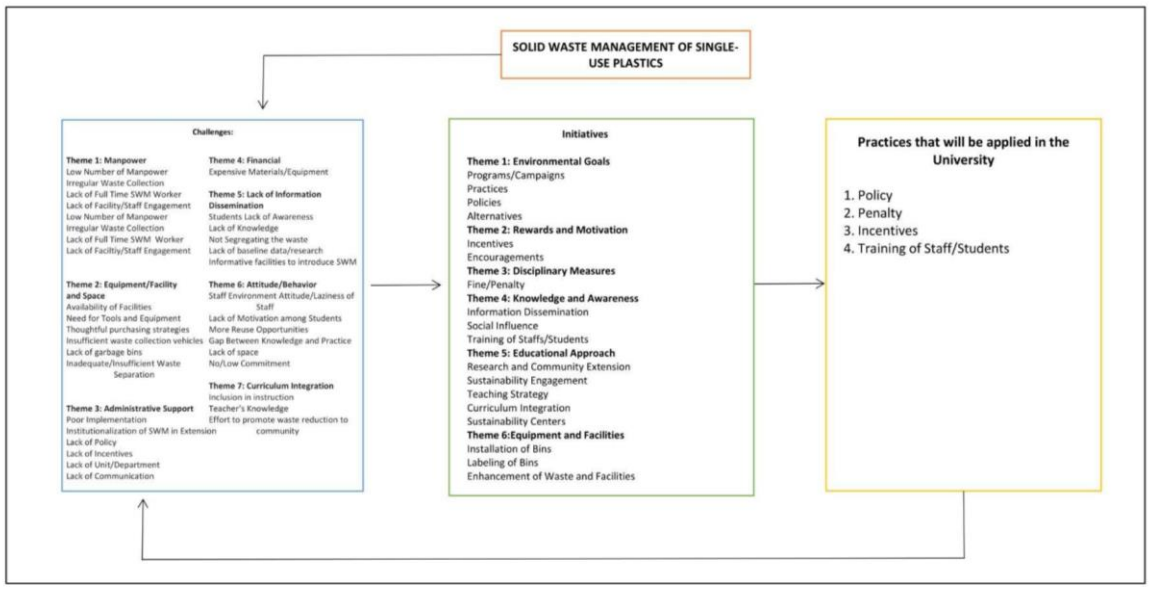

***Figure 3**: Thematic framework of challenges and initiatives of single-use plastics in the universities*

CONCLUSIONS

This meta-synthesis interpreted that the different challenges of the universities in managing single-use plastic hinders the effectiveness of implementing them along with the various initiatives that the universities employed in order to foster proliferation of environmentally aware and responsible individuals. Learning and practices starts within a close community such as the University or school where it is the most ideal and appropriate place for learners to understand, be informed and practice the different ways in order to combat the rising environmental challenges especially the harmful effects of the use of single-use plastics. These initiatives are grown from the challenges that occurred in the different schools and universities all over Asia and some schools and universities in the United States of America which took part in the goal to reduce the generation of single-use plastic waste. The thematic framework depicts the cyclical process of promoting Sustainable waste management of Single-use plastics that gives rise to challenges that is identified where it is then countered by the initiatives that are formulated to promote environmental stewardship and resolve the problems regarding the usage and the generating plastic waste. The school or university administration and teachers must work together in order to train the learners to adopt good practices towards the single-use plastic waste segregation, reduction and usage. This can be achieved by establishing significant environmental programs, campaigns and policy where its success relies on the proper information dissemination of their environmental goals. Therefore, this study recommends that the school administration and teachers must work together in integrating the reduction of plastic waste to the teaching instruction and foster environmental practices through undergoing environmental training and seminars for teachers and students to know and realize their environmental responsibilities. Moreover, it must be taken into consideration that ,aside from the training and integration to the instruction, incentives and disciplinary measures are one of the best strategies to inculcate habits, practices and routines in the plastic waste reduction and generation. And lastly, to create a strong foundation for environmental education and awareness, establishing policies that provide accountability and guidance to the students, staff and teachers that promotes the capacity to transition into a more environmentally responsible learning community.

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