IMPROVING SUBDIVISION RESIDENTS' SOLID WASTE DISPOSAL

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ABSTRACT

Solid waste management intitiative is a challenge in today's modern world. A semi-urbanized region where subdivisions are located will really need to have a great solid waste management plan. This study aims to contribute to the challenging concept of solid wastes management, particularly this will identify the solid waste composition and weight assessment, quantify the perception of the residents and subdivision officials in the solid waste practices indicators, and to develop solid waste management scheme to improve wastes disposal of Laguna Buenavista Executive Homes, Barandal, Calamba, Laguna. The study is a descriptive quantitative research. Solid waste compositions were identified based on a three-day random observation and listing of the solid wastes presence on the street corners one hour before collection. Weight compositions were gathered by finding out the weight in grams of each type of solid wastes idenfied. A modified solid waste management practices indicator statements were used. G power software was used in identifying sample size. Weighted mean was used in quantifying perceived solid waste management practices of the residents and subdivision officials. The study found that the majority of the wastes generated in Laguna Buenavista Executive Home were mixed plastics (13.32%) and yarn wastes (12.55%). The total solid wastes of 29,499 grams were recorded on the three-day observation and collection in the random study sites. In the perception of the residents in the soid waste management practices indicator, most of the statement were greater than 4.5, interpreted as strongly agree. On the other hand, an average of 4.2 with a verbal interpretation of agree were gathered in the perception of the subdivision officials in the solid wastes management practices indicator. The new solid waste management scheme for Laguna Buenavista Executive Home were developed and the involvement of the household residents and community/ subdivision officials were emphasized. It was recommended that the new solid waste management will be implemented to prove its effectivity in improving solid waste disposal of the residents of Laguna Buenavista Executive Homes.

Keywords: *solid waste management scheme, subdivision solid wastes, solid waste composition, solid waste management practices indicator*

INTRODUCTION

Solid waste management (SWM) pertains to the control of the"generation, storage, collection, transfer and transport, processing and disposal (RA 9003)" of solid waste in a fashion that is in accordance to societal and economic needs while at the same time compliant to environmental standards and principles The Philippines' Environment and Natural Resources secretary, Ramon J. P. Paje has signed a memorandum of agreement (MOA) with 11 Metro Manila local government units (LGUs) establishing ecological solid waste management systems for homeowners associations of subdivisions and condominiums. . Solid waste is a sign of how citizens' lifestyles change as a result of economic development. Though waste collections in subdivisions are on a regular basis, still it is not enough because some of the homeowners doesn't have their own trash bins, doesn't know how to segregate and for those who have pets without a proper "dump place" their owners would put it with the other trash or throw into an unoccupied house. That is why the researchers came up with an idea of developing a waste management scheme, which will convince them to change their ways of disposing waste. This study will benefit not only the researcher, but also the community, if the homeowners association would implement the waste management scheme.

Waste can be generally described as any item or material that is generated and disposed of or intended to be disposed of by a person that has custody of it. However, in addition to considerations of legal nature and geographical location of generation, different definitions of waste exist based on conditions under which they occur (Williams, 2005). A process whereby strategic combination of methods are employed to efficiently regulate waste from source of generation up to the final disposal point is referred to as waste management, and the aim is to maintain a perpetually safe and healthy environment at minimal cost (Igbinomwanhia, 2011).

EEA (2009) defines MSW as: "...waste from households and other waste which because of its nature or composition is similar to waste from households (cf. the Land Directive). Some of this waste is biodegradable, e.g. paper and cardboard, food waste and garden waste. Biodegradable waste means any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, and paper and paperboard (cf. Landfill directive)" (EAA, 2009, p. 14). The whole process of collecting, transferring, treating, recycling, recovering resources and disposing solid waste in metropolitan areas defines municipal solid waste management MSWM (Ogwueleka, 2009). Sustainable MSWM should entail handling of

waste (from collection, treatment to disposal) in a manner that ensures continued safety of public and environment (Adewole, 2009).

Households are considered major sources of solid waste in comparison to other sources of generation such as educational and commercial institutions or the municipal (from cleaning of public places such as streets). In addition to generating a large part of the organic waste component especially food, households also generate waste such as plastic, glass, metal, paper and rags, and others which are harmful such as batteries, vehicular parts, , etc. (Magutu & Onsongo, 2011).

The three R's are commonly used terms in waste management; they stand for "reduce, reuse, and recycle". As waste generation rates have risen, processing costs increased, and available landfill space decreased, the three R`s have become a central tenet in sustainable waste management efforts (El- Haggar, 2007; Tudor et al., 2011). Many waste management frameworks seek to incorporate the three R's in some capacity. In the UK, North America, throughout Europe and in parts of Asia, waste hierarchies are being incorporated which promote the adoption and use of "reduce, reuse and recycle" initiatives (Allwood et al., 2010).

The most effective way to reduce waste is by not creating it in the first place, and so reduction is placed at the top of waste hierarchies (USEPA, 2010). In many instances, reduction can be achieved through the reuse of products. Efforts to take action to reduce waste before waste is actually produced can also be termed pre-cycling (HRM, 2010).

It is sometimes possible to use a product more than once in its same form for the same purpose; this is known as reuse (USEPA, 1995). Examples include using single-sided paper for notes, reusing disposable shopping bags, or using boxes as storage containers (UC Davis, 2008). Reusing products displaces the need to buy other products thus preventing the generation of waste.   Minimizing waste through reduction and reuse offers several advantages including: saving the use of natural resources to form new products and the wastes produced in the manufacturing processes; reducing waste generated from product disposal; and reducing costs associated with waste disposal (USEPA, 2010).

Laguna Buenavista Executive Home is located at barangay Barandal, Calamba City and it is adjacent to the Calamba Premier Industrial Park, thus the location can be also an opportunity for income on room rentals. There is a solid waste program in the subdivision but improvement still needs because of the increasing volume of solid wastes generated these days. Improving residents solid wastes disposal can be possible through this study and the cooperation of the both the residents and subdivision officials.Figure 1 below shows the interlinking factors to improve solid wastes disposal in the subdivisions.
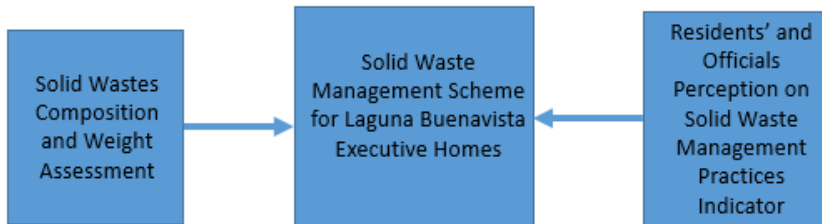
Figure 1. Conceptual Framework

The conceptual framework shows factors that can be use as basis in drafing the solid waste management scheme for Laguna Buenavista Executive Homes. This factors were the identified solid wastes composition and weight assessment as well as the perceived solid wastes management practices indicator of residents and subdivisions officials.

Objectives of the Study

This study aims to (1) identify the solid waste composition and weight assessment, (2) quantify perception of the residents and subdivision officials in the solid waste practices indicators, and (3) develop solid waste management scheme to improve wastes disposal of Laguna Buenavista Executive Homes, Barandal, Calamba, Laguna.

METHODOLOGY

The study is a descriptive quantitative research. Solid waste compositions were identified based on a three-day random observation and listing of the solid wastes presence on the street corners one hour before collection. Weight compositions were gathered by finding out the weight in grams of each type of solid wastes idenfied. A modified solid waste management practices indicator statement (Purdy and Sabugal, 2011) were used. G power software was used in identifying sample size. Weighted mean was used in quantifying perceived solid waste management practices of the residents and subdivision officials. In improving solid wastes management practices, a new solid waste management scheme was developed based on the identified solid wastes composition and weight assessment as well as the perception of the residents and subdivision officials in solid waste management practices.

RESULTS AND DISCUSSION

Solid Waste Composition and Weight Assesment

In order to determine the estimated solid wastes composition and weight, researcher observed, listed, and pre-weighed the collected solid wastes found on the street corner. Among the solid wastes collected were classified as trashes, rubbishes and garbages. Sarah et.al. 2015 define trash as a mixture contain up to 10% by weight of plastic bags, laminated paper, disposable plactics and rubber wastes. Rubbishes on the other hand is a mixture of combustible wastes such as paper, cardboards, cartoons, foliage, this mixture contains up to 20% moisture by weight, but contains no treated papers, plastics or rubber wastes. While garbage are consists of animal and vegetable wastes.

Table 1. Estimated Solid Waste Composition and Weight Assessment of Laguna Buenavista Executive Homes

| Items	Block 1 Weight (g)	%	Block 2 Weight (g)	%	Block 3 Weight (g)	%	Total Weight (g)	%
Mixed Paper	1020	10.79	980	10.24	1120	10.69	3120	10.58
Newspaper	810	8.57	760	7.94	920	8.78	2490	8.44
Yarn Wastes	1410	14.92	1220	12.75	1071	10.22	3701	12.55
Foof Wastes	1080	11.43	1221	12.76	995	9.50	3296	11.17
Mixed Plastics	1200	12.70	1318	13.77	1410	13.46	3928	13.32
Water Bottles	720	7.62	860	8.99	920	8.78	2500	8.47
Other PET Bottles	930	9.84	1080	11.28	1318	12.58	3328	11.28
Diaper Wastes	630	6.67	760	7.94	430	4.10	1820	6.17
Glass	300	3.17	212	2.22	120	1.15	632	2.14
Mixed Metals	390	4.13	265	2.77	956	9.12	1611	5.46
Mixed Wastes	960	10.16	895	9.35	1218	11.62	3073	10.42
Total	9450	100.00	9571	100.00	10478	100.00	29499	100.00

Table 1 shows the estimated solid wastes generation of selected blocks in the Laguna Buenavista Executive Homes. Majority of the wastes generated were mixed plastics (13.32%) and yarn wastes (12.55%). Block 3 has the highest solid wastes generated with an estimated weight of 10,478 grams. The total solid wastes of 29,499 grams were recorded on the three-day observation and collection in the random study sites. This projection (10

kg per block) was similar with the daily solid wastes generation of each household in a modern urbanized city in Croatia (Magutu and Onsongo, 2011).

Based on the data collected, an effective solid wastes management is needed. The use of material recovery facility (MRF) in the subdivision even in each household will be effective in minimizing solid wastes. (Tudor et.al, 2011) specify the used of MRF as the most effective means of solid waste minimization in UK households. Solid wastes such as dry newspaper, mixed plastics, water bottles, PET bottles and metals can be recycle, reuse or even earn some money. Yarn wastes and food wastes can be converted into organic fertilizers that can be used at home for recreational gardening or donated to the community garden as composed pit.

Smyth et.al. (2010) applied the reducing of solid wastes started with segregation and the use of color coding bins for easy solid waste transfer. PET bottles and other plastics were classified as high-value solid wastes that can be recycle and with high monetary value. Similarly, majority of the listed solid wastes in Laguna Buenavista Executive Homes were considered high-value solid wastes. Figure 2 below show the graphical presentation of the percentage by weight of solid wastes composition of Laguna Buenavista Executive Home.

Figure 2. Percentage by Weight of Solid Wastes Composition of Laguna Buenavista Executive Home
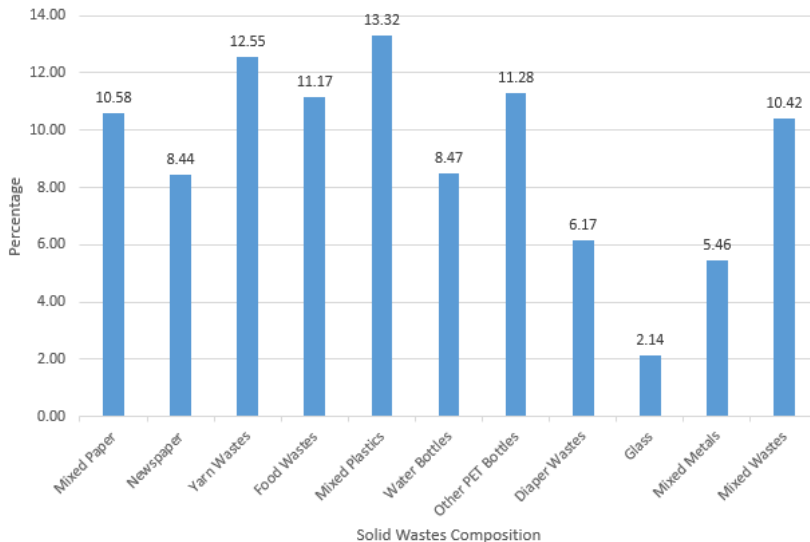
Mixed plastics (13.32%) has the highest percentage by weight on the other hand, PET bottles (11.28%) and water bottles (8.47%) were also recorded. In the most urbanized area in Cambodia, plastics are never been considered solid wastes because the residents were collecting it and converting it into cash (Seng et al, 2010). In some rural areas of the Philippines, burning of yarn wastes were still practice despite the fact that the law on burning wastes are now implemented in the baraggay level. Yarn wastes can be used as organic fertilizer and this will be a great idea to encourage households to try recreational gardening at home. (Smyth et.al.,2010) suggested the use the recreational gardening in a campus to transform yarn and food wastes into organic fertilizer. Lastly, the generated solid wastes of Laguna Buenavista Executive Home will be minimized by applying the practice of solid waste management scheme thus, a responsible home owners will be soon happier about the results of this practice.

Perception on the soild waste management practices of the residents and suddivision officials

The perception of the residents in practicing solid wastes management was one of the consideration of this study. A modified solid waste management practices indicator statement by Purdy and Sabugal, 2011 were used.

Table 2. Solid Waste Management Practices Indicator for Residents

Indicators	Weighted Mean	Interpretation
1. Solid wastes are segregated at home before the collection	4.9	Strongly Agree
2. Use of own eco bag when going to groceries or market	4.7	Strongly Agree
3. Buy food/household needs in large quantities rather than retail	4.1	Agree
4. Practice recycling, reusing and reducing techniques	4.7	Strongly Agree
5. Create a recreational gardening at home that may use organic wastes as fertilizers (ex. Coca cola liter bottle gardening)	4.2	Agree
6. Provide specific material recovery facility (MRF) in your home (ex: storage for solid wastes than can be sell like bottles and plactics)	4.7	Strongly Agree
Total	4.6	Strongly Agree

Table 2 shows that most of the statement were greater than 4.5 interpreted as strongly agree. Segration of solid wastes at home will be easier for them. Residents were also willing to cooperate in using eco bag and to practice the 3 r's (reduce, reuse and recycling). Upon interviewing the residents, they have some reservation in buying food/household needs in large quantities, since they follow their monthly budget for everything. Recreational gardening on the other hand will be a great challenge since they only have small spaces for everything. Overall the residents strongly agree in the support for the practice of solid waste management.

Another data that this study considered was the perception of the sudvivision officials in support in the practice of solid wastes management. The practice of solid waste management will be supported by authorities to maintain or sustain its effectivity. In the realization of such project, monetary support will also needed (Purdy and Sabugal, 2011). Table 3 below presents the perception of the subdivision officials in solid waste management practices.

Table 3. Solid Waste Management Practices Indicator for Subdivision Officials

Indicators	Weighted Mean	Interpretation
1. Schedule a monthly meeting with representative of each household on solid wastes management until it will become a practice	4.3	Agree
2. Minimize the collecting schedule of solid wastes into 2 times per week	4.0	Agree
3. Provide color coding solid wastes bins in every block of the subdivisions, including club house and guard house	4.3	Agree
4. Provide one big material recovery facility (MRF) inside the subdivision	4.0	Agree
5. Provide composed pit that can be used in community gardening.	3.8	Agree
6. Conduct a monthly clean-up drive in the subdivision	4.6	Strongly Agree
Total	4.2	Agree

An average of 4.2 with a verbal interpretation of agree were gathered. Among the listed statements, only statement 6 has an average

weighted mean of more than 4.5. The results were similarly accurate since, monthly clean-up was a practice in the subdivisions especially during rainy/typhoon season. A monthly meeting for solid wastes management information was difficult, since, the cooperation of many are occupied by their personal schedules. Some were disagree in minimizing the collection of solid wastes into two times a week as well as having a problem in providing composed pit and material recovery facility. Moreover, a fund generating scheme is a must to make some monetary allocation for the said needs.

Solid wastes management scheme for laguna buenavista executive homes

Based on the data presented above the new solid waste management scheme for Laguna Buenavista Executive Home were developed. Involvement of the household residents and community/ subdivision officials were emphasized.
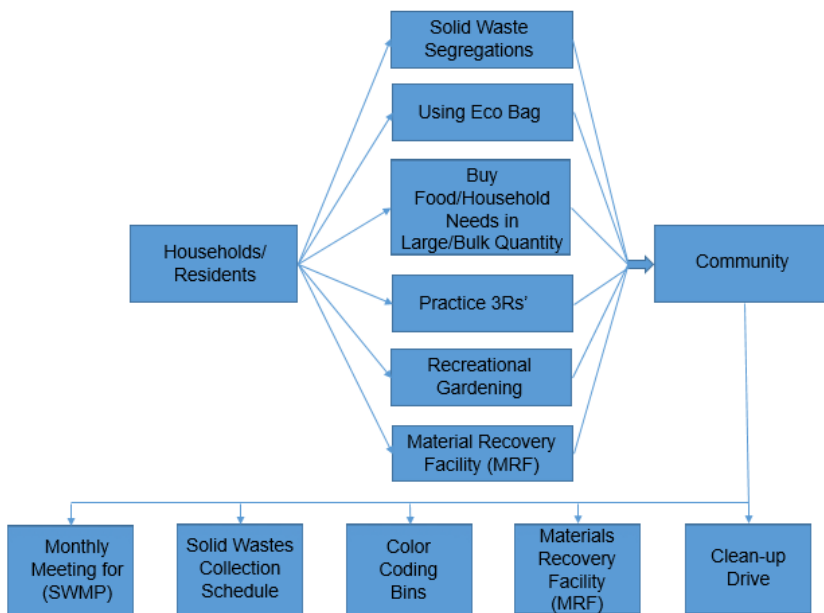

Figure 3. New Solid Waste Management Scheme for Laguna Buenavista Executive Homes

Figure 3 shows the action should be taken by the residents in order to sustain solid waste management practices. Segration of solid wastes in their respective houses before the wastes collection will make a big difference in minimizing solid wastes. In having their groceries, buying food and house hold needs in bulk or large quantities plus the use of their own eco bag will also a great keys in solid wastes management. The practice of 3Rs', reuse, reduce and recycle was the classic technique used by many were so easy to re introduce with a community with a sense of environmental sustainability like the people in the Laguna Buenavista Executive Homes. New sets of idea such as recreational gardening and providing material recovery facilty (MRF) in their respective home will be an issue yet the willingness of the residents were observed based on the average perception on their solid wastes management practices.

As the residents seems cooperating in the concept of solid waste management practices, the community, headed by the subdivision officials/home owners association leaders, must have do their part to obtain this practices. They must continue the monthly clean-up drive to sustain community awareness about cleaning their own vicinities. Visibility of the color coding bins for solid wastes segration in the community level was one of the great ideas in the practice solid waste management. Providing a huge quarter as material recovery facility inside the subdivision will be a good decision to think of, since the residents were willing to have their own MRF. In this regard, the idea of decreasing wastes collection schedule into two times a week will be possible.

Although solid wastes management practices scheme have similarities, the only thing that matters was how the people surrounded the area were cooperated (Oteng-Ababio, 2011). In relation to the people of Laguna Buenasvista Executive Homes, study found out that they were willing to participate if the implementation of the the new solid waste management scheme were introduce. Moreover, in the expense of the community, they must have some monetary funds to sustain solid waste management practices by providing them tools/facilties such as color coding bins for segration, compost pit for community gardening, and material recovey facility (MRF) for recycle and reusable solid wastes (Asase et.al 2013).

CONCLUSION AND RECOMMENDATION

The study concludes that the majority of the wastes generated in Laguna Buenavista Executive Home were mixed plastics (13.32%) and yarn wastes (12.55%). Block 3 of the the study site, located north-east side of the subdivision has the highest solid wastes generated with an estimated weight

of 10,478 grams. The total solid wastes of 29,499 grams were recorded on the three-day observation and collection in the random study sites. In the perception of the residents in the soid waste management practices indicator, most of the statement were greater than 4.5, interpreted as strongly agree. On the other hand, an average of 4.2 with a verbal interpretation of agree were gathered in the perception of the subdivision officials in the solid wastes management practices indicator. The new solid waste management scheme for Laguna Buenavista Executive Home were developed and the involvement of the household residents and community/ subdivision officials were emphasized. On the residents' level, factors such as solid wastes segration at home, using own ego bag while having groceries, buying food/household needs in bulk or large quantities, practicing 3Rs', doing recreational gardening and providing materials recovery facility were included in the new solid wastes manangement scheme. On the community level, limiting solid wastes collection in two times weekly, scheduling of a monthly meeting for solid waste management scheme and monthly clean up drive, providing color coding bins for segregation as well as major material recovery facility for community solid wastes were the factors obtained.

It was recommended that the new solid waste management will be implemented to prove its effectivity in improving solid waste disposal of the residents of Laguna Buenavista Executive Homes.

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